

ABSTRACT

Title of Dissertation: THE LONGITUDINAL EFFECTS OF
BEHAVIORAL PROBLEMS ON
ACADEMIC PERFORMANCE

Phuong Anna Vu, PhD, 2012

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Counseling and Personnel Services

Students' behavior and emotional well being are instrumental for their success in the school setting. The present study examined the effects of behavioral problems on the academic performance of students three years later. The behavioral problems consisted of individual externalizing, internalizing, and inattentive behaviors. Next, this study examined the classroom-level of externalizing behaviors and the cross-level interaction between individual-level behavioral problems and classroom-level externalizing behaviors on the academic performance of students. Further, the moderating effects of sex and FARM on the associations between behavioral problems and academic performance were studied. The academic performance of students was measured by teacher reported grades and standardized achievement assessment scores. The participants were fifth grade students ($N = 2,677$) in 193 classrooms from 45 public schools in the mid-Atlantic region. Results indicated that individual inattentive behaviors and

classroom-level of externalizing behaviors negatively and significantly predicted academic performance three years later. Although it was hypothesized that the negative effects of behavioral problems on the academic performance of students would be greater being in classrooms with higher average levels of externalizing behaviors, the opposite was found. The negative effects of behavioral problems on academic performance were greater for students who were in classrooms with lower average levels of externalizing behaviors. Overall, results here confirmed the previous literature supporting the negative effects of inattentive behaviors and classroom-level externalizing behaviors on the students' academic grades and achievement test scores.

THE LONGITUDINAL EFFECTS OF BEHAVIORAL PROBLEMS ON
ACADEMIC PERFORMANCE

By

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Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2012

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Acknowledgements

To my dissertation chair, Dr. William Strein, I would like to express my sincere gratitude and appreciation for all of your guidance, patience, encouragement, and time. The completion of my doctoral dissertation would not have been possible without your support. Thank you for helping to make my professional aspirations become a reality.

This research was supported in part by Institute of Education Sciences (IES) grant #R305F050051. Opinions expressed do not necessarily reflect those of the sponsor. I am grateful for the contributions of the Instructional Consultation Teams evaluation research group at the University of Maryland (Sylvia Rosenfield, Gary Gottfredson, Katherine Bruckman, Jessica Koehler, Lauren Kaiser, Deborah Nelson, and Todd Gravois).

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The Longitudinal Effects of Behavioral Problems on Academic Performance

Chapter I: Introduction

Background and Significance

Once students enter the school setting, their behaviors, interpersonal relations, and emotional adjustments contribute to their successful academic development. Positive school behaviors and interpersonal relations represent good adjustments in the school setting, whereas negative school behaviors and interpersonal relations represent poor school adjustments. Harrison, Vannest, Davis, and Reynolds (2012) found that the most common problem behaviors for children and adolescents, as reported by their teachers in general education classrooms in the United States, were categorized as externalizing, internalizing, and inattentive behaviors. Externalizing, internalizing, and inattentive behavioral problems have been linked to academic difficulties (Arnold, 1997; Breslau, Miller, Breslau, Bohnert, Lucia, & Schweitzer, 2009; Hinshaw, 1992; Masten et al., 2005). Therefore, it is important to further study these behaviors and how they affect the students' academic performance to better provide the students with more appropriate and effective interventions.

Theoretically, students with behavioral problems elicit rejection and tension from others such as teachers or same aged peers (Hankin, Stone & Wright, 2010). When students behave in ways that are inconsistent with social expectations, teachers and peers may react negatively to those students. This creates a challenging environment for students, teachers, and peers. Not knowing how best to help those students, teachers may avoid spending time with them and

may refer them elsewhere in the school, such as to a specialist or the principal. Similarly, peers may not know how to converse or interact with the problematic students, so the peers may also avoid contact with those students. Consequently, without additional support from the teachers and peers, the problematic students become isolated and less engaged, miss opportunities to experience successful relationships, and have fewer opportunities to learn from their teachers and peers (Arnold, 1997; Arnold, Brown, Meagher, Baker, Dobbs, & Doctoroff, 2006). This pattern prevents an optimal learning environment and limits the efficacy of the teacher's classroom instruction.

At present, noticeable percentages of students are reported by their teachers to have behavioral problems, 6 to 8% in public schools overall and 11% in schools where the majority of students qualify for free lunch (Briggs-Gowan, Horwitz, Schwab-Stone, Leventhal, & Leaf, 2000; Ma, Truong, & Sturm, 2007). When teachers were asked to recall the individual occurrences of specific aggressive behaviors, the percentages were higher. According to a National Center for Educational Statistics survey, public school teachers reported that 15% of elementary students displayed acts of disrespect for their teachers, 15% of elementary students engaged in bullying among peers, 13% of elementary students displayed physical conflicts with other students, 7% of elementary students verbally abused their teachers, and 3% of elementary students created widespread disorder in their classrooms (Provasnik, Ramani, Coleman, Gilbertson, Herring, & Xie, 2007).

Definitions of Behavioral Problems

Students with problematic behaviors may display externalizing behaviors, internalizing behaviors, and have difficulties with attention. Specifically, externalizing behaviors are “action-oriented” problematic behaviors that manifest outwardly towards other people, such as conduct problems or aggressive actions. Internalizing behaviors are “thought-oriented” problematic behaviors dealing with unwanted emotions directed toward the self and manifest in inhibited, over-controlled behavior such as anxiety, fearfulness, and social withdrawal. Inattentive problems occur when students have difficulty focusing their attention toward academic objectives (Dobbs, Doctoeroff, Fisher, & Arnold, 2006; Hinshaw, 1992). The constructs of externalizing, internalizing, and inattentive behaviors have been examined over four decades of research (Achenbach & Rescorla, 2001) and with diverse populations in 30 societies (Ivanova et al., 2007). Achenbach and Rescorla concluded that the construct validity of the scales meant to measure these constructs is strong, as evidenced from their results indicating significant associations with analogous scales from other instruments, and consistent with the Diagnostic and Statistical Manual criteria.

