EXAMINING BEHAVIORAL ENGAGEMENT AND SOCIAL SKILLS AS ACADEMIC ENABLERS OF CHILDREN’S READING AND MATH ACHIEVEMENT

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EXAMINING BEHAVIORAL ENGAGEMENT AND SOCIAL SKILLS AS ACADEMIC ENABLERS OF CHILDREN’S READING AND MATH ACHIEVEMENT

By

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DOCTORAL COMMITTEE

The members of the Committee appointed to examine the Dissertation of Karissa Jensen find it satisfactory and recommend that it be accepted.

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Abstract

The importance of nonacademic skills, termed academic enablers, in facilitating and supplementing academic success is well-established (DiPerna et al., 2002; DiPerna et al., 2005). Previous investigations of academic enablers have established engagement, or the degree students interact with academic activities, and social skills, or the learned behaviors that facilitate positive interactions with others, as key to understanding the behaviors essential for academic success (DiPerna et al., 2002; Gresham & Elliott, 1984). However, less research has established the nature of the relationship between these academic enablers and reading and math achievement, especially across time. The current study aims to test the predictive relations, including the direct and indirect effects, of behavioral engagement and social skills on reading and math achievement for students in the fourth and fifth grade using a half-longitudinal design with a large longitudinal sample (N = 11,246, ECLS-K:2011). Results showed previous levels of social skills demonstrated a moderate positive effect on future levels of behavioral engagement ($\beta = 0.14$). However, the results did not show evidence for student-rated behavioral engagement predicting future levels of standardized reading or math achievement. Future researchers may examine how social skills and behavioral engagement may be associated with other important student outcomes. Further, researchers may also consider how behavioral engagement may differentially contribute to the effects of social skills on student reading and mathematics ratings compared to standardized reading and mathematics assessments. Other possible explanations and implications for future research are discussed.

Dissertation Advisor

[Signature]

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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctoral Committee</td>
<td>iii</td>
</tr>
<tr>
<td>Abstract</td>
<td>iv</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>v</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>vi</td>
</tr>
<tr>
<td>List of Tables</td>
<td>ix</td>
</tr>
<tr>
<td>List of Figures</td>
<td>x</td>
</tr>
<tr>
<td>Chapter</td>
<td></td>
</tr>
<tr>
<td>I. Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Background of the Problem</td>
<td>1</td>
</tr>
<tr>
<td>Significance of the Study</td>
<td>4</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>6</td>
</tr>
<tr>
<td>Research Questions</td>
<td>9</td>
</tr>
<tr>
<td>Limitations of the Study</td>
<td>9</td>
</tr>
<tr>
<td>Definitions of Terms</td>
<td>11</td>
</tr>
<tr>
<td>II. Review of the Literature</td>
<td>17</td>
</tr>
<tr>
<td>III. Method</td>
<td>30</td>
</tr>
<tr>
<td>Participants</td>
<td>30</td>
</tr>
<tr>
<td>Measurement Instruments</td>
<td>31</td>
</tr>
<tr>
<td>Mediation Analytic Steps</td>
<td>35</td>
</tr>
<tr>
<td>Model Fit Evaluation</td>
<td>39</td>
</tr>
<tr>
<td>IV. Results</td>
<td>42</td>
</tr>
</tbody>
</table>
Descriptive Statistics.................................................................43
Longitudinal Factorial Invariance...............................................45
Model Fit Evaluation..................................................................46
Structural Equation Model..........................................................47

V. Discussion ...............................................................................52

Research Question 1: To what extent do social skills in fourth grade
directly predict future student ratings of behavioral engagement in fifth
grade, after controlling for prior levels of behavioral
engagement?..................................................................................53

Research Question 2: To what extent do student ratings of behavioral
engagement in the fourth grade directly predict future reading and math
achievement in the fifth grade, after controlling for prior levels of
academic achievement?..............................................................54

Research Question 2a: Does behavioral engagement have stronger effects
on reading or math achievement?..................................................55

Research Question 3: To what extent do social skills in fourth grade
indirectly predict future reading and math achievement through behavioral
engagement?..................................................................................56

Research Question 3a: Do social skills show stronger direct effects or
indirect effects on reading and math achievement?.......................57

Research Question 3b: Do social skills indirectly predict performance
more strongly for reading or math achievement?...........................58

Implications for Research and Practice........................................58
Strengths of the Study.................................................................61
Limitations and Future Directions.................................................62
Conclusion.....................................................................................64

VI. References .................................................................................66
<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Item Factor Loadings, Item/Variable Means, Standard Deviations, Skew, and Kurtosis</td>
<td>43</td>
</tr>
<tr>
<td>2. Scale Intercorrelations of Predictor and Outcome Variables</td>
<td>44</td>
</tr>
<tr>
<td>3. Longitudinal Factorial Invariance Results</td>
<td>46</td>
</tr>
<tr>
<td>4. Model Fit Evaluation Results</td>
<td>46</td>
</tr>
<tr>
<td>5. Parameter Estimates for the Longitudinal SEM Model</td>
<td>49</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Reading Achievement Model</td>
<td>37</td>
</tr>
<tr>
<td>2.</td>
<td>Math Achievement Model</td>
<td>37</td>
</tr>
<tr>
<td>3.</td>
<td>Longitudinal Latent Variable Reading Model</td>
<td>50</td>
</tr>
<tr>
<td>4.</td>
<td>Longitudinal Latent Variable Math Model</td>
<td>50</td>
</tr>
</tbody>
</table>
Chapter 1

Introduction

Background of the Problem

Researchers have demonstrated the utility of multiple nonacademic skills, sometimes referred to as noncognitive skills, in improving school learning and supporting academic outcomes (DiPerna et al., 2002; Heckman & Kautz, 2012). Specifically, scholars have highlighted how educators should capitalize on these behavioral and social skills to facilitate and supplement academic instruction and interventions. Moreover, others have shown how behavioral and social skills deficits may help explain the persistent difficulties some students continue to face throughout school despite the increased focus on the development and implementation of evidence-based academic interventions (Ponitz et al., 2009). Among other school learning models, DiPerna and colleagues (2002) developed a model of these essential, nonacademic skills termed academic enablers that facilitate instruction and contribute to academic growth and success. Specifically, they identified motivation, study skills, social skills, and engagement as key influences on academic outcomes for students from kindergarten through the sixth grade (DiPerna et al., 2005). These academic enablers capture the importance of one’s willingness to do something, ability to efficiently learn new skills, capability of positively interacting with others, and active participation on academic achievement (DiPerna, 2006; Skinner & Pitzer, 2012). Subsequent research on this model has supported that increasing academic productivity relies on bolstering the development of these academic enablers (DiPerna et al., 2005; Heckman & Kautz, 2012; Wentzel, 2009). Conceptualizing student achievement with an appreciation of academic enablers offers an empirically based link between social behaviors, problem behaviors, and school success (DiPerna, 2006; DiPerna et al., 2005; Wentzel,
Thus, it is important to determine the contributions of specific academic enablers on academic achievement to promote academic success.

Prior examination of academic enablers has established engagement and social skills as key skill domains in understanding the behaviors necessary for academic success (DiPerna et al., 2002). However, less research has established the nature of the relationship between these academic enablers and reading and math achievement, especially across time. A better understanding of specific behaviors captured by social skills and engagement will provide additional insight for guiding assessment and interventions (DiPerna, 2006; Keith, 2002).

As an academic enabler, engagement is hypothesized to mediate the relationship between academic instruction and academic success (DiPerna, 2006; Reschly & Christenson, 2012). Some researchers have defined engagement as a meta construct, comprised of cognitive, behavioral, and emotional engagement (Fredericks et al., 2004; Skinner et al., 2009). Although scholars have yet to agree on specific engagement characteristics, the key descriptions of engagement often include observable behavioral terms, such as on-task behavior or participation, similar to the concept of behavioral engagement (DiPerna, 2006; Fredericks et al., 2004; Ponitz et al., 2009). These on-task behaviors often align with teachers’ behavioral expectations and can include asking or answering questions and looking at the teacher to indicate listening (Lane et al., 2009). Comparatively, researchers have defined inattention to include the behaviors indicating that students are not participating or attending and to include the passive behaviors needing prompting to communicate or to work on tasks (Finn et al., 1995). Importantly, researchers have demonstrated that students are also capable of reporting these engaged or disengaged behaviors, including whether they are attending, concentrating, participating, and/or working hard (Skinner et al., 2009). As used in the literature and in the current study, behavioral...
engagement provides an important, more tangible link, for both teachers and students, between academic instruction, participation opportunity, and student learning compared to the broader engagement meta construct (De Laet et al., 2015; Downer et al., 2007; Hughes & Kwok, 2007).

Researchers have also demonstrated social skills as a separate, but important influence on academic outcomes (Farrington et al., 2012; Malecki & Elliott, 2002; Wentzel, 1993). Social skills include the specific behaviors individuals have that allow them to effectively engage in a social task and that serve as a basis of social evaluations from others (Gresham & Elliott, 1990; Gresham & Elliott, 2008). To illustrate the relationship between social skills and academic outcomes, Malecki and Elliott (2002) found that social skills positively predicted current and future standardized academic achievement whereas problem behaviors negatively predicted current standardized academic achievement. As an academic enabler, some scholars suggest social skills indirectly influence achievement by allowing students to more successfully work with peers, ask questions, listen, and attend to the classroom environment (DiPerna et al., 2002; Farrington et al., 2012). Likewise, Caemmerer and Keith (2015) found social skills mostly demonstrated indirect effects on achievement over time. Although research appears to support social skills indirect influence on academic achievement, more longitudinal research is needed to better understand the potential mechanisms that mediate the relationship between social skills and academic achievement.

Previous research on academic enablers suggests social skills may indirectly influence academic achievement through motivation which, in turn acts on engagement and study skills to influence achievement (DiPerna et al., 2002). Beginning in early elementary, social skills may enhance students’ behavioral competencies such as peer play, participation, and cooperation (Mahatmya et al., 2012). Similar lines of research have proposed that this trend continues
through the fifth grade, as children with higher levels of behavioral engagement are likely to seek and maintain friendships with students demonstrating comparable levels of participation, cooperation, and initiation (Kindermann, 1993; Skinner & Pitzer, 2012). Others have suggested the importance of social behaviors, including rule compliance and active group membership, on facilitating learning as one works to achieve social and academic goals (Malecki & Elliott, 2002). Behaviorally, students with difficulty engaging may sometimes lack the requisite social skills to participate and achieve these goals (Mahatmya et al., 2012). Further, as students enter later elementary school, friendships begin to focus more on engaging in similar activities and on playing cooperatively with others (Mahatmya et al., 2012). Therefore, the interplay of developmentally appropriate social and behavioral skills may encourage academically oriented behavior and enable reading and math achievement. A deeper examination of the means by which behavioral engagement and social skills interact to facilitate current and future academic achievement is informative in supporting at-risk students and in developing targets for intervention for students in later elementary school. Thus, the aim of the current study is to examine how behavioral engagement and social skills facilitate reading and math achievement for students in the fourth and fifth grade.

**Significance of the Study**

The current study aims to test the predictive relations of behavioral engagement and social skills on reading and math achievement for students in the fourth and fifth grade using a half-longitudinal design. Thus, the current study offers several advantages. First, the majority of behavioral engagement research has not separated out behavioral engagement from engagement and/or motivation as an academic enabler. Moreover, these terms are often viewed as overlapping and lack a clear operational definition. The specification of behavioral engagement
may provide a more measurable indicator of student participation in learning compared to the more covert characteristics of cognitive or emotional engagement and motivation (Archambault et al., 2009; Birch & Ladd, 1997; Fredericks et al., 2004). Li and Lerner (2011) argue for parsing out behavioral engagement from school engagement to better identify the antecedents and trajectories specific to behavioral engagement and its relationship to academic achievement. Altogether, a more concrete examination of behavioral engagement may better allow for identifying specific targets for intervention.

A second advantage is the current study investigates how behavioral engagement may help predict the relationship between social skills on concurrent and subsequent academic achievement. Thus, in addition to providing a more measurable component of engagement, the present study provides intervention implications and may help inform future researchers regarding whether a separate intervention is important for both behavioral engagement and social skills or if one intervention may provide sufficient support to students’ academic achievement (Keith, 2002). To further inform the developmental nature of this relationship, the current study utilizes a half-longitudinal design with two measurement occasions to better isolate how behavioral engagement may contribute to academic achievement (Little, 2013). Comparatively, studies examining behavioral engagement and social skills with cross-sectional data lack repeated measurements over time and are less adequate in addressing questions of mediation (Little, 2013). With respect to the developmental nature of behavioral engagement and social skills, the present study highlights how an intervention targeted at one time point may influence the relationship at a subsequent time point. Thus, a better understanding of the nature of the relationship between behavioral engagement, social skills, and academic achievement will help
inform the timing of interventions as well as the importance of behavioral and social skills interventions to improve academic outcomes.