Overview of Literature

Behavioral problems. Previous studies have investigated the association between students’ behavioral problems and students’ current and future academic success (Bub, McCartney & Willet, 2007; Hinshaw, 1992; Miles & Stipek, 2006; Rabiner, Murraray, Schmid & Malone, 2004). Students who did not demonstrate externalizing, internalizing, and inattentive behavioral problems were more

academically successful. Generally, studies indicated that students with more positive school behaviors such as staying on task, attending to the teacher, and getting along well with others tended to have higher academic grades and higher test scores (Finn, Pannozzo, & Voelkl, 1995; Masten et al., 2005; Pianta, Steinberg, & Rollins, 1995). On the other hand, students with externalizing, internalizing, or inattentive behavioral problems were more likely to experience academic difficulties. More specifically, students with problematic school behaviors, such as being easily distracted, displaying emotional distress, breaking school rules, and interacting inappropriately with others, had poorer academic grades, lower test scores, and higher school drop-out rates (Breslau et al., 2009; Hinshaw, 1992; Masten et al., 2005; McLeod & Kaiser, 2004).

Classroom-level behavioral effects and interaction effects. While, individual-level behavioral problems are significantly associated with the academic development of students (Breslau et al., 2009; Hinshaw, 1992; Masten et al., 2005; McLeod & Kaiser, 2004), the classroom context has also affected the academic success of the students. For example, students in a highly aggressive classroom tend to have more academic difficulties (Alexander, Entwisle, & Dauber, 1993; Barth, Dunlap, Dane, Lochman, & Wells, 2004; DeRosier, Cillessen, Coie, & Dodge, 1994; Koth, Bradshaw, & Leaf, 2008). Subsequently, researchers investigated how individual behaviors interact with the classroom context to affect the students' academic development. Results reported have not been consistent. Some researchers found that students with behavioral problems have poorer academic success when in a highly aggressive classroom (Kellam,

Ling, Merisca, Brown, & Ialongo, 1998; Werthamer-Larsson, Kellam, & Wheeler, 1991). Conversely, other researchers found that students with behavioral problems did not have poorer academic success as a result of being in a highly aggressive classroom (Petras, Masyn, Buckley, Ialongo, & Kellam, 2011).

Sex and FARM. The negative relationship between students' personal behavioral problems and their academic development has been long established, though the relationship varies by other student characteristics. Differences among the results have consistently emerged depending on the students' sex or FARM status. For example, academic performance of males was more negatively affected by their behavioral problems compared to females (Arnold, 1997; Kellam et al., 1998). Moreover, the academic performance of students who receives FARM assistance was more negatively affected by their behavioral problems compared to students who did not receive FARM assistance (Entwisle, Alexander & Olson, 2005; Petras et al., 2011).

Rationale and Purpose of the Current Study

Previous researchers have documented the negative effects of behavioral problems on academic performance. However, several limitations from their studies indicated a need for a more in depth longitudinal investigation of multiple behavioral problems on students' academic performance. First, some researchers examined behavioral problems without adequate statistical controls (e.g., students' other behavioral problems), which prevents confident conclusions (Breslau et al., 2009; Bub et al., 2007; Massetti et al., 2008; Masten et al., 2005;

Miles & Stipek, 2006; Obradovic, Burt, & Masten, 2010; Rabiner et al., 2004). Secondly, a few researchers studied the effects of multiple behavioral problems by constructing combined variables that consisted of many theoretical and statistical errors such as arbitrary identification of behavioral problems (August, Realmuto, MacDonald, Nugent, & Crosby, 1996; Farmer, 2001; Gresham, MacMillan, Bocian, Ward, & Forness, 1998). Studying the unique effects of different behavioral problems using uncombined approach is more appropriate. Thirdly, the interactions effects between individual variables and classroom-level behavioral context have been inconsistently reported (Kellam et al., 1998; Petras et al., 2011; Werthamer-Larsson et al., 1991). Finally, some studies failed to account for the possible moderating effects of students' sex or FARM status when the behavioral and academic variables were examined (Caprara, Barbaranelli, Pastorelli, Bandora, & Zimbardo, 2000; Horn & Packard, 1985; Miles & Stipek, 2006; Rapport, Denney, Chung, & Hustace, 2001). Therefore, this study contributes to the literature by addressing the limitations from prior studies by simultaneously investigating the effects of multiple behavioral problems on students' subsequent academic performance.

The broad purpose of this study is to examine longitudinally the effects of multiple behavioral problems on the students' academic performance. The behavioral problems of second grades students were obtained in the 2005-06 school year to determine whether their behavioral problems affected their academic performance three years later as they transitioned to the fifth grade level, 2008-09 school year. Specifically, this study seeks to determine whether

students with externalizing, internalizing, and inattentive behavioral problems will have lower academic grades and lower academic test scores three years later.