Finally, a third advantage of the current study is the use of a nationally representative sample from the Early Childhood Longitudinal Study (ECLS-K:2011) that includes sampling of children based on the 2007 census data. Although previous studies have examined behavioral engagement using the ECLS-K data, researchers have not yet examined behavioral engagement on academic achievement utilizing behavioral engagement specific measures (Reynolds, 2014; Robinson, 2013). Importantly, the present study investigates the longitudinal influence of behavioral engagement and social skills on academic achievement in fourth and fifth grade students. Therefore, the current study’s results will provide updated and specific findings that are more reflective of the nation’s demographics with regard to how behavioral engagement and social skills may influence fourth and fifth grade students’ academic achievement.

Statement of the Problem

Behavioral engagement is presumed a malleable correlate to academic achievement (Skinner & Pitzer, 2012), highlighting the need to further explore its predictors and outcomes. Although researchers have begun to demonstrate the utility of social skills on behavioral engagement, these constructs have yet to be included in the same academic achievement model. The current study aims to contribute to the literature by investigating the antecedents and consequences of behavioral engagement. Specifically, the present study tests whether behavioral engagement longitudinally mediates the relationship between social skills and reading and math achievement using the ECLS-K:2011 longitudinal data.

Researchers consistently demonstrate that behavior problems and achievement difficulties often occur with students demonstrating social problems (Algozzine et al., 2011).
Social skills are a popular construct when explaining academic achievement over time (Caemmerer & Keith, 2015; Cooper et al., 2014), but the literature is limited in identifying the behavioral mechanisms on which social skills interact to predict academic achievement (Jenkins & Demaray, 2015). Even though some have evaluated the importance of specific social behaviors in social skills development (Malecki & Elliott, 2002), there is less research linking social skills and key academic behaviors to reading and math achievement (Morrison et al., 2010). Although the literature provides some evidence that behavioral engagement may help facilitate developmental social skills milestones (Mahatmya et al., 2012) and suggests that social skills may indirectly predict academic achievement (Caemmerer & Keith, 2015; DiPerna et al., 2002), research should further specify how behavioral engagement may serve as a mediator of social skills on academic achievement.

Considering the nature of mediation, Little (2013) argues for longitudinal designs in determining the significance of the mediator on the outcome. Currently, few researchers provide longitudinal examinations of behavioral engagement on reading or math achievement (Bryce et al., 2018; Reynolds, 2013; Robinson, 2013). The lack of longitudinal research limits the ability to determine if the results indicate whether behavioral engagement influences reading and math achievement over time or if the results indicate the stable relationship between behavioral engagement and reading and math achievement (Maxwell & Cole, 2007). A deeper understanding of the developmental nature of behavioral engagement on reading and math achievement will better allow for more timely intervention and prevention strategies for at-risk students (Archambault & Dupere, 2017). Moreover, this study seeks to add to the literature in examining how behavioral engagement and social skills may differentially predict reading and math achievement. This examination will provide a helpful first step for researchers to better
employ nonexperimental research to determine if separate interventions, targeting behavioral engagement and social skills, are required for reading and math achievement, or if one intervention will sufficiently improve outcomes in both domains.

With respect to Niemiec and Ryan’s (2009) conceptualization of how meeting students’ basic intrinsic social needs provides students with motivation to actively engage within that context, findings from the current study are hypothesized to indicate children with higher levels of social skills in the fourth grade will demonstrate higher levels of behavioral engagement in the fifth grade, after controlling for prior levels of behavioral engagement. In further support, evidence suggests that social skills are foundational to competence in the surrounding academic environment, including following classroom rules, asking for help, and cooperating with teachers and peers (Lane et al., 2004). Behavioral engagement, which includes attention, involvement, and persistence, is a well-established, necessary component of classroom learning (Downer et al., 2007; Skinner & Pitzer, 2012). Thus, an outcome of the present study is hypothesized to show students demonstrating higher levels of behavioral engagement in the fourth grade to demonstrate higher academic achievement in the fifth grade, after accounting for prior levels of academic achievement. Relatedly, behavioral engagement is expected to have stronger effects on reading achievement than math achievement. Evidence suggests that similar constructs such as approaches to learning, work-related skills, and behavioral regulation demonstrate a stronger relationship to reading achievement than math achievement (Bodovski & Youn, 2011; Matthews et al., 2009; Montroy et al., 2014). Therefore, it is expected that behavioral engagement, which similarly captures these constructs, will demonstrate a stronger relationship to reading achievement compared to math achievement. Finally, it is hypothesized that increased behavioral engagement will serve as a mediator for social skills on both reading and math achievement in
the fourth and fifth grade. Given the social context of learning (Mashburn & Pianta, 2006), the data suggest that behavioral engagement allows children to interact with others and leads to higher academic achievement (Bronfenbrenner & Morris, 2006). Specifically, behavioral engagement provides competence in the immediate context, allowing for social skills to act on academic achievement (Gresham et al., 2010; Lane et al., 2004; Li & Lerner, 2011). Similarly, research suggests that social skills most often contribute indirectly to academic achievement (Caemmerer & Keith, 2015; DiPerna et al., 2002). Therefore, social skills are predicted to show stronger indirect effects, through behavioral engagement, on academic achievement. This study aims to address the following research questions:

**Research Questions**

1. To what extent do social skills in fourth grade directly predict future behavioral engagement in fifth grade, after controlling for prior levels of behavioral engagement?
2. To what extent do student ratings of behavioral engagement in fourth grade directly predict future reading and math achievement in fifth grade, after controlling for prior, respective levels of reading and math achievement?
   a. Does behavioral engagement have stronger effects on reading or math achievement?
3. To what extent do social skills in fourth grade indirectly predict future reading and math achievement in fifth grade through behavioral engagement?
   a. Do social skills show stronger direct effects or indirect effects on reading and math achievement?
   b. Do social skills indirectly influence performance more strongly for reading or math achievement?
Limitations of the Study

The current study is associated with several limitations. First, the present study examines one component of engagement and omits two other known components of engagement, such as cognitive and emotional engagement (Fredericks et al., 2004). Conceptually, cognitive and emotional engagement provide additional insight into students’ internal reactions and investments in learning (Connell & Wellborn, 1991; Reschly & Christenson, 2012). Although the current study focuses on action-oriented behaviors, these overt behaviors do not occur in isolation from cognitive and emotional engagement and examining one type of engagement may neglect the additive and interactive effects of cognitive and emotional engagement on achievement (Fredericks et al., 2004; Reschly & Christenson, 2012). Keith (2019) refers to the exclusion of these relevant, important variables as omitted-variable bias. Omitted-variable bias occurs when another known variable, such as emotional engagement, is correlated with the dependent variable (i.e., academic achievement) and at least one of the independent variables (i.e., behavioral engagement). Omitting other important variables may overestimate or underestimate the results and limit the generalization of the findings (Keith, 2019).

Similarly, the current study’s definition of behavioral engagement aligns with the ECLS-K:2011 adaptation of Skinner and colleagues’ (2009) measurement definition of behavioral engagement. As a result, this measure may omit other important indicators of behavioral engagement. For example, some measures of behavioral engagement include measures of conduct, such as homework completion and rule compliance (Birch & Ladd, 1997; Finn et al., 1995) or self-reliance (Guo et al., 2014). Researchers have demonstrated how these variables overlap with other empirically supported student variables on learning, such as motivation (DiPerna et al., 2002). Likewise, the current study has adapted Gresham and Elliott’s (1990)
operative definition of social skills and does not include other factors of social skills, such as prosocial or aggressive behaviors.

Finally, the present study is limited to the data provided by the ECLS-K:2011. As a result, the current study examines the fourth and fifth grade dataset and does not test how the relationship between social skills and behavioral engagement develop in early elementary school. Consequently, the present study is not able to explore the patterns of behavioral engagement and social skills continuity in the early elementary grades and determine how these patterns relate to achievement. Additionally, the data analyzed were collected from different informants, including the teacher and child, but does not include parent ratings. Specifically, this study utilizes teacher-reported social skills and child-reported behavioral engagement skills. However, teachers and students demonstrate modest congruence on ratings of behavioral engagement (Fredericks et al., 2004). Similarly, the literature suggests that teacher-reported social skills do not significantly differ from child-rated or parent-rated social skills (Gresham et al., 2010) and may provide a more valid estimate of students’ social skills (Konold et al., 2010). Likewise, the present study explores the effect of behavioral engagement and social skills on standardized reading and math test scores and does not explore the effects on classroom grades. Nevertheless, some researchers have suggested that teachers may reward positive behaviors and social skills when assigning grades (Farrington et al., 2012), suggesting that standardized test scores may provide a more accurate reflection of the effect of social skills and behavioral engagement on reading and math achievement.

Finally, the present study does not incorporate random assignment, control groups, or manipulation of behavioral engagement or social skills. Therefore, the current study is considered nonexperimental, and the interpretation of the results are limited to the effects
described within the SEM models. However, the longitudinal SEM is better equipped to inform questions of mediation compared to cross-sectional designs (Little, 2013).

**Definition of Terms**

**Academic enablers.** Academic enablers complement and support academic skills, such as the discrete and complex skills focused on during instruction, to incorporate the behaviors and attitudes beyond academic competence and skill proficiency, that allow the student to capitalize on classroom instruction (DiPerna et al., 2002). These skills, attitudes, and behaviors, or lack thereof, work to either enhance or inhibit academic instruction (DiPerna, 2006). Academic enablers provide similar constructs to the approaches to learning model and learning-related skills framework (McClelland & Morrison, 2003; McDermott, 1999). However, academic enablers are differentiated from similar constructs to include the attitudes and behaviors of interpersonal skills, motivation, engagement, and study skills (DiPerna & Elliott, 2002).

**School engagement.** Engagement is a multi-faceted construct, often broadly defined as the degree to which students interact, connect, and identify with academic and nonacademic activities, people, and goals (Audas & Willms, 2001; Russell et al., 2005). Further, these fundamental characteristics of engagement are often described as the outward manifestation of motivation (Skinner et al., 2009). Moreover, researchers often describe school engagement as including the behavioral interaction with instructional activities (Skinner et al., 2009), the value and emotional reaction to people and events within the goal (Appleton et al., 2008), and the effort expended, and strategies used to complete different tasks and to achieve different goals (Marks, 2000). Compared to the academic enabler research, engagement is sometimes interchanged with attention/persistence and completion of tasks (McClelland & Morrison, 2003; McDermott, 1999). Specifically, researchers have asserted that school engagement provides the
link between what is taught and the skills that are acquired (Skinner et al., 2009; Skinner & Pitzer, 2012). Given the multifaceted nature, researchers have highlighted that school engagement is best defined when distinguished as part of a three-component model to include cognitive engagement, behavioral engagement, and emotional engagement (Appleton et al., 2008; Fredericks et al., 2004; Wang & Eccles, 2012).

**Engagement versus motivation.** Motivation is often defined in terms of students’ actions, quantity and quality of work, and comments to highlight their value of academic work (Griffiths et al., 2012). Specifically, motivation is the intrinsic goal-directed manifestation of engagement (Connell & Wellborn, 1991; DiPerna, 2006; Skinner & Pitzer, 2012). Others describe motivation as overlapping the cognitive and emotional engagement construct to include investment, interest, and value of learning (Fredericks et al., 2004). Altogether, researchers differentiate engagement from motivation in that engagement captures the idea of the overt, directed interactions with different academic and nonacademic tasks while motivation is the covert intent of behaviors (Skinner & Pitzer, 2012).

**Cognitive engagement.** Cognitive engagement refers to the internalized, strategic interaction and investment in learning (Connell & Wellborn, 1991; Fredericks et al., 2004). Some scholars define cognitive engagement in terms of utilization of different problem-solving strategies, critical thinking, and other internal self-regulation processes (Fredericks et al., 2004; Skinner & Pitzer, 2012). Students exhibiting higher levels of cognitive engagement are often described to exhibit flexible problem-solving, preference for hard work, autonomy in work, and active coping with failure (Connell & Wellborn, 1991; Fredericks et al., 2004). On the other hand, students with lower levels of cognitive engagement may exhibit indifference to failure and a dependence on others in task completion (Connell & Wellborn, 1991).
**Emotional engagement.** Emotional engagement, also referred to as affective engagement, refers to the student’s emotional responses to class, school, and academic activities (Fredericks et al., 2004). Specifically, these emotional responses, including interest and enthusiasm, help facilitate task completion (Reeve, 2012). Students exhibiting higher levels of emotional engagement demonstrate enjoyment of school activities, understand the importance and value of doing well, and consider the cost of engaging in specific academic activities (Connell & Wellborn, 1991; Fredericks et al., 2004). Conversely, students demonstrating low levels of emotional engagement may demonstrate boredom, discouragement, and sadness with academic activities (Connell & Wellborn, 1991).