Additionally, this study seeks: (a) to examine how the externalizing behaviors of the classroom affects the students' academic performance and (b) to investigate how the individual behavioral problems interact with externalizing behaviors of the classroom to affect the students' academic performance. Mainly, this study seeks to identify whether the negative effects of students with behavioral problems on academic performance will be greater in a classroom environment with more externalizing behaviors. The final purpose of this study is to examine how students' sex and FARM moderates the relationship between behavioral problems and academic performance. Particularly, this study seeks to determine whether the relationship between behavioral problems and academic performance will be exacerbated for males or for students with lower FARM. The following research questions are proposed:

1. What is the unique effect of externalizing, internalizing or inattentive behaviors from the 2005-06 school year on academic grades and standardized tests scores three years later, 2008-09 school year, net of demographic variables and prior achievement?
2. What is the effect of being in classrooms with higher levels of externalizing behavioral problems from the 2005-06 school year on academic grades and standardized tests scores three years later, 2008-09 school year, net of other student and classroom variables?

3. Is there a cross-level interaction between average levels of classroom externalizing behaviors and the individual-level behaviors, in that, do the associations between behavioral problems and academic performance vary as function of classroom levels of behavioral problems?
4. Does sex or FARM moderate the relationships between behavioral problems and academic performance?

Chapter II: Literature Review

There is a diverse list of behavioral problems that exist in the general education classroom. Harrison et al. (2012) found that the most common problem behaviors for children and adolescents as reported by their teachers in the general education classrooms in the United States were categorized as externalizing, internalizing, and inattentive behaviors. For instance, some of the most common problem behaviors as reported by their teachers included being distracted from tasks and lectures, worrying about making mistakes, lacking concentration, demonstrating excessive movements, demonstrating self-doubt, demonstrating short attention span, worrying about what others think, misunderstanding directions, and talking without permission. Externalizing, internalizing, and inattentive behavioral problems have been linked to academic difficulties (Arnold, 1997; Breslau et al., 2009; Hinshaw, 1992; Masten et al., 2005). Therefore, it is important to further study the complexity of these behaviors and how they affect the students' academic performance to better provide the students with more appropriate and effective interventions. A review of literature on how the three different types of behaviors affect students' academic performance follows.

Externalizing Behavioral Problems and Academic Performance

Externalizing behaviors are defined as “action-oriented” problematic behaviors that manifest outwardly towards other people such as conduct problems or aggressive actions (Achenbach & Rescorla, 2001). It is important to study externalizing behaviors because of their strong associations with academic development (Arnold, 1997; Caprara et al., 2000; Henricsson & Rydell, 2004;

Hinshaw, 1992; Masten et al., 2005; Miles & Stipek, 2006; Obradovic et al., 2010).

Conceptually, externalizing behaviors may affect the students' academic performance through the principle of behavioral reinforcement (Skinner, 1938; 1956). The principle of behavioral reinforcement states that when a behavior is followed by a favorable consequence, then that behavior is more likely to be repeated in the future. Arnold (1997) posits that teachers of students with externalizing behaviors may be inadvertently reinforcing the externalizing behaviors. For instance, when the student behaves aggressively or disruptively in a general classroom for any particular reason (e.g., the academic content may be too difficult or conflict with another peer in the class), the teacher removes the student from that aversive situation or the teacher attends to the student as a reinforcer. Teachers tend to send the students with externalizing behavioral problems to the principal or counselor's office because the student becomes too disruptive to the rest of the class or the teacher is unable to deal with the student or the teachers provides the students with attention (Fabre & Walker, 1987; McConaughy & Skiba, 1993). Hence, the student learns at an early age that their externalizing behaviors allow them to escape difficult learning situations or get them extra attention from adult. The students with externalizing behaviors are missing many learning opportunities in the classrooms because they are removed from the class.

Moreover, students with externalizing behaviors tend to have a negative relationship with their teachers, which show that the teacher may not be motivated

to provide additional academic assistance or tutoring for the student (Birch & Ladd, 1998; Hamre, Pianta, Downer, & Mashbum, 1998; Hamre & Pianta, 2001; Henricsson & Rydel, 2004). Pianta's teacher-student relationship theory indicates that both the teacher and student are more motivated to work harder when they have a positive relationship, while they are less likely to work hard for each other when they have a conflicting or negative relationship (Hamre & Pianta, 2001). Once the students miss an academic lesson, they are more likely to fall behind other peers in their class. With the academic curriculum being cumulative, subsequent lessons becomes increasingly difficult and the students' poor academic performances are exacerbated.

Many researchers have examined the development of childhood externalizing behavior and subsequent school performance (Arnold, 1997; Caprara et al., 2000; Henricsson & Rydell, 2004; Hinshaw, 1992; Masten et al., 2005; Miles & Stipek, 2006; Obradovic et al., 2010). For example, Miles and Stipek examined the association between aggressive behaviors and academic performance among a sample of kindergarten and first grade students; both short-term (same year) and long-term (two and four years later) associations were examined. Concurrent correlation results revealed that students with high levels of aggression, as reported by their teachers, were more likely to exhibit literacy difficulties that same year. Nevertheless, long-term results from their path analyses revealed that aggressive students in first grade did not exhibit literacy difficulties in third grade, and aggressive students in third grade did not exhibit literacy difficulties in fifth grade. As a result of the path analysis method that was

utilized examined the data, they accounted for the student's prior academic performance and prior behavioral problems. Once the student's prior academic performance and prior behaviors were controlled for, the student's behavioral problems no longer significantly predicted later academic performance.

According to a different sample of young boys (i.e., ages 3 to 6 years) from low-income families, Miles and Stipek's (2006) short-term results were similarly found (Arnold, 1997). Arnold measured the boys' externalizing behaviors by observing them in their classroom and by obtaining disruptive behavioral ratings of the boys from their teacher. The researchers measured the boys' emergent academic skills by individually testing the boys' expressive vocabulary, receptive vocabulary, and letter recognition abilities. From the results of their analysis, Arnold found that young boys who exhibited higher levels of externalizing behaviors were at a much greater risk of having academic problems.