**Behavioral engagement.** Behavioral engagement is the observable, action-oriented, manifestation of student participation in learning, including effort and concentration, in both academic and nonacademic activities (Birch & Ladd, 1997). Some researchers have expanded upon this definition to include complying with rules, displaying positive conduct, demonstrating on-task behavior, asking questions, and persisting in difficult tasks (De Laet et al., 2015; Fredericks et al., 2004; Skinner et al., 2009). At its core, researchers have indicated behavioral engagement is the threshold required for learning as it captures the idea of involvement, attention, and self-reliance (Finn & Zimmer, 2012; Guo et al., 2014; Ponitz et al., 2009).

The current study will utilize Skinner and colleagues’ (2009) definition of behavioral engagement to include attention, effort, participation, and initiation in learning activities. Other researchers may describe similar behaviors in relation to on-task behaviors, participation, and academic behavior (McClelland & Morrison, 2003; McDermott, 1999), but behavioral engagement is used in this study with the goal of examining the integration of these observable, behavioral components. Behavioral engagement also extends to various social school tasks,
including interacting with teachers, following rules, and not disrupting class (Finn & Zimmer, 2012). Although each component of school engagement is necessary for academic success, scholars posit that behavioral engagement is an outward expression of cognitive and emotional engagement (Archambault et al., 2009). Similarly, some definitions of engagement ascribe to the definition of behavioral engagement, with measurement of observable behaviors, self-control, and participation in learning activities (Ponitz et al., 2009).

**Social skills.** Social skills are the specific typology of learned behaviors individuals demonstrate to effectively engage in a social task, including building friendships, engaging in conversations, and playing games (Gresham & Elliott, 1990; Malecki & Elliott, 2002). Others have also defined social skills in terms of peer relations, self-management, compliance, and assertion (Caldarella & Merrell, 1997). Additionally, others have behaviorally defined social skills to include the interpersonal verbal and nonverbal responses that provide children with the ability to adapt to changes in their environments (Matson et al., 2007). These skills are utilized to achieve social competence, peer acceptance, academic proficiency, increased self-esteem, and psychological adjustment (Elliott et al., 2001; Gresham et al., 2011). Social skills are differentiated from the broader construct of social competence, a multidimensional, umbrella term, to include different behavioral skills and cognitive and emotional adjustment components that facilitate positive social outcomes (Wentzel, 2015). Although related, social skills are theoretically considered subordinate to social competence and provide the basis of social evaluations from those in the surrounding environment (Gresham & Elliott, 2008). For example, a student is viewed as competent if he or she demonstrates valued social skills like sharing or helping others (Wentzel, 2015). As an academic enabler, social skills are documented to include
cooperating with teachers and peers, following classroom rules, responding appropriately to conflict, and asking for help (Gresham, 2016; Gresham et al., 2011).

Further, social skills are differentiated from interfering problem behaviors, including noncompliance or uncooperating behaviors, that prevent positive social behavior and result from a lack of self-control (Elliott et al., 1988). These interfering problem behaviors reduce the likelihood of learning and/or performing social skills (Gresham et al., 2010). Similarly, researchers often describe social skills as complementary to one’s self-control, or the regulatory behaviors and emotions that allow for positive social interactions (Cooper et al., 2014), highlighting the importance of children’s behavioral competencies on social skills. The current study will utilize Gresham and Elliott’s (1990) comprehensive definition of social skills to include assertion, cooperation, empathy, and self-control.

**Early Childhood Longitudinal Study, Kindergarten Class of 2010-2011.** The Early Childhood Longitudinal Study, Kindergarten Class of 2010-2011 (ECLS-K:2011) is a longitudinal study, following children from kindergarten through the fifth grade, from Fall 2010 through Spring 2016. The study is comprised of a nationally representative sample of children across the United States. The ECLS-K:2011 study provides information on children’s cognitive, social, emotional, and physical development, their home and school environments, and their parent and teacher characteristics. This study allows for examinations of how different child, parent, and teacher characteristics contribute to future development and achievement.
Chapter 2

Review of the Literature

This literature review examines multiple factors related to behavioral engagement, academic achievement, and social skills. First, this review explores the evidence to examine behavioral engagement as a separate construct from school engagement and the rationale to study behavioral engagement in relation to academic achievement. Next, this review will assess the available evidence in support of the relationship between social skills and academic achievement. Finally, the review will examine how social skills and behavioral engagement are related.

Behavioral Engagement

Scholars have examined the utility of partitioning the multidimensional construct of school engagement into more specific constructs of behavioral, emotional, and cognitive engagement (Fredericks et al., 2004; Guo et al., 2014; Skinner et al., 2009). Although these components are related and interactive, specifying the type of engagement helps mitigate some conceptual confusion and provides variable specific antecedents and consequences (Fredericks et al., 2004; Li & Lerner, 2011; Wang & Eccles, 2012). For example, a narrower examination of behavioral engagement provides insight into the specific contributions of behavioral engagement on reading and math achievement that may otherwise be masked when using nonspecific measures of engagement (Eccles & Wang, 2012). Additionally, examining behavioral engagement decreases the reliance on inferring students’ internal thoughts and feelings, such as the reliance required for teacher reports of cognitive and emotional engagement (Appleton et al., 2008; Bulotsky-Shearer & Fantuzzo, 2011; Skinner et al., 2009). Although these processes are related, the literature suggests that each type of engagement has a unique developmental pattern.
and differentially contributes to academic achievement (Li & Lerner, 2011; Wang & Eccles, 2012). Therefore, researchers should individually examine the unique contributions of the different types of engagement to better understand academic performance and inform the tools and interventions required for at-risk students.

Previous scholars have identified how behavioral, cognitive, and emotional engagement differentially develop and influence academic outcomes (Li & Lerner, 2011; Li et al., 2010; Mahatmya et al., 2012). Given this developmental process of engagement, scholars often examine behavioral engagement in elementary students and examine cognitive and emotional engagement in older students (Gregory et al., 2014; Guo et al., 2014; Ponitz & Rimm-Kaufmann, 2011). Similarly, behavioral engagement in early childhood may provide the foundation for further development of cognitive and emotional engagement at later developmental periods (Li et al., 2010). Additionally, others have suggested that examining emotional and cognitive engagement on academic achievement may be more appropriate for older students with better developed prefrontal cortexes and limbic systems (Mahatmya et al., 2012).

Behavioral engagement is an established and empirically validated construct important for academic achievement and future success. Specifically, behavioral dispositions such as attention, self-regulation, and self-reliance are key to learning and succeeding in school (Finn, 1993; Finn & Zimmer, 2012). The importance of examining the differential influence of each type of behavioral engagement at key developmental periods is well established (Bryce et al., 2019; Li & Lerner, 2011; Mahatmya et al., 2012). Developmentally, behavioral engagement may serve as an important, supplemental indicator of achievement as students progress through elementary school given teachers’ increasing expectations for students’ mastery of basic reading and computational skills (Bryce et al., 2019). Beginning with school entry, attendance,
timeliness, attention, and task-completion are foundational to achieving and maintaining positive school outcomes (Finn, 1993). These foundational characteristics are likely related to the behavioral mechanisms needed to actively attend to and concentrate on various learning opportunities to acquire different skills (Downer et al., 2007; Greenwood et al., 2002; Skinner & Pitzer, 2012). Further, researchers have identified behavioral engagement as a protective factor against school dropout across genders, socioeconomic status, and different school sizes (Archambault et al., 2009; Reschly & Christenson, 2012).

During early to middle childhood, students are tasked with cooperating with rules, mastering peer play, and maintaining focus and attention throughout the school day (Bryce et al., 2019). Further, as students age, these behavioral expectations expand to include more active involvement and participation, such as asking questions or asking for help (Finn, 1993; Lane et al., 2003). These congruent, developmental tasks require children to incorporate and integrate each of these skills within the classroom setting to take advantage of the learning experience (Greenwood et al., 2002). However, researchers have also noted a developmental decline in behavioral engagement (Li & Lerner, 2011; Wang & Eccles, 2011). According to stage-environment fit theory, as students progress through schooling the potential for misalignment between their social-emotional needs and the school context could result in decreased academic participation and performance (Eccles & Roeser, 2009). Although some have noted a decline in behavioral engagement beginning as early as fifth grade (Li & Lerner, 2011), others have found this decline begins later in seventh grade (Wang & Eccles, 2011). Despite the differences in the reported declines, the associated decline with students’ GPA remained consistent (Li & Lerner, 2011; Wang & Eccles, 2011). Fortunately, intervening early to help children develop more stable
patterns of behavioral engagement during elementary school may help facilitate future academic achievement (Ladd & Dinella, 2009).

Likewise, these behavioral engagement dispositions may prove especially useful in determining interventions for students at risk of academic failure, given that behavioral problems and academic problems often co-occur (Skinner & Pitzer, 2012). Problem behaviors, or off-task behaviors, are considered risk factors to poorer academic outcomes including low academic achievement, low test performance, and school dropout (Fall & Roberts, 2012; Finn & Zimmer, 2012). These competing problem behaviors are inversely related to students’ level of engaged behaviors (Greenwood, 1991). To that point, Finn (1993) found at-risk students demonstrated lower levels of attendance, preparation, and participation and demonstrated higher levels of problem behaviors. Further, students with lower levels of participation are likely to see decreased academic performance including in reading and math (Finn et al., 1995, Wang & Eccles, 2011). The effects of poor task engagement help persistently explain the likelihood of later reading difficulties, after controlling for prior reading difficulties (Morgan et al., 2008). Logically, researchers highlight students are not able to learn when they are not attending, participating, and/or cooperating (Algozzine et al., 2011; Valiente et al., 2008).

Alternatively, poor academic performance is often proposed as a cause of poor behavior, including poor task engagement and poor self-control (Morgan et al., 2008). For example, students demonstrating difficulty in reading or mathematics may become more frustrated, have greater difficulty attending to the lesson, and may avoid the subject altogether (Metsapelto et al., 2015; Miles & Stipek, 2006). Importantly, these task-avoidant behaviors such as lack of focus, persistence, and initiation are found to mediate the relationship between externalizing problems and low academic performance (Metsapelto et al., 2015). Taken together, other scholars have
highlighted the negative feedback cycle between low academic achievement and problem behaviors (Morgan et al., 2008).

However, promoting behavioral engagement including providing increased opportunities to respond, response feedback, and reinforcement has been demonstrated to promote learning (Greenwood, 2002; Gregory et al., 2014). For example, Gregory and colleagues (2014) demonstrated the importance of targeting instructional formats and increasing student involvement on increasing behavioral engagement. In a similar vein, Greenwood (2002) validated the importance of increased opportunities to respond on promoting behavioral engagement and academic achievement and decreasing problem behaviors. Thus, the relationship between behavioral engagement and academic achievement highlights a key mechanism for intervention.

**Behavioral engagement and reading achievement.** The acquisition of reading skills in early childhood is essential to the trajectory of future academic success (Duncan & Magnuson, 2014). Although high-quality core instruction is necessary for this literacy achievement, children also need to attend, concentrate, and participate to receive the greatest benefit in the learning experience (Downer et al., 2007; Greenwood et al., 2002). Researchers have identified these key, impactful behaviors as predictive of literacy, reading competence, and reading comprehension scores (Guthrie et al., 2012; Lee, 2014). Additionally, behavioral engagement is not only key to basic reading skills acquisition but also necessary as students read to learn (Kendeou et al., 2007). Behavioral engagement may also mediate the relationship between students’ sense of belonging, student-teacher conflict and classroom quality on basic reading skills (Bryce et al., 2019; Lee, 2014; Ponitz et al., 2009). Similarly, teacher ratings of these behavioral skills are predictive of reading skills throughout elementary school, beyond the contribution of different
reading interventions (Reynolds, 2014). Specifically, increased time spent responding and interacting during instruction is related to greater reading gains for at-risk students (Wanzek et al., 2014). Comparatively, students with behavioral difficulties may struggle to make reading gains at the same rate as students without behavioral difficulties (Georges et al., 2012). Thus, behavioral engagement may provide a key component of successful reading outcomes.

**Behavioral engagement and math achievement.** Research examining the relationship between behavioral engagement and math achievement is sparse. Recently, Putwain and colleagues (2018) found behavioral engagement predicted teacher-reported measures of mathematics achievement after accounting for previous levels of achievement. Further, Luo and colleagues (2009) clustered students into engagement subtypes, noting significant group differences with students considered behaviorally engaged scoring higher on standardized measures of math achievement compared to students considered enthusiastically engaged. Behavioral engagement may also prove important in understanding the link between student-teacher conflict, instructional support, and math achievement (Bryce et al., 2019). Researchers have demonstrated behavioral self-regulation skills such as attention, inhibition, and working memory predict gains in math skills (Georges et al., 2012; Matthews et al., 2009; Montroy et al., 2014). To this point, Robinson and Mueller (2014) created a behavioral engagement composite from items on the Approaches to Learning Scale using the ECLS-K dataset and demonstrated the importance of task persistence, attention, and independent work on math achievement growth in kindergarten. Others have demonstrated the importance of early elementary persistence and attention on continued mathematics gains for students of different race/ethnicity and socioeconomic status (Li-Grining et al., 2010). On another behavioral domain, Bramlett (2000) found a significant relationship between task-persistence, math problem solving, and math
calculation. Although data is limited regarding the specific contributions of behavioral engagement on mathematics achievement, research suggests that behavioral engagement may provide an important link to successful mathematics outcomes.

**Social Skills**

Social skills warrant considerable attention in the examination of children’s psychosocial, behavioral, and academic outcomes. Growing bodies of research continue to support the effect of students’ social skills, including positive peer and teacher-student interactions and competent social behaviors, on their academic achievement (Gresham, 2016). Much of the research examining social skills and academic achievement appears to focus on the relationship between social skills and literacy development or on the relationship between social skills and academic achievement composites (Durlak et al., 2011). As an academic enabler, researchers have suggested that the ability to utilize appropriate social skills including asking for help, cooperating with peers and teachers, and following classroom rules allows students to capitalize on instruction (DiPerna et al., 2002; Farrington et al., 2012). Within the classroom environment, these valued social skills are a key component and allow students to engage in reciprocal positive interactions with teachers and other students (Brofenbrenner & Morris, 2006; Elliott et al., 2001). This empirically based link between social skills and academic achievement is founded on the idea that social skills allow children to learn through engaging, listening, and observing their peers (Bandura, 1987; Vygotsky, 1978). Taken together, the literature suggests social skills indirectly influence student achievement.

Children who are able to effectively and appropriately use social skills are more likely to receive positive feedback and avoid undesirable responses from others (Gresham & Elliott, 1990). Additionally, teachers often identify cooperation and self-control as valued more than
assertion across grade levels (Lane et al., 2003; Lane et al., 2004; Meier et al., 2006). Further, teachers may reward these valued social skills with higher classroom grades while poorer social skills and behaviors lead to poorer classroom grades (Farrington et al., 2012). It is likely teachers and peers perceive these social skills as promoting a positive classroom environment, while problem social behaviors are perceived as disrupting learning (Wentzel, 2009). Students who are better able to interact with others have more resources to benefit from the learning environment compared to students who struggle to cooperate with peers and teachers (Denham & Brown, 2010). Similarly, peers provide each other with implicit and explicit social rules that are often considered criteria for friendships and are predictive of perceived academic competence (Kwon et al., 2012). Additionally, Caemmerer & Keith (2015) noted a bidirectional relationship between social skills and academic achievement and suggested that low achieving students may also struggle with behaving appropriately in the classroom and getting along with their peers. This observed bidirectional relationship suggests that teacher and peer feedback help shape and reinforce children’s social skills and behaviors.

Conversely, students with social skills deficits are at risk for adjustment difficulties, academic struggles, and vocational skills deficits (Elliott et al., 1988, Malecki & Elliott, 2002). Additionally, teacher and peer ratings of social skills deficits are predictive of learning problems group membership (Del Prette et al., 2012). Others have named these social skills deficits as problem behaviors and academic disablers to describe the negative impact of these deficits on academic achievement (Gresham et al., 2010; Gresham, 2016). These behaviors can include defiance, aggression, and noncompliance (Gresham et al., 2010). Researchers have also provided performance deficits, resulting from the students’ lack of motivation, are more common than acquisition deficits, resulting from a lack of knowledge (Gresham et al., 2010). Further,
performance deficits were much more common during elementary school than later adolescence (Gresham et al., 2010). A better understanding of the type of behavior deficit, including the mechanisms involved, provides insight into prevention and intervention efforts that will result in the best treatment outcomes (Gresham & Elliott, 1990, 2008; Gresham et al., 2010). For example, students with acquisitions deficits would require direct instruction to teach students how to ask for help or to cooperate more effectively with peers (Gresham, 2016). Altogether, the literature suggests that social skills are important in learning and warrant a deeper understanding of how schools can best target these skills for interventions.

Given the importance of social skills on academic achievement, researchers have also examined the utility of targeted interventions on social skills. The data support social skills intervention programs in promoting and generalizing prosocial behavior for students with and without emotional and behavioral disorders (Durlak et al., 2011; Farrington et al., 2012). Social skills intervention programs have also demonstrated value in facilitating academic outcomes (Durlak et al., 2011; Sklad et al., 2012). Researchers have further noted that the most effective social skills intervention programs are those that target and build on behavioral skills (Farrington et al., 2012; Gresham, 2016). Altogether, the literature highlights the importance of, and value placed on appropriate social skills, but the literature is less clear on the specific behavioral mechanisms that facilitate social skills effect on reading and math achievement.

**Social skills and reading achievement.** The importance of social skills on future reading achievement is well-established (Caemmerer & Keith, 2015; Cooper et al., 2014). However, some researchers have noted that social skills do not significantly predict later reading achievement (Claessens et al., 2006; Duncan et al., 2007). Comparatively, the most common research highlights how students with greater social competencies demonstrate higher reading
grades (Elias & Haynes, 2008; Jenkins & Demaray, 2015), higher standardized test scores (Malecki & Elliott, 2002), and greater literacy gains (Montroy et al., 2014). In the early grades, social skills may provide students with support in vocabulary development and reading comprehension (Sparapani et al., 2018). As an academic enabler, DiPerna and colleagues (2002) found interpersonal skills demonstrated a small, consistent effect on concurrent reading competence. Additionally, empirical evidence suggests that social skills may serve as a protective factor for students with early academic difficulties through later elementary school (Cooper et al., 2014). Some suggest that children’s ability to interact with their teachers facilitates positive attention and opportunities to make reading gains (Denham & Brown, 2010).

**Social skills and mathematics achievement.** Although some researchers highlight the effectiveness of cooperative, peer learning approaches (Fuchs et al., 2001; Greenwood et al., 1989) with classroom instruction and math interventions, the literature is much more limited in examining how social skills facilitate positive math outcomes. Different social skills, such as perspective taking and observing others, may help children consider different math reasoning and problem-solving strategies (Kilpatrick et al., 2001; Zeuli & Ben-Avie, 2002). In support of social skills on math achievement, Malecki and Elliott (2002) found a significant relationship between teaching ratings on the Social Skills Rating System and math achievement. Similarly, as an academic enabler, DiPerna and colleagues (2005) found a small effect of social skills on math achievement. These researchers asserted that social skills indirectly influenced math achievement through motivation (DiPerna et al., 2005). Relatedly, others have found teacher and peer-rated social acceptance, prosocial behavior, and peer status is related to math grades (Deroiser & Lloyd, 2011; Wentzel, 1993). Interestingly, Bodovski and Youn (2011) found a small negative relationship between first grade interpersonal skills and fifth grade math achievement.
Altogether, social skills appear to relate to mathematics outcomes, but more research is needed to better determine the direction of effect between these two variables.

**Social Skills and Behavioral Engagement**

Behavioral engagement may provide an important mechanism in understanding the relationship between social skills and academic achievement. As children enter early adolescence, they are increasingly expected to demonstrate self-directed behavioral engagement including sustaining attention, cooperating and participating with teachers and peers, and maintaining appropriate activity level (Bryce et al., 2019; Lane et al., 2004). More specifically, children are expected to demonstrate the key indicators of behavioral engagement (e.g., attention, effort, and participation) to facilitate appropriate interaction such as initiating a conversation, taking turns with peers, and attending to social cues within the classroom environment (Gresham et al., 2010; Linnenbrink-Garcia et al., 2011; Pekrun & Linnenbrink-Garcia, 2012). Other scholars have proposed children seek out cooperative and helpful friends to ensure the greatest benefit (e.g., doing well on assignments, having fun) while minimizing consequences (e.g., punishment, doing poorly on assignments) (Ladd et al., 1999). To this point, children with more reciprocal peer relationships were more likely to demonstrate greater behavioral engagement in academic tasks (Cappella et al., 2013; Kindermann, 1993).

Conversely, competing problem behaviors such as defiance, noncompliance, inattention, and disengagement, can inhibit social skill performance (Gresham & Elliott, 1990) and academic achievement (Malecki & Elliott, 2002; Metsapelto et al., 2015). Students with limited participation, effort, and attention may appear withdrawn from their learning and social activities and may miss out on academic and social benefits (Skinner et al., 2009). Moreover, problem behaviors and social skills deficits may result in lower grades (Farrington et al., 2012), greater
difficulties relating with peers (Ladd et al., 1999; Skinner et al., 2009), and less supportive teacher-child relationships (Skinner et al., 2009). Therefore, behavioral engagement may either serve as an enabler or disabler of social skills effects on academic achievement.

Rationale

The present study plans to examine how behavioral engagement and social skills act as academic enablers for reading and math achievement using the ECLS-K:2011 data. Although some studies examine behavioral engagement in targeted populations, the ECLS-K:2011 data was used in the current study to increase the external validity and to provide a more representative estimate of the nation’s demographics. Additionally, the ECLS-K:2011 provides the benefit of incorporating empirically validated measures of social skills and behavioral engagement to better allow for future researchers to replicate results and compare results with different constructs. Although some have begun to examine how behavioral engagement may enable social skills development (Mahatmya et al., 2012), researchers have yet to examine how behavioral engagement may serve as a mediator of social skills on academic achievement. Additionally, other researchers have examined the importance of behavioral engagement in early elementary school, with greater teacher-directed learning, but have not examined the relationship between behavioral engagement and achievement in later elementary school as students are increasingly expected to engage in more self-directed learning (Mahatmya et al., 2012). A deeper understanding of the nature of the relationship between behavioral engagement and social skills will help inform future researchers and education professionals if, and when, timely, separate interventions are required for behavioral engagement and social skills or if one intervention is sufficient to enable positive student outcomes (Keith, 2002). Moreover, the present study seeks to add to the current literature by exploring how behavioral engagement and social skills
differentially predict reading and math achievement for students in the fourth and fifth grade. Although researchers have begun to demonstrate the importance of various behavioral engagement and social skills indicators on reading and math achievement, the opportunity to understand whether these specific academic enablers better predict reading or math achievement, remains. Specifically, if findings suggest behavioral engagement and social skills predict reading and/or math achievement, intervention researchers may find a benefit from incorporating these enablers in the intervention. Additionally, researchers can utilize this information to consider how students may benefit from monitoring strategies related to attention, task persistence, asking for help, and cooperating with their peers and teachers. To the researcher’s knowledge, a longitudinal examination of the predictive relation between behavioral engagement and social skills on academic achievement is absent from the literature.
Chapter 3

Method

Participants

The current study utilized data from the ECLS-K:2011 fourth and fifth grade public use longitudinal dataset, sponsored by the U.S. Department of Education National Center for Education Statistics (NCES). This dataset included a nationally representative sample of children, beginning in kindergarten (2010-2011) through fifth grade (2015-2016). Children were selected for inclusion in the ECLS-K:2011 using a multistage probability sampling design, from schools with targeted population sizes from counties or groups of counties preselected as primary sampling units. Additionally, children were sampled by clusters in as few schools as possible to achieve precise estimates while minimizing cost. The overall sample included a total of 18,174 children from 968 schools. Demographics reported in the sample were comprised of students from each census region. Participants included White (47.7%), Hispanic (25.27%), Black (13.18%), Asian (8.5%), American Indian or Alaska Native (0.92%), Native American/Other Pacific Islander (0.64%), and a group who identified with two or more races (4.6%) or unknown (0.24%).

Procedure. The current study used secondary data collected from direct child assessments, teacher reports, and student self-reports across two rounds of data collection, in spring 2015 and spring 2016. The ECLS-K:2011 data is made publicly available and is sponsored by NCES within the Institute of Education Sciences of the U.S. Department of Education. The ECLS-K:2011 provides measures of children’s early social, educational, and learning experiences. The complete list of measures used are publicly available on the ECLS-K website (https://nces.ed.gov/ecls/kindergarten2011.asp). The data were obtained directly from
The assessment items described below were reviewed for inclusion by an expert panel (Tourangeau et al., 2019). The assessment reliability statistics were acquired from either the ECLS-K:2011 User’s Manual for the public version of the ECLS: K-2011 Fifth-Grade Data File (Narjarian et al., 2020) or from the instruments’ technical reports.

The fourth and fifth grade data comprised information from children, parents, classroom teachers, special education teachers, and school administrators. Prior to the fourth and fifth grade data collection, team leaders and assessors were trained in the parent interview, child assessment, and child-questionnaire. Beginning in the third grade, data were collected each spring. Students were directly assessed by a trained assessor in reading and math and by a self-administered questionnaire on a laptop. The self-administered questionnaire included a software system that read the instructions and questionnaire items to the student as the student had the option to read the question on the screen. Children selected responses on the touch screen of the laptop.