Masten et al. (2005) and Obradovic et al. (2010) examined the longitudinal relationship between externalizing behavior and academic performance over multiple assessments spanning 20 years. At the start of the study, the students were 8 to 12 years old ($N = 205$). The students were reexamined three times later: Time 1, 7 years later while they were about 17 years old; Time 2, 10 years later while they were about 20 years old; and Time 3, 20 years later while they were about 30 years old. The authors used a series of nested cascade models through structural equation modeling to test the developmental progressive effects of externalizing problems in childhood.

Based on their developmental theory and longitudinal data, Obradovic et al. described cascade models as the examination of “problems in one domain spreading to affect later development through various pathways” (p. 90). Masten et al. and Obradovic et al. found that students who had externalizing problems during the elementary school years had reduced academic competence seven years later (about 17 years old) as measured by the students’ grade point averages and parent and self-report of academic status. In turn, students who displayed academic underachievement while they were 20 years old had significantly more internalizing problems when they were 30 years old. Nevertheless, other long-term effects of externalizing behaviors were not revealed (Masten et al., 2005); the authors found that students who had externalizing behaviors when they were 17 or 20 years old did not have significantly lower academic competency when they were 30 years old.

Caprara et al. (2000) similarly examined the longitudinal effects of aggressive behaviors on the students’ later academic performance, but they found inconsistent results. Among a sample of 294 students from Rome, Italy, the students’ physically and verbally aggressive behaviors were obtained during their third grade school year via self-report, teacher report, and peer report. The students were monitored for the next five years; during the students’ eighth grade year, six different teachers reported on the students’ academic performance. Results from the structural equation modeling indicated that early levels of aggression did not significantly predict either later academic performance or later social preference. Their results remained insignificant after they controlled for

the students' prior academic skills. The generalization of these results to U.S. schools is limited because the research was conducted in an Italian context. The contextual differences (e.g., different grading system and different perception of aggression) may explain the insignificant effects of early aggression.

Summary of externalizing behaviors and academic performance.

Previous studies have linked externalizing behaviors with later academic development; however, the long-term effects have not always been consistent. Generally, students with externalizing behavioral problems were more likely to have academic difficulties in school. Similar negative effects of externalizing behavioral problems on academic performance have been found among students in early elementary school years (i.e., preschool, kindergarten, and first grade students; Arnold, 1997; Henricsson & Rydell, 2004; Miles & Stipek, 2006) and among students in later elementary school years to middle school years (i.e., fourth through eighth grade students; Masten et al., 2005; Obradovic et al., 2010).

The concurrent and long-term effects of externalizing behavioral problems on academic performance have been examined in the literature. Although the concurrent effects of externalizing behavioral problems have been consistent, the long-term effects have not been as stable. Concurrent results indicated that students with externalizing behavioral problems constantly had more academic problems during the same school year (Arnold, 1997; Miles & Stipek, 2006). Nevertheless, longitudinal results have varied. For example, three longitudinal studies indicated that students with externalizing behavioral problems had poorer academic performance two years later (Henricsson & Rydell, 2004) and seven

years later (Masten et al., 2005; Obradovic et al., 2010). Conversely, three other longitudinal studies indicated that students with externalizing behavioral problems did not have academic difficulties two years later, four years later (Miles & Stipek, 2006), five years later (Caprara et al., 2000), and ten years later (Masten et al., 2005). Variation in findings may have been attributed to a variety of ways the researchers defined externalizing behaviors, how they defined academic performance, or the differential effects of the context. For instance, while Miles and Stipek (2006) determined the students' academic performance by measuring their literacy skills, Masten et al. (2005) determined the students' academic performance by obtaining their grade point averages and parent, teacher, and self reports.

Internalizing Behavioral Problems and Academic Performance

Internalizing behaviors are defined as “thought-oriented” problematic behaviors dealing with unwanted emotions directed toward the self and manifested in inhibited, over-controlled behavior such as anxiety, fearfulness, and social withdrawal (Achenbach & Rescorla, 2001). Students who exhibit internalizing behaviors struggle academically (Bub et al., 2007; Horn & Packard, 1985; Massetti et al., 2008; Rapport et al., 2001). Hence, it behooves researchers to investigate and better understand the effects of internalizing behaviors on academic development.

Conceptually, internalizing behaviors affect the students' academic performance through both their cognitive and physiological symptoms. Students with internalizing behaviors exhibit cognitive symptoms such as feelings of low

self-worth, self-doubt, and learned helplessness and physiological symptoms such as muscle tension, elevated heart rate, sweating, shaking, and feeling sick (APA, 1995; McDonald, 2001). When students have these cognitive and physiological symptoms, they are preoccupied and are unable to attend to the teacher or academic content (Wu, West, & Hughes, 2010). As a result, the amount of academic content that these students learn is significantly reduced.

Cole, Martin, and Powers (1997) posit that the association between internalizing behaviors and academic performance is a reciprocal causal process. For instance, when the low performing students are identified by the teacher and peers as a struggling student (i.e., negatively perceived), the student's internalizing symptoms such as self-perceived incompetence, insecurities, and worrying thoughts are heightened. This leads the student to be even more distracted from the academic content and become more worried about how others negatively perceive them. This reciprocal process indicates that students with internalizing behaviors will produce many academic difficulties.

Internalizing behavioral problems have been shown to influence the academic development of students (Horn & Packard, 1985; Massetti et al., 2008; Rapport et al., 2001). For example, Horn and Packard (1985) reported on the meta-analysis of 58 correlational studies and found negative effects of internalizing behaviors on later learning problems. The studies included in this meta-analysis used the students' problematic behaviors that were measured during their kindergarten or first grade school year to predict the students' reading achievement during elementary school. Among the array of predictor variables

used among the 58 studies, 6 categories emerged as predictors of later reading achievement of the students: (a) language variable (e.g., students' expressive, receptive, and written language), (b) sensory variable (e.g., auditory, visual, and perceptual measures), (c) behavioral-emotional variable (e.g., attention/distractibility, externalizing, internalizing, and social skills), (d) neurological variables (e.g., fine and gross motor skills), (e) IQ measures, and (f) teacher ratings of academic performance.

The authors reported that the two best predictors of reading achievement were attention/distractibility behavioral problem, with a mean r of .63, and internalizing behavioral problem, with a mean r of .59. The authors also examined the correlations separately for the two different grade level outcomes (i.e., reading performance at the end of the same year and reading performance a year later, during the second or third grade). The behavioral results were as follow: (a) attention/distractibility behavioral problem was better at predicting the reading performance for the same year compared to a year later, a mean r of .71 in first grade and a mean r of .43 in the second/third grade; (b) externalizing behavioral problem was better at predicting the reading performance a year later compared to the same year, a mean r of .46 in first grade and a mean r of .78 in the second/third grade; and (c) internalizing behavioral problem was better at predicting the reading performance a year later compared to the same year, a mean r of .56 in first grade and a mean r of .72 in the second/third grade.

The negative effects of internalizing behavioral problems on academic performance were also found in a study that examined both the short- and long-

term effects among a sample of 325 students in elementary school (Rapport et al., 2001). At the start of the study, Rapport et al. obtained the students' intelligence (i.e., measured by two subtests from the Kaufman Brief Intelligence Test, K-BIT), internalizing behavior (i.e., teacher reported on the students' anxiety/depression and social withdrawal), classroom performance (i.e., teacher reported on the students' academic success and productivity), and cognitive function (i.e., their performance on the vigilance/continuous test and short-term memory test). The students were then monitored for the next three to four years when the authors obtained the students' academic performance in three areas (i.e., reading, math, and language). The authors used structural equation modeling to examine the concurrent and longitudinal effects of internalizing behaviors.

They found that socially withdrawn behaviors were directly associated with classroom performance, but not directly with cognitive functioning or with later scholastic performance; however, socially withdrawn behaviors were indirectly associated with later scholastic performance. Therefore, the results imply that socially withdrawn behaviors indirectly affect later scholastic performance via classroom performance. Conversely, the authors found that anxious/depressive behaviors were directly associated with cognitive functioning but not directly with classroom performance or later scholastic performance; however, anxious/depressive behaviors were indirectly associated with later scholastic performance. Hence, the results imply that anxious/depressive behaviors indirectly affect later scholastic performance via cognitive functioning.

An association between internalizing behaviors and academic performance has also been reported among students with attentive impairments over an eight year period (Massetti et al., 2008). Regression results indicated that elevated inattentive behaviors and internalizing behaviors (i.e., anxiety and depression) identified by parents in early childhood (ages ranged from 3 to 5) significantly predicted lower reading and mathematics test scores eight years later (ages ranged from 11 to 13). The negative effects of internalizing problems remained after controlling for students' attentive impairments, intelligence level, sex, race-ethnicity, and FARM.

Summary of internalizing behaviors and academic performance.

Prior studies have strong evidence indicating significant relationships between internalizing behaviors and academic success. More specifically, students with internalizing behavioral problems were more likely to exhibit academic struggles in school. Consistent negative effects of internalizing behavioral problems on academic performance were found across different grade levels. For instance, internalizing behavioral problems significantly predicted more learning problems and lower reading performance among preschool students (Massetti et al., 2008), kindergarten through first grade students (Horn & Packard, 1985), and second through ninth grade students (Rapport et al., 2001).

Furthermore, researchers have reported consistent negative effects of internalizing behavioral problems among concurrent and longitudinal studies. For example, students with internalizing behavioral problems had lower reading performance, poorer classroom performance, and lower scholastic performance

scores during the same school year (Horn & Packard, 1985), one year later (Horn & Packard, 1985), two years later (Bub et al. (2007), three to four years later (Rapport et al., 2001), and eight years later (Massetti et al., 2008).

Externalizing and Internalizing Behavioral Problems and Academic Performance

Many researchers have studied both externalizing and internalizing behavioral problems together and have found negative effects (Bub et al., 2007; Henricsson & Rydell, 2004; Rabiner et al., 2004). For example, Henricsson and Rydell (2004) examined the teacher-child relations and self-perceptions of elementary school students who had behavioral problems. The sample consisted of 95 first grade students in 23 classes from a Swedish city; the students were followed through their third grade school year. Students' externalizing problems, internalizing problems, and social competence were reported by their teachers during the spring of first grade.

During second grade, aggressive behaviors, withdrawn behaviors, teachers' corrections of students' disruptive behaviors, mutual anger interactions between the teachers and students and positive interactions between the teachers and students were obtained via independent classroom observations. Mutual anger interactions between the teacher and students were defined as students exhibiting uncommon hostile behaviors such as disobedience, disruptive talk, irritated or angry remarks targeted at the teachers and as teachers exhibiting uncommon hostile behaviors such as physical restraints, dismissive behaviors, irritated or angry remarks targeted at the students.

Finally, during their third grade, the students were interviewed about the self-perceptions of physical well-being, achievement in school, psychological well-being, and social relations with peers and teachers, and the teachers also reported on their relationships with the students and behavioral problems of the students. The authors found that students who had externalizing problems had poorer self-perceptions, had more conflictual relations with the teachers, and more negative attitudes toward the teachers. Further, students who had internalizing problems had more dependent and conflictual relations with the teachers.