**Measurement Instruments**

**Cognitive assessments.** The content coverage of the reading and math assessments were designed by an expert panel to represent important knowledge and skills students acquire throughout elementary school. The panel determined the emphasis given to the different content categories to align with curriculum standards. During the first stage of assessment, children were provided with a routing assessment and tested on items with a broad range of difficulty to determine the level of difficulty the student would receive during the second stage of assessment. The reading and math scores of individuals and groups were calculated using item response theory (IRT). IRT calculates scores on the same scale within each domain despite students receiving and answering different questions. As part of IRT, the expert panel determined the test items were unidimensional and dependent on the student’s underlying measured ability, within
the reading or math domain. Similarly, IRT evaluates the item quality using the probability of students correctly answering an item given their ability estimate. IRT allows test developers to calculate and adjust the probability students with lower ability will correctly guess more difficult questions. IRT also lends to longitudinal measurement of achievement growth despite differing assessment items and levels at each assessment period. Additionally, the cognitive assessment items were scored either correct or incorrect and were not assigned partial credit. The cognitive assessments were also analyzed for differential item functioning (DIF) to evaluate whether students performed differently as a function of their group membership. The analysis revealed a slight female favor for one item on the fourth-grade math assessment, but this item was determined to not demonstrate any observable bias (Narjarian et al., 2020).

**Reading achievement.** The ECLS-K:2011 reading assessment was designed to measure basic skills, such as word recognition, vocabulary knowledge, and reading comprehension, based on the National Assessment for Education Progress (NAEP), Reading Frameworks for 2011, state curriculum standards, and Common Core state standards. Basic reading skills in the fourth and fifth grade were measured by students’ knowledge of sight words from the Dolch sight word list (Dolch, 1948). Vocabulary knowledge measured students’ understanding of word meanings, including students’ receptive vocabulary skills of assessing words used in the context of sentences or paragraphs. The reading comprehension questions required the child to identify definitions, facts, and supporting details, make complex inferences of problems and solutions, and determine the appropriateness and quality of the various fictional and informational texts. The reading assessments demonstrated acceptable reliabilities at both fourth (.87) and fifth grade (.86).
**Math achievement.** The ECLS-K:2011 mathematics assessment was designed to measure conceptual knowledge, procedural knowledge, and problem-solving skills, based on state and/or NAEP and the National Council of Teachers of Mathematics standards. Within the mathematics assessment, children were assessed on number properties and operations, measurement, geometry, data analysis and probability, and algebra. The number properties and operations component examined students’ ability to add, subtract, multiply, and divide two, three, and/or four-digit numbers and ability to compare fractions. The measurement content area asked students to estimate the weight of objects on a scale, to calculate area, and to perform money calculations. The geometry portion asked children to combine basic shapes to form other basic shapes and to determine the diameter and circumference of a circle. The data analysis portion measured children’s ability to read basic graphs, determine probabilities, and compare fractions with probabilities. The algebra content area assessed students’ ability to complete sequences and solve simple equations. The math assessments demonstrated acceptable reliabilities at both fourth (.91) and fifth grade (.92).

**Child questionnaire.** The child questionnaire was provided to children beginning in the third grade. This questionnaire included items on self-concept, relationships with peers (e.g., peer support and peer victimization), school belonging, and happiness with life (e.g., hobbies, free time, and parental attention). Beginning with the third-grade round, children listened to the instructions and questionnaire items, one question at a time, from a computer software system and selected their answers from the laptop touch screen. The fourth-grade child questionnaire totaled 35 questions and took approximately 11 minutes to complete and the fifth-grade questionnaire totaled 48 questions and took approximately 10 minutes to complete (Narjarian et
al., 2020). Many of the items from the child questionnaire were adapted from existing scales with author permission (Narjarian et al., 2020).

**Behavioral engagement.** The behavioral engagement measure was new to the fourth and fifth grade child questionnaire. The measure was a 5-item child questionnaire adapted from Skinner and colleagues’ (2009) measure of behavioral engagement. This questionnaire was designed to measure the child’s initiation, effort, attention, persistence, and participation in different learning activities (Skinner et al., 2009). This behavioral engagement questionnaire demonstrated modest convergent validity with teacher reports of behavioral engagement ($r = .32$) (Skinner et al., 2009). Children were asked to “Think about yourself and your experiences this school year. How often do the following things happen?” Children rated the following items on a 5-point Likert-type scale (1 = Never to 5 = Very often): “I try to do well in school,” “In class, I work as hard as I can,” “When I’m in class, I participate in class discussions,” “I pay attention in class,” and “When I’m in class, I listen carefully.” Although the items in the ECLS-K:2011 were identical to Skinner and colleagues’ (2009) original wording, the response options were adapted from the original wording (i.e., ranging from “Not at all true” to “Very true”) to match the response options provided for the other child questionnaire items. Children completed these five items at the beginning of the questionnaire following the questionnaire practice items. The internal reliability for these five items were .74 in both the fourth and fifth grade (Narjarian et al., 2020).

**Teacher report.** Similar to previous rounds of the study, teachers provided information about their professional style, their students, and their school environment using a self-administered questionnaire. Teachers also reported on the child’s social skills, peer relationships, and other child behaviors. Beginning with the fourth-grade round, the child’s reading teacher
completed the general teacher questionnaire and either the child’s randomly sampled math or science teacher completed an additional questionnaire. Altogether, each child had one reading teacher and a math or science teacher complete a questionnaire.

**Social skills.** The social skills measure was derived from the Social Skills Rating System (Gresham & Elliott, 1990). This measure asked teachers to rate how often their students exhibited specific social skills using a four-point Likert scale ranging from “never” to “very often.” Teachers were also able to indicate if they had not had the chance to observe the child perform that specific behavior. This teacher questionnaire included four scales: Self-Control (four items), Interpersonal Skills (five items), Externalizing Problem Behaviors (six items), and Internalizing Problem Behaviors (four items). This measure included some verbatim items from the SSRS, some adaptations of original SSRS items, and some newly developed items tailored to the ECLS studies (Narjarian et al., 2020). The fourth-grade teacher questionnaire demonstrated reliability estimates between 0.79 and 0.87 and the fifth-grade questionnaire demonstrated reliability estimates between 0.79 and 0.88 (Narjarian et al., 2020). Gresham and colleagues (2011) found the SSRS demonstrated moderate convergent validity with the Social Skills Improvement System-Rating Scales ($r = .59$). The score provided for each scale was the mean rating of the items within the specific scales. Higher scores on each scale indicated the student demonstrated those skills or behaviors more often. Similar to Caemmerer and Keith’s (2015) study, the interpersonal and self-control subscales are validated in the SSRS social skills scales and therefore were the focus of the current study.

**Analytic Steps**

The ECLS: K-2011 data were publicly released in July 2019 by the NCES and was obtained and downloaded from https://nces.ed.gov/ecls/dataproducts.asp. Institutional Review
Board (IRB) was obtained prior to beginning analysis. Analyses was completed with R Studio version 1.2.1335 (R Studio Team, 2020). Descriptive statistics, confirmatory factor analysis, and SEM path models were conducted using R. The descriptive statistics included correlations, means, and standard deviations of the study variables.

First, CFA was utilized with the lavaan package in R to test the expected relations between the derived social skills scales and the social skills latent variable in the fourth grade and the measured behavioral engagement indicators and the behavioral engagement latent variable in the fourth and fifth grade (Rosseel, 2012). CFA models inform whether the indicators share common variance to the degree that they indicate a single factor (Bagozzi & Yi, 2012). The CFA fixed factors model sets the variance of the behavioral engagement and social skills latent variable to 1 to identify the model and allow the items to freely load onto the variable. The CFA includes reports of the statistical significance of factor loadings and the overall fit of the model. The CFA will provide the foundation for determining the sufficiency of the behavioral engagement and social skills construct measurement properties, the factorial invariance for the behavioral engagement items, the overall model fit, and the sufficiency of the hypothesized structural model (Little, 2013).

After the CFA shows support for the unidimensional nature of the behavioral engagement and social skills variables, SEM path analysis was used to simultaneously model each of the predictors on reading and math achievement.

**Longitudinal Factorial Invariance**

Factorial invariance is an empirical question that examines the degree latent constructs are measured similarly across measurement occasions (Little, 2013). Specifically, factorial invariance tests how the relationship between the latent and observed variables are similar across
measurement times, despite increases or decreases in the latent variable (Little, 2013). Factorial invariance was sequentially tested by first using a configural factorial invariance model, which is considered a baseline model that does not include any constraints on parameters at any measurement occasion. This model was followed by a weak factorial invariance model, which places constraints only on each factor loading, and then strong factorial invariance, with constraints on both factor loadings and item intercepts to test the degree responses are similar across measurement occasions (Little, 2013). Cheung and Rensvold (2002) highlight that invariance tests examine approximate similarity and that researchers should examine changes in CFI from configural invariance to weak invariance and from weak invariance to strong invariance. Specifically, he recommends that a change in CFI of .01 or less provides sufficient evidence for longitudinal factorial invariance.

![Figure 1. Reading achievement proposed SEM model.](image-url)
Social skills and behavioral engagement were selected *a priori* in part based on the academic enablers framework (DiPerna et al., 2002; DiPerna et al., 2005). That is, social skills were assumed to indirectly influence reading and math achievement through behavioral engagement. Separate SEM path models were created for reading and math achievement to examine whether social skills and behavioral engagement have stronger effects on reading or math achievement.

**Mediation Analytic Steps**

The present study’s analysis involved a series of progressive steps. First, the data were examined to determine univariate normality. Additionally, missing data were analyzed for randomness to determine the most appropriate estimation model. Next, SEM path analysis was employed to analyze the effect of social skills on academic achievement after including behavioral engagement in the model for children in the fourth and fifth grade. The test for mediation included testing all pathways simultaneously (Little, 2013). Specifically, this analysis included an examination of the direct pathways between social skills and reading and math achievement and between behavioral engagement and reading and math achievement. Although some researchers suggest that the $ab$ pathway is likely statistically significant if the $a$ and $b$
pathways are significant, Little (2013) cautions that the $ab$ product is not likely normally distributed and a separate, precise method to examine this pathway is required. Thus, the present study will apply bootstrapping estimation procedures to determine the significance of the indirect effects of social skills on academic achievement (Shrout & Bolger, 2002).

**Model Fit Evaluation**

Model fit evaluations provide a numerical appraisal of how well the hypothesized model reflects the empirically observed covariance matrix obtained from the sample data (Schermelleh-Engel et al., 2003). These model fit evaluations are categorized into absolute fit and incremental fit (Iacobucci, 2010). Measures of absolute fit, such as the $\chi^2$ statistic, indicate how well the hypothesized model compares to a perfectly fitting model and measures of incremental fit compare the hypothesized model to a null or worst fitting model (Little, 2013). Although researchers have highlighted how the $\chi^2$ statistic provides the most direct measure of model fit, the statistic’s sensitivity to population size have led to the practice of utilizing measures of incremental fit to determine the practicality of the hypothesized model (Bagozzi & Yi, 2011; Iacobucci, 2010). The current study reported commonly used absolute and incremental measures of the CFA and SEM model to include chi-square ($\chi^2$), root mean square error of approximation (RMSEA), and comparative fit index (CFI). While multiple fit measures exist, Hu and Bentler (1999) provide that the RMSEA and CFI are sufficient for overall model evaluation. The results of the CFA will help establish the behavioral engagement indicators and social skills scales are unidimensional, respectively, or the degree that the indicators represent a single factor (Bagozzi & Yi, 2012). The results of the overall SEM model fit will support the observed covariances and changes in covariances between social skills, behavioral engagement, and reading and math achievement are a result of the actual relationship between the variables specified in the
proposed model (Ullman & Bentler, 2013). All SEM path models were fitted with maximum likelihood estimation (ML). ML utilizes parameter estimates that maximize the probability the sample data fits population estimates (Allison, 2003). Additionally, the structural paths were interpreted according to Keith (2019)’s effect size criteria: small (greater than .05), moderate (greater than .10), and large (greater than .25).

**Chi-square test statistic.** The chi-square test statistic ($\chi^2$) is considered an absolute measure of model fit and provides a statistical measure of the difference between the hypothesized model values and the observed data (Little, 2013; Ullman, 2006). The null hypothesis for this statistic states the predicted model is the same as the observed model (Keith, 2019). The $\chi^2$ statistic of the hypothesized model is compared to a saturated model, a perfectly fitting model usually without degrees of freedom. The $\chi^2$ is known for its sensitivity to sample size and increased degrees of freedom which often leads to a significant chi-square statistic for models with large sample sizes complicating assessment of model fit (Ullman & Bentler, 2013). Therefore, common practice involves examining alternative methods of model fit (Little, 2013).

**Root mean square error of approximation.** The root mean square error of approximation similarly compares the observed model to the saturated model but is based on the noncentral $\chi^2$ distribution. The RMSEA includes sample size in the equation, allowing for a correction to the effect of sample size and groups on the $\chi^2$ (Little, 2013). Specifically, the RMSEA examines the degree of misfit for the observed model per the model’s degrees of freedom (Bagozzi & Yi, 2012). Similarly, the RMSEA provides the upper and lower confidence intervals of the RMSEA estimation (Little, 2013). Noncentrality parameters with greater sample sizes and more degrees of freedom usually lend to better fitting models and lower RMSEAs.
Traditionally, an acceptable RMSEA is less than 0.06 (Hu & Bentler, 1999), although others suggest an acceptable RMSEA is less than 0.08 (Little, 2013).