Bub et al. (2007) examined the effects of behavioral problems on cognitive ability and academic skills. In a sample of young children, the researchers measured the children's internalizing and externalizing behaviors during their preschool years (i.e., 2 through 4 years old) by obtaining the parents' reports. During the students' first grade school year (i.e., 5 years old), the students were individually administered seven subtests of the Woodcock-Johnson Psycho-Educational Battery-Revised to measure their cognitive ability and academic skills.

The researchers found that higher levels of internalizing and externalizing behaviors during preschool significantly predicted lower cognitive ability and academic skills at first grade; results remained after sex and ethnicity differences were controlled for. The authors also investigated the growth rate of behavioral problems and its effects on the students' cognitive ability and academic skills. They found that positive rates of change in internalizing behaviors between ages two and four significantly predicted lower cognitive ability at age five. Contrary

to their hypothesis, the authors found positive rates of growth in externalizing behaviors between ages two and four did not significantly predict lower cognitive ability at age five. From these results, the authors surmised that internalizing behaviors are more important than externalizing behaviors on influencing the students' academic development.

Rabiner et al. (2004) investigated the relationship between various behaviors and academic performance in a sample of 621 first grade students from eight public elementary schools. Towards the end of the school year, the teachers were asked to complete rating scales that measured the students' behaviors (i.e., oppositional, anxious/shy, inattentive, and hyperactive behaviors) and academic performance across three content areas (i.e., reading, math, and written language). Results from the initial correlations indicated that the students' behavioral problems were negatively related to academic performance. By relying on the magnitude of the correlation coefficients, the authors determined that inattentive behaviors had the strongest relationship with academic performance compared to oppositional, anxious/shy, and hyperactive behaviors.

Summary of externalizing and internalizing behaviors and academic performance. Among the studies that examined different types of externalizing and internalizing behaviors together, many negative effects were reported, poorer self-perceptions, lower cognitive ability, and lower academic performance. Nevertheless, several variations emerged. Henricsson and Rydell (2004) found that students with externalizing behaviors, but not internalizing behaviors, were significantly related to academic self-perception. Rabiner et al. (2004) found that

inattentive behaviors, but not other behaviors, significantly predicted academic performance.

Differences in findings may have been attributed to multiple reasons. First, different methods of measuring the student's behaviors were used. For example, Henricsson and Rydell (2004) and Rabiner et al. (2004) obtained the teacher's reports on the student's behaviors while Bub et al. (2007) obtained the parent's reports on the student's behaviors. Second, significantly different samples were used to study similar behavioral variables. For example, Henricsson and Rydell (2004) studied a group of Swedish elementary students while Rabiner et al. (2004) and Bub et al. (2007) studied students from the United States. Finally, different outcome measures were used across the studies. For example, Henricsson and Rydell (2004) measured the student's self-perception, Bub et al. (2007) administered objective assessment measures, and Rabiner et al. (2004) obtained the teacher reported academic grades.

Inattentive Behavioral Problems and Academic Performance

Inattentive behavioral problems are defined as having difficulty focusing their attention on the academic objectives, the teacher, or school-related tasks (Dobbs et al., 2006; Hinshaw, 1992). With a growing number of teachers reporting attention-related behaviors in their classrooms and studies linking inattentive behaviors with academic difficulties (Breslau et al., 2009; Finn et al., 1995; Rabiner, Coie, & The Conduct Problems Prevention Research Group, 2000; Rabiner et al., 2004), it is of value for researchers to examine inattentive behaviors in more detail.

Conceptually, inattentive behaviors affect the students' academic performance through their behavioral symptoms such as an inability to self-regulate and sustain their attention on the objective. As a result of their inattentive behaviors, the students will obtain only parts or sections of the academic lessons. Their learning is inefficient; this leaves the students with an incomplete understanding of the academic content. Their abilities to learn the basic skills are impeded (Breslau et al., 2009). Naturally, these students will struggle to maintain the pace of the class. Once the student begins to struggle with the academic content, they will become increasingly disengaged because they do not understand the content, do not understand the assignment, and are unable to participate during class discussion. Furthermore, inattentive students tend to be neglected because their behaviors are generally covert and not distracting to the teacher or other peers (Warner-Rogers, Taylor, Taylor, & Sandberg, 2000). The students' inattentive behaviors and academic problems go unnoticed for a long period of time which results in more academic struggles.

Many researchers have investigated the effects of inattentive behavioral problems and have consistently reported significant associations with academic performance. In particular, students who have higher levels of attention generally have better academic performance, including better grade point averages, more academic persistence and resilience, and higher academic test scores (Breslau et al., 2009; Finn et al., 1995; Rabiner, Coie, & The Conduct Problems Prevention Research Group, 2000; Rabiner et al., 2004;).

The negative association between inattentive behavior and academic performance was reported in another study (Finn et al., 1995). Finn et al. (1995) examined the associations between inattentive behavior and performance among 1,013 fourth grade students. In the fall of the students' fourth grade, the classroom teachers were asked to report on the students' inattentive behaviors with items such as "doesn't seem to know what is going on in class" and "doesn't take independent initiative, must be helped to get started and kept going on work" (Finn et al., 1995, p. 425). The students' academic performance was measured by the spring of their fourth grade using both the norm-referenced and criterion-referenced tests. Multivariate analysis of variance (MANOVA) results indicated that students who were more attentive and compliant to the teachers' classroom instructions and directions had significantly higher test scores, and the students who were inattentive performed significantly worse on the academic measures.