**Comparative fit index.** The comparative fit index examines the model fit relative to other model of the same data (Iacobucci, 2010). The CFI applies the $\chi^2$ distribution with noncentrality parameters with a perfect fitting estimated model noncentrality parameters equal to zero (Ullman & Bentler, 2013). The CFI is considered a goodness-of-fit index, ranging from 0.0 (worst fitting model) to 1.0 (perfect fitting model) (Iacobucci, 2010). Traditionally, CFI estimates of 0.95 or greater are acceptable (Hu & Bentler, 1999). Additionally, the CFI incorporates the model’s degrees of freedom in the estimation (Iacobucci, 2010)
CHAPTER 4

Results

Prior to examining the SEM models, the data were examined for univariate normality and were inspected for patterns of missingness. Given SEM estimation operates under the assumption of univariate normality, the data were examined for absolute univariate skewness and absolute univariate kurtosis. See Table 1 for results of this data inspection. Absolute item and univariate skewness greater than one and absolute item and univariate kurtosis greater than three suggest nonnormal data and may bias results (Bulmer, 1979; DeCarlo, 1997). The examination of skewness and kurtosis revealed multiple behavioral engagement items violated assumptions of normality. However, further examination of the behavioral engagement items revealed that fifth grade behavioral engagement approached normality after controlling for fourth grade behavioral engagement. Although some scholars posit researchers should transform nonnormal data, Little (2013) argues that transformations do not significantly impact the interpretation of model results. Instead, bootstrapping estimation procedures are a robust approach that can calculate the confidence intervals of nonnormal data (Little, 2013). Therefore, bootstrapping estimation was utilized in the current study to test for the statistical significance of the $ab$ product. Further, despite low item factor loadings for behavioral engagement, all items were retained to parallel previous research using all items from this behavioral engagement questionnaire (Cheon & Reeve, 2015; Skinner et al., 2008).
Table 1. *Item Factor Loadings, Item/Variable Means, Standard Deviations, Skew, and Kurtosis*

<table>
<thead>
<tr>
<th>Item/Variable</th>
<th>( \lambda )</th>
<th>Mean</th>
<th>SD</th>
<th>Skew</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. G4 Try Hard</td>
<td>0.45</td>
<td>4.58</td>
<td>0.75</td>
<td>-1.88</td>
<td>3.38</td>
</tr>
<tr>
<td>2. G4 Work Hard</td>
<td>0.47</td>
<td>4.45</td>
<td>0.78</td>
<td>-1.41</td>
<td>1.74</td>
</tr>
<tr>
<td>3. G4 Participate</td>
<td>0.29</td>
<td>3.90</td>
<td>0.97</td>
<td>0.53</td>
<td>0.29</td>
</tr>
<tr>
<td>4. G4 Pay Attention</td>
<td>0.48</td>
<td>4.37</td>
<td>0.81</td>
<td>-1.20</td>
<td>1.11</td>
</tr>
<tr>
<td>5. G4 Listen Carefully</td>
<td>0.48</td>
<td>4.26</td>
<td>0.81</td>
<td>-0.92</td>
<td>0.38</td>
</tr>
<tr>
<td>6. G5 Try Hard</td>
<td>0.40</td>
<td>4.58</td>
<td>0.70</td>
<td>-1.81</td>
<td>3.53</td>
</tr>
<tr>
<td>7. G5 Work Hard</td>
<td>0.47</td>
<td>4.44</td>
<td>0.72</td>
<td>-1.17</td>
<td>1.05</td>
</tr>
<tr>
<td>8. G5 Participate</td>
<td>0.29</td>
<td>3.92</td>
<td>0.93</td>
<td>-0.48</td>
<td>-0.36</td>
</tr>
<tr>
<td>9. G5 Pay Attention</td>
<td>0.48</td>
<td>4.36</td>
<td>0.76</td>
<td>-1.05</td>
<td>0.83</td>
</tr>
<tr>
<td>10. G5 Listen Carefully</td>
<td>0.48</td>
<td>4.22</td>
<td>0.77</td>
<td>-0.72</td>
<td>0.12</td>
</tr>
<tr>
<td>11. G4 Interpersonal</td>
<td>0.56</td>
<td>3.14</td>
<td>0.65</td>
<td>-0.44</td>
<td>-0.67</td>
</tr>
<tr>
<td>12. G4 Self-Control</td>
<td>0.49</td>
<td>3.30</td>
<td>0.60</td>
<td>-0.78</td>
<td>-0.13</td>
</tr>
<tr>
<td>13. G4 Reading</td>
<td>–</td>
<td>129.23</td>
<td>14.81</td>
<td>-0.72</td>
<td>0.14</td>
</tr>
<tr>
<td>14. G5 Reading</td>
<td>–</td>
<td>136.28</td>
<td>15.50</td>
<td>-0.83</td>
<td>0.15</td>
</tr>
<tr>
<td>15. G4 Math</td>
<td>–</td>
<td>112.70</td>
<td>17.71</td>
<td>-0.78</td>
<td>0.17</td>
</tr>
<tr>
<td>16. G5 Math</td>
<td>–</td>
<td>119.89</td>
<td>17.50</td>
<td>-0.91</td>
<td>0.17</td>
</tr>
</tbody>
</table>

*Note:* Abbreviations: G4 = Grade 4; G5 = Grade 5; \( \lambda \) = Factor Loading; SD = Standard Deviation.

**Descriptive Statistics**

Item means and standard deviations are also reported in Table 1. Scale correlations, corrected for attenuation, between each predictor variable and each outcome variable are reported in Table 2. Beginning with fourth grade behavioral engagement, the scale correlations ranged from 0.32 to 0.33 for reading and 0.31 to 0.33 for math. Additionally, for fifth grade behavioral engagement, the scale correlations were 0.29 for reading and ranged from 0.27 to 0.30 for math. Additionally, scale correlations between fourth grade social skills and behavioral engagement were 0.22 to 0.24. Finally, for social skills, the scale correlations for interpersonal skills and self-control ranged from 0.28 to 0.29 for reading and 0.26 to 0.28 for math. The small to moderate scale correlations between these variables suggest the items and variables are related, yet distinct from each other.
Missing Data

Longitudinal data are often assumed to have missing data (Little, 2013). Missing data are categorized by the mechanism of missingness to include completely random missingness, called missing completely at random (MCAR), a measurable random missingness, called missing at random (MAR), and an unknown random missingness, called missing not at random (MNAR; Graham, 2009). Missing data can result from both attrition and nonresponse. Attrition defines data with missing values for one or more subsequent measurement occasions, whereas nonresponse defines missing values as a result of part of a certain question not answered for a given measure or survey (Little, 2013). To better understand the pattern of missingness in the current sample, missing patterns were examined across variables and participants. Across the twenty variables, missingness ranged from 0 to 43.77%, with an average of 31.74% per item (SD = 13.65). Across the 18,174 participants, missingness ranged from 0 to 90%, with an average of 31.74% per person (SD = 38.31). Only cases with data, demonstrating less than 25% missingness, for both measures of behavioral engagement and with data for reading and math achievement across the fourth and fifth grade were retained before imputation. Utilizing this retention criteria helped minimize missingness bias, from attrition and nonresponse.

Overall, 62% (N = 11,246) of the original sample met the inclusion criteria. Removing the cases that did not meet this inclusion criteria reduced the overall pattern of missingness to

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Behavioral Engagement G4</td>
<td>0.72</td>
<td>0.38</td>
<td>0.33</td>
<td>0.32</td>
<td>0.31</td>
<td>0.33</td>
<td></td>
</tr>
<tr>
<td>2. Behavioral Engagement G5</td>
<td>0.52</td>
<td>0.36</td>
<td>0.29</td>
<td>0.29</td>
<td>0.27</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>3. Social Skills G4</td>
<td>0.30</td>
<td>0.28</td>
<td>0.28</td>
<td>0.29</td>
<td>0.26</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>4. Reading G4</td>
<td>0.28</td>
<td>0.25</td>
<td>0.26</td>
<td>0.86</td>
<td>0.73</td>
<td>0.73</td>
<td></td>
</tr>
<tr>
<td>5. Reading G5</td>
<td>0.27</td>
<td>0.25</td>
<td>0.27</td>
<td>0.86</td>
<td>0.72</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>6. Math G4</td>
<td>0.26</td>
<td>0.23</td>
<td>0.24</td>
<td>0.73</td>
<td>0.72</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td>7. Math G5</td>
<td>0.28</td>
<td>0.25</td>
<td>0.26</td>
<td>0.73</td>
<td>0.75</td>
<td>0.90</td>
<td></td>
</tr>
</tbody>
</table>

Note: Scale correlations corrected for attenuation. Raw correlations are below the diagonal and corrected correlations are above the diagonal. Abbreviations: G4 = Grade 4; G5 = Grade 5.
2%, with participant patterns ranging from 0% to 20% ($SD = 3.79$) and variable patterns ranging from 0% to 18% ($SD = 4.99$).

The current study utilized multiple imputation by chained equations (MICE), via the *mice* package (van Buuren & Groothuis-Oudshoorn, 2011) in R, to handle the remaining missing data points. MICE replaces missing values, one variable at a time, through an iterative series of predictive models. After each variable is cycled through, the process is repeated to create a single imputed data set (White et al., 2011). According to White et al., 2011, researchers should set the procedure to repeat proportionally to the percentage of incomplete cases in the data set. Following this guideline, this process was set to repeat five datasets before completing one final dataset.

**Longitudinal Factorial Invariance**

The test for factorial invariance in the longitudinal model involved freely estimating parameter estimates, followed by constraining factor loadings, and finally followed by constraining both factor loadings and intercepts. Altogether, the configural model demonstrated good model fit with a $\chi^2 (30) = 1235.21$ ($p < 0.001$), RMSEA = 0.060 (90%CI [0.057; 0.063]), CFI = 0.960, and SRMR = 0.027. Additionally, the weak invariance model also demonstrated good model fit with a $\chi^2 (34) = 1268.65$ ($p < 0.001$), RMSEA = 0.057 (90%CI [0.054; 0.060]), CFI = 0.960, and SRMR = 0.031. Finally, the strong invariance model demonstrated good model fit with a $\chi^2 (37) = 1292.99$ ($p < 0.001$), RMSEA = 0.055 (90%CI [0.052; 0.058]), CFI = 0.958, and SRMR = 0.032. Table 3 provides the results for the tests of factorial invariance.
According to Cheung and Rensvold (2002), the sequential constraints that contributed to factorial invariance (i.e., factor loading constraints and intercept constraints) should result in less than 0.01 change in CFI between each model. According to this criterion for determining factorial invariance, there is enough evidence to suggest invariance is plausible. Therefore, behavioral engagement was measured similarly across the fourth and fifth grade levels. The strong invariance CFA model was utilized in the current study’s final SEM model.

**Model Fit Evaluation Results**

Table 4 provides the chi-square ($\chi^2$), $\chi^2$ degrees of freedom, comparative fit index (CFI), and root mean square of approximation (RMSEA). Altogether, the final reading achievement model fit the data well with $\chi^2$ (74) = 2696.42 ($p < 0.001$), RMSEA = 0.056 (90%CI [0.054-0.058], CFI =

<table>
<thead>
<tr>
<th>Model Tested</th>
<th>Robust $\chi^2$</th>
<th>df</th>
<th>$p$</th>
<th>RMSEA</th>
<th>RMSEA 90% CI</th>
<th>CFI</th>
<th>SRMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>2696.42</td>
<td>74</td>
<td>&lt;0.001</td>
<td>0.056</td>
<td>0.054-0.058</td>
<td>0.95</td>
<td>0.060</td>
</tr>
<tr>
<td>Math</td>
<td>2606.94</td>
<td>75</td>
<td>&lt;0.001</td>
<td>0.055</td>
<td>0.053-0.057</td>
<td>0.96</td>
<td>0.060</td>
</tr>
</tbody>
</table>

0.95, and SRMR = 0.060. Similarly, the final math model fit the data well with $\chi^2$ (75) = 2606.94 ($p < 0.001$), RMSEA = 0.055 (90%CI [0.053-0.057], CFI = 0.96, and SRMR = 0.060.
**Structural Equation Model**

The structural equational model was examined holistically for mediation to determine the predictive relations of fourth grade social skills on fifth grade academic achievement to address the following research questions: (a) To what extent do social skills in fourth grade directly predict future student ratings of behavioral engagement in fifth grade, after controlling for prior levels of behavioral engagement? (b) To what extent do student ratings of behavioral engagement in the fourth grade directly predict future reading and math achievement in the fifth grade, after controlling for prior levels of academic achievement? (c) Does behavioral engagement have stronger effects on reading or math achievement? (d) To what extent do social skills in fourth grade indirectly predict future reading and math achievement through behavioral engagement? (e) Do social skills show stronger direct effects or indirect effects on reading and math achievement? (f) Do social skills indirectly predict performance more strongly for reading or math achievement?

Separate path models were examined for both reading and math as the outcome variable. Across the two grade levels behavioral engagement, reading achievement, and math achievement demonstrated stability, with scores for behavioral engagement, reading achievement, and math achievement at fourth grade positively predicting the behavioral engagement, reading achievement, and math achievement scores at fifth grade, respectively. Further, previous reading achievement statistically significantly predicted future reading achievement \( (b = 0.88, \beta = 0.86, p < 0.001) \). Similarly, previous math achievement statistically significantly predicted future math achievement \( (b = 0.88, \beta = 0.90, p < 0.001) \). Results are summarized in Table 5.

To address the first research question, behavioral engagement at fifth grade was regressed on social skills at fourth grade. The SEM path model showed that social skills at fourth grade
were a statistically significant predictor of behavioral engagement at fifth grade, after controlling for previous levels of behavioral engagement ($b = 0.16$, $\beta = 0.13$, $p < 0.001$), meaning that each standard deviation increase in students’ social skills resulted in a 0.13 standard deviation increase in students’ subsequent behavioral engagement.

Table 5. Parameter Estimates for the Longitudinal SEM Models

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unstandardized (SE)</th>
<th>Standardized</th>
<th>$p$ Value</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reading G5</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct Effects</td>
<td>→ Reading G4</td>
<td>0.88(0.005)</td>
<td>0.86</td>
<td>$&lt;0.001$</td>
</tr>
<tr>
<td></td>
<td>→ Social Skills G4</td>
<td>0.16(0.013)</td>
<td>0.011</td>
<td>$&lt;0.001$</td>
</tr>
<tr>
<td></td>
<td>→ Behavioral Engagement G4</td>
<td>0.566(0.016)</td>
<td>0.037</td>
<td>$&lt;0.001$</td>
</tr>
<tr>
<td>Indirect Effects</td>
<td>← Behavioral Engagement G4 X Social Skills G4</td>
<td>0.091(0.07)</td>
<td>0.000</td>
<td>$&lt;0.001$</td>
</tr>
<tr>
<td><strong>Math G5</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct Effects</td>
<td>← Math G4</td>
<td>0.88 (0.005)</td>
<td>0.90</td>
<td>$&lt;0.001$</td>
</tr>
<tr>
<td></td>
<td>← Social Skills G4</td>
<td>0.16(0.013)</td>
<td>0.009</td>
<td>$&lt;0.001$</td>
</tr>
<tr>
<td></td>
<td>← Behavioral Engagement G4</td>
<td>0.57 (0.015)</td>
<td>0.033</td>
<td>$&lt;0.001$</td>
</tr>
<tr>
<td>Indirect Effects</td>
<td>← Behavioral Engagement G4 X Social Skills G4</td>
<td>0.091(0.10)</td>
<td>0.000</td>
<td>$&lt;0.001$</td>
</tr>
<tr>
<td>Behavioral Engagement G5</td>
<td>← Social Skills G4</td>
<td>0.16(0.013)</td>
<td>0.14</td>
<td>$&lt;0.001$</td>
</tr>
<tr>
<td>Behavioral Engagement G5</td>
<td>← Behavioral Engagement G4</td>
<td>0.57(0.016)</td>
<td>0.48</td>
<td>$&lt;0.001$</td>
</tr>
</tbody>
</table>

Note: Abbreviations: SE = Standard Error; G4 = Grade 4; G5 = Grade 5.

Beginning with the reading achievement SEM path model, the second research question was addressed by regressing reading and math achievement at fifth grade on behavioral engagement at fourth grade. Behavioral engagement at fourth grade was a statistically significant
predictor of reading achievement at fifth grade, after controlling for previous levels of reading achievement (b = 0.57, β = 0.037, p < 0.001). Additionally, behavioral engagement at fourth grade was a statistically significant predictor of math achievement at fifth grade, after controlling for previous levels of math achievement (b = 0.57, β = 0.033, p < 0.001). Behavioral engagement at fourth grade demonstrated slightly stronger effects on reading achievement at fifth grade compared to effects on math achievement at fifth grade, but these effects were negligible. This suggests that students with higher levels of behavioral engagement also demonstrated higher levels of reading and math achievement, but behavioral engagement does not appear to meaningfully contribute to standardized measures of reading and math achievement.

Finally, to determine the extent social skills predict future reading achievement via behavioral engagement, bootstrapping estimation procedures were utilized to calculate the statistical significance \( ab \) product term (Shrout & Bolger, 2002). The reading achievement model results indicated social skills at fourth grade statistically significantly predicted reading achievement at fifth grade via behavioral engagement (b = 0.085, β = 0.005, p < 0.001). Similarly, the math achievement model results indicated social skills at fourth grade statistically significantly predicted reading achievement at fifth grade via behavioral engagement (b = 0.083, β = 0.004, p < 0.001). These results suggest social skills demonstrated a slightly stronger indirect effect on reading achievement than on math achievement via behavioral engagement. Additionally, the present study also examined how social skills at fourth grade predicted academic achievement at fifth grade to answer the research question if social skills demonstrated stronger direct or indirect effects on future reading and math achievement. Although the effect sizes were negligible, the present study found that social skills demonstrated stronger direct effects on reading and math achievement than indirect effects through behavioral engagement.
This suggests that although behavioral engagement may provide insight into classroom involvement, behavioral engagement does not meaningfully contribute to the relationship between social skills and academic achievement.

**Figure 3.** Latent variable longitudinal reading model with directionality details. *Note:* All pathways were statistically significant.

**Figure 4.** Latent variable longitudinal mathematics model with directionality details. *Note:* All pathways were statistically significant.
CHAPTER 5

Discussion

The current study examined the predictive relations, including the direct and indirect effects, of behavioral engagement and social skills on reading and math achievement for students in the fourth and fifth grade. Specifically, the present study utilized a half-longitudinal design to test whether behavioral engagement longitudinally mediates the relationship between social skills and future reading and math achievement using the ECLS-K:2011 longitudinal data.

Although previous studies have examined engagement and social skills as academic enablers, research has yet to investigate how behavioral engagement may provide a more measurable indicator of student learning compared to the broadly defined engagement construct. Additionally, past studies have not compared the relationship between behavioral engagement and social skills on current and subsequent reading and math achievement. This discussion aims to address this missing information by linking evidence of the importance of academic enablers on reading and math achievement to answer the present study’s research questions. Therefore, the discussion focuses on the following: (a) key findings of social skills on behavioral engagement (b) key findings of behavioral engagement on academic achievement, (c) key findings of the mediating role of behavioral engagement, (d) implications for research and practice (e) strengths of the study (f) limitations and future directions, and (g) conclusion.

Academic Achievement

The present study examined how social skills and behavioral engagement, predicted reading and math achievement. These nonacademic skills, termed academic enablers are important in considering potential facilitators of instruction and academic success. The present study examined how social skills and behavioral engagement predicted reading and math
achievement after controlling for prior levels of achievement. The SEM model revealed that previous reading and math achievement demonstrated a large, positive effect on future reading and math achievement, respectively. These results parallel prior research findings that reading and math achievement are stable and strong predictors of future achievement (Claessens et al., 2006; Duncan et al., 2007).

Research Question 1: To what extent do social skills in fourth grade directly predict future behavioral engagement in fifth grade, after controlling for prior levels of behavioral engagement?

The present results suggested that children rated higher on social skills indicated higher levels of their own future behavioral engagement. Specifically, the results from the current study found that fourth grade social skills had a moderate effect on subsequent behavioral engagement in fifth grade. These results support the hypothesis that children with higher levels of social skills in the fourth grade will demonstrate higher levels of behavioral engagement in the fifth grade, after controlling for prior levels of behavioral engagement. Further, these results support previous research suggesting that social skills may encourage engagement in the surrounding environments, to provide students with better competence with their initiation, effort, attention, persistence, and participation (Gresham et al., 2010; Lane et al., 2004; Li & Lerner, 2011).

Similarly, the current findings lend insight into how children with poorer social skills may appear withdrawn from their learning activities. For example, in the classroom, social skills can lend students the skills to ask for help, respond appropriately, or cooperate with peers (Gresham, 2016). Comparatively, students struggling to utilize appropriate skills may struggle to actively engage in their surrounding academic environment. These students that do not have as well-
developed social skills may not view themselves as competent to participate in class, work hard, or attend to the lesson.

**Research Question 2a: To what extent does behavioral engagement in fourth grade directly predict future reading and math achievement in fifth grade, after controlling for prior, respective levels of reading and math achievement?**

The evidence suggests previous behavioral engagement statistically significantly predicts future reading and math achievement. Specifically, students rating themselves higher on behavioral engagement in the fourth grade demonstrated higher levels of both reading and math achievement in the fifth grade, after accounting for their previous levels of reading and math achievement, respectively. This suggests that students that view themselves as better able to try and work hard, pay attention, participate in class, and persist on difficult tasks are more likely to score higher on reading and math achievement measures compared to students rating themselves lower in these areas. However, the effect of the behavioral engagement on reading and math achievement may not appear meaningful. These results are similar to Guo and colleagues’ (2014) results showing that behavioral engagement is not a strong predictor of later academic achievement. To this point, these researchers highlighted that multiple variables, such as student self-efficacy, teacher-student relationships, or classroom quality (e.g., instructional support and teacher-child interactions) may confound the relationship between behavioral engagement and academic achievement (De Laet et al., 2015; Guo et al., 2011). Further, previous academic enabler research suggests that other enablers, such as motivation or study skills, may also impact the relationship between behavioral engagement and reading and math achievement (Anthony et al., 2021; DiPerna, 2006; Guthrie et al., 2012).
However, these results differ from past research findings that behavioral engagement is important as students learn to read and also read to learn (Guthrie et al., 2012; Kendeou et al., 2007). It is possible that other indicators of behavioral engagement such as rule-compliance or homework completion utilized in these past research studies, may provide a better indication of the strength of the relationship between behavioral engagement and reading and math achievement (Birch & Ladd, 1997; Finn et al., 1995). Further, it is possible that students rated themselves too high and these ratings did not allow for a true representation of the relationship between behavioral engagement and reading and math achievement. For example, Dotterer and Lowe (2011) utilized an observation system, to measure time on task and attention, to find that behavioral engagement statistically significantly predicted academic achievement. Altogether, these results suggest that student ratings of behavioral engagement demonstrate negligible effects on future reading and math achievement.

**Research Question 2b: Does behavioral engagement have stronger effects on reading or math achievement?**

The next research question examined how behavioral engagement differentially predicts reading and math achievement. Examining this research question also provided evidence to suggest that student ratings of behavioral engagement in fourth grade similarly predicted reading and math achievement in fifth grade. These results did not support the hypothesis that student ratings of their behavioral engagement will demonstrate stronger effects on reading achievement than on math achievement.

As previously discussed, researchers have not yet compared how behavioral engagement may differentially predict future reading and math achievement. However, there are several considerations that may provide insight into the observed negligible differences. To begin with,
ubiquitous research highlights the stability of achievement over time, making it more difficult for other variables to exert a change in achievement (Duncan et al., 2007). Not only does this achievement stability make change more difficult, but the achievement stability makes detection of how other variables may predict reading and math achievement more difficult. Additionally, the present study found trivial effects of student ratings of behavioral engagement on both reading and math achievement, making a comparison between these results not meaningful.

**Research Question 3: To what extent do social skills in fourth grade indirectly predict future reading and math achievement in fifth grade through behavioral engagement?**

Finally, the current study sought to answer the extent social skills, in the fourth grade, indirectly predict reading and math achievement, in the fifth grade, through behavioral engagement. The present study found that social skills in fourth grade statistically significantly predicted reading achievement in fifth grade, through behavioral engagement. Similarly, the present study also found that social skills in fourth grade predicted math achievement in fifth grade, through behavioral engagement. However, according to Keith (2019) the effect sizes of social skills’ indirect effect on reading and math achievement are minimal. This suggests that although social skills demonstrate small effects on reading and math achievement, behavioral engagement may not meaningfully contribute to this relationship. Additionally, it is possible that the social skills scales utilized in this study may capture behavioral engagement indicators measured with the current study’s behavioral engagement scale (Cooper et al., 2014; Gresham & Elliott, 1990). Further, other researchers have provided that other academic enablers, such as study skills, appear to play a larger role in later reading or math achievement than engagement, as students transition from early to late elementary school (Anthony et al., 2021). Therefore, the
addition of the behavioral engagement scale may not have provided helpful information on the indirect effects of social skills on reading or math achievement.

**Research Question 3a: Do social skills show stronger direct effects or indirect effects on reading and math achievement?**

A secondary goal of the third research question was to answer the research question if social skills show stronger direct effects or indirect effects on achievement. This question was developed with the goal to test the hypothesis that social skills will show stronger indirect effects through behavioral engagement on reading and math achievement. The fourth hypothesis was not supported as the present study found that social skills demonstrated stronger direct effects on both reading and math achievement than indirectly through behavioral engagement.