In a longitudinal study, Rabiner et al. (2000) studied the effects of early inattentive problems on academic performance among a sample of 387 students from four states. During the students' kindergarten school year, their behaviors (i.e., inattentive, overactive, externalizing, and internalizing behaviors) and parental involvement in education were measured by teacher-reported surveys, and the students' intelligence was measured by their performance on two individually administered subtests (i.e., Vocabulary and Block Design subtests) from the Wechsler Intelligence Scale for Children-Revised, WISC-R. The students were then monitored for the next five years; the students' reading performance was measured in the fifth grade by their performance on two

individually administered subtests (i.e., Letter-Word Identification and Passage Comprehension subtests) from the Woodcock-Johnson Psychoeducational Battery-Revised.

Based on the magnitude of the initial correlation coefficients, the authors found that intelligence and inattentive behaviors showed the strongest association with reading performance. To examine the longitudinal association between behavioral problems and later reading performance, the authors used multiple regression analyses and found that only inattentive behaviors significantly predicted later reading performance after controlling for intelligence, prior reading performance, and parental involvement in education. Results were similar for boys and girls.

The negative effects of early inattentive behavioral problems remained after 10 years (Breslau et al., 2009). Breslau et al. studied students' externalizing, internalizing, and inattentive behavioral problems at age 6 ($N = 693$). The students' academic performance outcomes were assessed at age 17. When initially examined separately, the regression results indicated that externalizing, internalizing, and inattentive behavioral problems significantly predicted lower math and reading achievement scores as measured by the Woodcock-Johnson Revised Achievement test net of earlier IQ, low birth weight, sex, maternal education, and maternal marital status. When they examined the behaviors together, regression analyses results indicated that externalizing behaviors no longer significantly predicted lower academic performance scores after controlling for inattentive behaviors. Similarly, results indicated that internalizing

behaviors no longer significantly predicted lower academic performance scores after controlling for inattentive behaviors. In contrast, inattentive behavioral problems continued to significantly predict lower math and reading scores at age 17 after controlling for both externalizing and internalizing behaviors. Based on the results, the authors concluded that students' early inattentive behavioral problems have negative, long-term effects.

Summary of inattentive behaviors and academic performance.

Researchers have demonstrated a strong and stable relationship between inattentive behavioral problems and negative academic development. Mainly, students who exhibited attention difficulties in school were more likely to struggle academically. The negative effects of inattentive behaviors on academic performance have been indicated across different grade levels. For example, inattentive behavioral problems significantly predicted more academic difficulties among kindergarten students (Rabiner et al., 2000), first grade students (Rabiner et al., 2004; Breslau et al., 2009), and fourth grade students (Finn et al., 1995).

Consistent negative effects of inattentive behavioral problems on the students' academic success have been indicated among numerous concurrent and longitudinal studies. For example, results from concurrent studies indicated that students with attention problems had lower reading, math, and writing grades during the same school year (Rabiner et al., 2004) and lower norm-referenced and criterion-referenced tests scores during the same school year (Finn et al., 1995). Results from longitudinal studies indicated students with attention problems had

lower standardized test scores five years later (Rabiner et al., 2000) and lower math and reading performance scores 10 years later (Breslau et al., 2009).

Multiple Behavioral Problems and Academic Performance

Prior researchers have studied the effects of behavioral problems separately from one another; those results should be cautiously interpreted. It is necessary to study these significant behavioral problems simultaneously, as there is high comorbidity and high correlations among behavioral problems (Barriga et al., 2002; McConaughy & Achenbach, 1994). For instance, students with externalizing behaviors also exhibit attention problems (Frick et al., 1991); students with internalizing behavioral also exhibit attention problems (Jensen, Martin, & Cantwell, 1997); and students with externalizing behaviors also have internalizing behaviors (Fischer, Rolf, Hasazi, & Cummings, 1984). The effects of behavioral problems on the students' academic performance are confounded by other behavioral problems of the students. Differentiating the behavioral problems is difficult. Hence, it is important to examine the unique effects of the behavioral problems while accounting for the students' other problems.

It is especially important to study the multiple behavioral problems simultaneously within a school setting. Theoretically, teachers have an even more difficult time differentiating and reporting on the students' behaviors. The validity of the teacher's report on student behaviors in the classroom is limited because the teacher is responsible for an average of 24 students in their classroom (Kazdin, Esveldt-Dawson, & Loar, 1983).

Kazdin et al. (1983) examined the correspondence of teacher behavioral ratings and external personnel behavioral ratings with the direct behavioral observations of the students and found that data from external raters corresponded more closely with direct observations than with data from teacher ratings. The teachers viewed the students' behaviors subjectively, in that the teachers reported more positive behaviors and less disruption than the objective data obtained from the direct observations. Secondly, the validity of teacher reports on student behaviors are limited because of the amount of time that has elapsed since the student exhibited the behaviors. Teachers are generally asked to report on the students' behaviors at the end of the school year, and the teacher may not be able to recall all of the information. Finally, the validity of the teacher's report on the students' behavior is additionally problematic because it is difficult for the teacher to differentiate whether the students were exhibiting externalizing, internalizing, or inattentive behaviors. For instance, when a student is misbehaving, the teacher tends to report that the student is both aggressive and inattentive in the classroom. Therefore, it is difficult to study one behavior exclusively from the other behavioral problems; it is important to examine the effects of multiple behavioral problems simultaneously.

The effects of multiple behavioral problems on academic performance have been studied in different ways. The first approach is the combined variable approach which is the construction of a combined variable consisting of two or more original variables (Pedhazur, 1997). The second approach is uncombined variable approach which is described as evaluating the separate effects of multiple

independent variables on the dependent variable (Pedhazur, 1997). A review of multiple behavioral problems using the different approaches and their findings follows.