The current findings extend on previous research that the effect size for social skills on reading achievement is close to zero (Duncan et al., 2007). These results are consistent with previous researchers’ findings that social skills are not as powerful of predictors as previous academic skills (Caemmerer & Keith, 2015; Duncan et al., 2007). Additionally, these results add to the limited available research on how social skills may facilitate future math achievement. Of the available research, these results are consistent with previous findings that social skills significantly predict math achievement (Malecki & Elliott, 2002). However, others have theorized that social skills encourage classroom grades through student classroom behaviors, such as engagement (Greenberg et al., 2003). To this point, previous researchers have found that teachers indicate they often include student behavior, cooperation, and self-control in their grades (Lane et al., 2003; Lane et al., 2004). The present study’s results add to this literature to suggest that although social skills may indirectly predict classroom grades, through behavioral engagement, these indirect effects may not operate as much on standardized measures of
achievement. This assertion is also recently supported with findings that academic enablers were more predictive of indirect measures of achievement than direct measures of achievement (Anthony et al., 2021). Altogether, this suggests that social skills may not facilitate learning through engagement but may prove more important in grade decisions (Farrington et al., 2012).

Additionally, other researchers have demonstrated reciprocal effects of academic achievement and social skills throughout elementary school (Caemmerer & Keith, 2015). The current study adds to this previous research to suggest that these reciprocal effects may not operate through behavioral engagement but may operate through additional variables, such as students that struggle in school may experience greater difficulties interacting or cooperating with their peers (Caemmerer & Keith, 2015). In consideration of the academic enabler research, researchers posit that social skills likely indirectly influence math achievement through motivation (DiPerna et al., 2002). Additionally, other researchers have found that of the academic enablers, interpersonal skills, motivation, and study skills demonstrate greater importance on academic achievement, compared to engagement, as students transition from primary grades to intermediate grades (Anthony et al., 2021; DiPerna et al., 2005). Taken together, although engagement is predictive of academic achievement, the current study supports previous research findings that engagement may not prove as important as students transition into upper elementary school.

**Research Question 3b. Do social skills indirectly influence performance more strongly for reading or math achievement?**

Relatedly, this study sought to answer if social skills indirectly influence performance more strongly for reading or math achievement. Extending on the findings of the previous research question, the present study found that social skills in fourth grade indirectly influence
reading achievement similarly to math achievement. Notably, the present study found negligible indirect effects of social skills on both reading and math achievement, through behavioral engagement, making a comparison between these results not meaningful.

**Implications for Research and Practice**

**Behavioral engagement.** Behavioral engagement has been suggested as an important construct in helping connect what teachers are teaching in the classroom and what students are learning. Previous researchers have posited that in order for students to capitalize on reading and math instruction, students are required to maintain focus, attend, participate, and work hard (Birch & Ladd, 1997; De Laet et al., 2015). School psychologists are often tasked with providing teacher suggestions on how to improve student outcomes, including behavioral antecedents, such as attention or participation, that may enhance or inhibit instruction, and with providing administrators or staff suggestions for other student outcomes, such as increasing student retention and attendance. Often school psychologists examine students’ on-task behaviors (e.g., participating, looking at the teacher, working on seatwork), to determine if off-task behavior may provide insight into why the students are not benefiting from instructions and/or interventions. To this point, researchers have proposed that behavioral engagement may serve as a corresponding indicator of instructional benefit (Ponitz et al., 2009). However, the present study did not find that student-rated behavioral engagement meaningfully contributed to standardized reading and math achievement. However, some researchers have noted that student grades are more malleable to behavior modifications than standardized achievement measures (Keith, 2002). Therefore, future researchers should consider examining how behavioral engagement may contribute to the effects of social skills on student reading and mathematics classroom ratings.
Although the present student did not support the importance of behavioral engagement on future achievement, future researchers should consider how behavioral engagement may facilitate other important aspects of student outcomes that were not measured in the current study. For example, school psychologists are often involved in discussions on better supporting students with chronic absenteeism and students at-risk for school dropout. Students who feel better connected to their peers and better able to participate in class may have additional resources to draw on to encourage school attendance (Finn & Zimmer, 2012). To this point, Virtanen and colleagues (2014) found that behavioral engagement significantly mediated the relationship between social support and school truancy. Similarly, other researchers have highlighted that higher behavioral engagement is associated with a decreased likelihood of school dropout (Fall & Roberts, 2012). Further, Li and Lerner (2011) found that a subgroup of students demonstrating low levels of behavioral engagement were at a higher risk for school dropout and drug use. Although, behavioral engagement may not directly exert meaningful effects on reading and math achievement in fourth or fifth grade, future researchers and educators should consider how student attention, participation, and persistence may provide a measurable indicator of other, important student outcomes. Further, although the current study did not find meaningful effects of behavioral engagement on fifth grade reading and achievement, behavioral engagement may still provide a meaningful target in early elementary school as students are faced with many new tasks, including developing friendships and learning foundational reading and math skills (Mahatmya et al., 2012).

**Social skills and behavioral engagement.** Students’ abilities to apply appropriate social skills, such as demonstrating self-control or cooperating with peers, have also received considerable attention when examining student outcomes. Often, during on-task/off-task
observations, school psychologists also note the extent students are appropriately cooperating and interacting with their peers and teachers. Although these interactions are noteworthy for observations, some students may not have as developed of an ability to engage in these social tasks as others. These students may struggle to engage in positive, reciprocal interactions with their teachers and/or peers and may not benefit as much from the learning environment if they struggle to appropriately ask questions or participate (Bronfenbrenner & Morris, 2006; Denham & Brown, 2010). Others have provided that social skills may encourage students’ behavioral engagement as this engagement may increase their opportunities to successfully meet the developmental tasks associated with building and maintaining friendships (Mahatmya et al., 2012). To this point, results from the current study suggest that social skills are predictive of future behavioral engagement. This supports the notion that students’ abilities to interact with others may support their participation, initiation, and effort in the classroom setting (Gresham et al., 2010; Lane et al., 2004). School psychologists targeting social skills may also build on skills to encourage students increased perceptions to behaviorally engage. Further, school psychologists engaged in consultation with teachers, concerned with student participation and effort, might find targeting social skills for students in later elementary school beneficial to addressing these concerns. Although the results suggest behavioral engagement may not prove impactful on standardized measures of reading and math achievement, others have established the importance of behavioral engagement on other student outcomes (Fall & Roberts, 2012; Li & Lerner, 2011; Virtanen et al., 2014). Therefore, school psychologists targeting social skills may also find benefits related to other outcomes not measured in this study.

Comparatively, the present study found that behavioral engagement did not meaningfully contribute to the relationship between social skills and reading and math achievement. Although
previous researchers have found other behavioral engagement indicators, such as asking for help and cooperating with others, are important to reciprocal positive reactions with teachers and peers, the behavioral engagement indicators used in the present study may be encapsulated within the construct of social skills. For example, some scholars describe social skills to include self-control and cooperation, similar to the behavioral engagement indicators used in the present study (Cooper et al., 2014; Gresham & Elliott, 1990). To this point, school psychologists interested in targeting student social skills may find an additional benefit of increased behavioral engagement. Further, understanding that social skills directly influences both behavioral engagement and reading and math achievement provides school psychologists a collateral advantage of targeting social skills (Keith, 2002).

**Strengths of the Study**

Given the previously stated research and practical implications, the current study offers multiple strengths. The main strength of the current study is the operationalization of behavioral engagement from the broader academic enabler constructs of engagement and motivation. Although the present study found that behavioral engagement did not meaningfully contribute to reading or math achievement, this study adds to the academic enabler literature. Keith (2002) posits that an understanding of the narrower components of engagement (i.e., behavioral engagement), provides a richer understanding of the larger school engagement construct on academic achievement. This study adds to the academic enabler literature to encourage future researchers to include the omitted measures of cognitive and emotional engagement as a potential mediator between social skills and reading and math achievement. Although previous research endorsed behavioral engagement is important to reading and math achievement, this study found that behavioral engagement did not meaningfully contribute to future standardized
reading and math achievement. To this point, this study suggests that future researchers may not find it beneficial to specifically target behavioral engagement as an academic enabler of reading and math achievement.

Not only does the current study provide a deeper insight into social skills and engagement as academic enablers but this study used a nationally representative, longitudinal design in determining the significance of behavioral engagement on reading and math achievement. Maxwell and Cole (2003) suggest that the previous cross-sectional studies may not accurately represent the longitudinal relationships between these constructs. Similarly, the present study utilized the nationally representative sample of the ECLS-K:2011 study to provide more generalizable results to other fourth and fifth grade students compared to previous examinations of behavioral engagement and social skills on the academic achievement of more specific populations.

Limitations and Future Directions

Although the current study benefits the literature, the present study is also associated with several limitations. Beginning with the study’s methodology, the longitudinal data did not utilize random assignment, control groups, or manipulation of behavioral engagement or social skills; therefore, the study is not considered experimental. As a result, the nonexperimental nature of the study should limit the interpretation of the results to effects described with longitudinal structural equation models. Specifically, Keith (2019) notes that interpreting coefficients as effects is only valid if the examined model approximates reality. However, the longitudinal SEM model is better able to inform questions of mediation compared to cross-sectional SEM models (Little, 2013). Future researchers may consider providing teacher intervention groups to target behavioral engagement skills to better examine how observed behavioral engagement may
contribute to student outcomes. For example, Greenwood and colleagues (2002) found students in classrooms with teachers emphasizing the individual, over groups, and with increasing generative responses, such as through opportunities to respond, were observed as demonstrating higher levels of behavioral engagement compared to classrooms that did not emphasize these aspects.

Relatedly, the present study utilized student ratings of behavioral engagement and the results may be limited to student response bias. For example, the behavioral engagement ratings were negatively skewed, showing most students rating themselves higher on the current study’s measure of behavioral engagement. Similarly, students may overestimate their behavioral engagement and the current study may not provide a full representation of the relationship between behavioral engagement, social skills, and reading and math achievement. Future researchers should consider incorporating teacher ratings of behavioral engagement to better align with the teacher ratings of social skills and determine if the student ratings of behavioral engagement accurately reflect student participation, persistence, and attention.

Another methodological limitation of the current study is related to the structure of the ECLS-K:2011 data. The data utilizes hierarchical structures with teachers rating multiple students, sampled within the different schools. The question of independence related to this hierarchical structure was addressed utilizing the robust standard error bootstrapping method. However, the present study cannot address the potential differences between schools or teachers, because the multi-level structures were not included in the SEM models. Although these differences were not the concern of the current study, future researchers may consider examining the link between teacher and school characteristics and social skills, behavioral engagement, and academic achievement.
The third notable limitation is related to the data provided by the ECLS-K:2011. Specifically, the current study examined behavioral engagement and reading and math achievement at both the fourth and fifth grade and examined social skills in the fourth grade, but did not test how the relationship between social skills and behavioral engagement develop in early elementary school. Other researchers have noted that students may demonstrate lower behavioral engagement as they progress through schooling, suggesting that behavioral engagement may better predict academic achievement in early elementary compared to later elementary (Greenwood et al., 2002; Li et al., 2010; Li & Lerner, 2011). Comparatively, other researchers have noted that behavioral engagement and social skills may prove particularly useful in early childhood, as children are tasked with mastering peer play, a key developmental task indicative of future school success (Anthony et al., 2021; Fantuzzo & McWayne, 2002; Mahatmya et al., 2012). However, as children progress into middle childhood and adolescence, greater emphasis is placed on following rules valued in society (Mahatmya et al., 2012). Additionally, future research should examine how males and females may differ in these effects given previous researchers have demonstrated girls are consistently rated higher on measures of social skills compared to boys (Hajovsky et al., 2021). Further, boys demonstrate more variability in their ratings of social skills and future research should consider how this variability may influence the relationship between social skills, behavioral engagement, and academic achievement (Hajovsky et al., 2021). This limitation should encourage future researchers to further examine the early developmental patterns of behavioral engagement and social skills and the constructs’ relationship to reading and math achievement.

Finally, the present study explored one component of engagement and omitted other relevant components of engagement, including cognitive and emotional engagement (Fredericks
et al., 2004). Previous researchers have highlighted how action-oriented behaviors do not occur in isolation and cognitive and emotional engagement may provide additive and interactive links between social skills and reading and math achievement (Reschly & Christenson, 2012). Although behavioral engagement provides a more observable measure of the engagement construct, future researchers may consider examining how students’ internal reactions and investments in learning may provide a better link between students’ social skills and reading and math achievement.

Conclusion

Altogether, the present study demonstrated important findings in examining if behavioral engagement mediates the relationship between social skills and reading and math achievement. Altogether, the results demonstrated findings, inconsistent with previous research, that behavioral engagement did not meaningfully contribute to future reading and math achievement at the fourth and fifth grade. Additionally, the findings suggested that social skills demonstrated significant effects on subsequent behavioral engagement. Therefore, future researchers interested in examining predictors of other student outcomes, such as attendance or drop-out, may find social skills and behavioral engagement an advantageous avenue to examine in improving these outcomes, especially in earlier years of schooling. Finally, the present study found that social skills demonstrated stronger direct effects on academic achievement on reading and math achievement than indirectly through behavioral engagement.
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