The combined variable approach. One approach used to examine the effects of multiple behavioral problems is the construction of a combined variable; various findings have emerged (August et al., 1996; Farmer, 2001; Gresham et al., 1998). For example, Farmer investigated the combination of externalizing and internalizing behaviors on the social and cognitive competencies of 754 students. Based on the teachers' reports of the students' behaviors in the first grade, the author identified the students as aggressive students because they scored .75 SD above the mean, as withdrawn students because they scored .75 SD above the mean, as aggressive and withdrawn students because they scored .75 SD above the mean on both scales, and as students with no problems because they scored .75 SD below the mean on both scales. A series of one-way multivariate analyses of variance (MANOVA) and *post hoc* analyses were used to determine significant differences among all groups.

Results were reported as follow: (a) students in the combined aggressive and withdrawn group scored significantly lower on the emotional recognition and expressiveness scales compared to students in all three of the other groups; (b) students in the combined aggressive and withdrawn group and students in the aggressive only group scored significantly lower than students in the withdrawn only group and students in the control group on the prosocial behavioral scales;

(c) students in the combined aggressive and withdrawn group differed significantly from the control group but did not differ from aggressive only group according to students' inattentive behaviors; and (d) students in the combined aggressive and withdrawn group differed significantly from the withdrawn only and control groups but did not differ from aggressive only group according to cognitive competency measures (i.e., subtest scores from the Wechsler Intelligence Scale for Children-WISC). Overall, there appears to be no significant cognitive differences between students who had only aggressive behaviors and students who had a combination of aggressive and withdrawn behaviors.

To examine longitudinally the predictability of the different behaviorally disordered groups on their later social and cognitive outcomes, Farmer (2001) monitored a group of first grade students for the next two years. The students' social and cognitive skills were obtained during their third grade school year. Regression analyses revealed that students in the combined aggressive and withdrawn group and aggressive only group had significantly poorer prosocial skills as nominated by their peers. Students in the combined aggressive and withdrawn group had significantly more depressive symptoms in the third grade. Overall, contrary to Farmer's hypotheses, there were no cognitive differences between aggressive only group and the combined aggressive and withdrawn group. Furthermore, neither the combined disordered group nor the single disordered groups in first grade was significantly associated with later cognitive performance of students in the third grade.

Contradictory to Farmer's (2001) findings, Gresham et al. (1998) found differential patterns between combined and single behaviorally disordered groups. Gresham et al. examined the effects of combined behavioral problems on students' social, affective, and academic domains. Third grade students were categorized into three groups: students were included in the hyperactive and conduct-problematic group (HIA+CP) because they obtained scores of 2 SD above the gender mean on both scales; students were included in the internalizing and externalizing behavioral group (I+E) because they obtained scores of 1 SD above the gender mean on both scales; and students were included in the control group because they had average academic performance, classroom behaviors, and have never been referred for school-related problems. They used a series of two-way repeated-measures multivariate analyses of variance (MANOVA) and *post hoc* analyses to determine significant differences among all groups.

At the end of the students' fourth grade, Gresham et al. reported that following results: (a) the combined HIA+CP group exhibited more social and academic difficulties than the combined I+E group who exhibited more social and academic difficulties than the control group; (b) students in the combined HIA+CP group and students in the combined I+E group were less socially accepted, had fewer friends, and had more social rejection than students in the control group; (c) students in the combined HIA+CP group and students in the combined I+E group had poorer social skills and had lower academic competencies than students in the control group; (d) students in both combined problematic groups (i.e., HIA+CP and I+E) had more negative narrative

comments, had more disciplinary referrals, and obtained lower reading and math scores compared to students in the control group; (e) the students in the combined I+E group obtained significantly lower math scores than students in the combined HIA+CP group and control group; (f) students in the combined HIA+CP group felt lonelier than students in the combined I+E group who felt lonelier than students in the control group; and (g) the academic self-concept of students in both the combined problematic groups (i.e., HIA+CP and I+E) was worse than the self-concept of students in the control groups.

Using a much more conservative standard to identify students with significant behavioral problems, August et al. (1996) studied the patterns of comorbidity among an initial sample of 7,231 first through fourth grade students from twenty-two elementary schools. The students were evaluated, and 318 students obtained a child psychiatric diagnosis based on the Diagnostic Interview for Children and Adolescents (DICA) by applying the DSM-III-R criteria. They studied the differential risks associated with comorbidity by comparing the patterns among the following five groups: ADHD with externalizing and internalizing disorders (ADHD + Ext + Int); ADHD and externalizing disorder (ADHD + Ext); ADHD and internalizing disorder (ADHD + Int); ADHD only (ADHD); and no diagnosis. The students' behavioral outcomes were based on self-report, parent report, and teacher reports, and their academic performance was based on their performance on intelligence, spelling, arithmetic, and broad reading tests. Multivariate analysis of variance (MANOVA) and *post hoc* analyses were used to determine significant differences among the various groups.

The following results were reported: (a) the ADHD only group was rated more disruptive than the no diagnosis group; (b) the parent ratings indicated that all comorbid groups were more disruptive than no diagnosis group; (c) the teacher ratings revealed that students in the ADHD + Ext group were more aggressive and delinquent than students in the ADHD + Int group and no diagnosis groups; (d) the parent ratings revealed that students in the ADHD + Ext + Int group and ADHD + Ext group were more aggressive and delinquent than all other groups; (e) no significant depressive or anxious behavioral differences among the five groups; and (f) no significant differences were found among the groups according to the students' intelligence, spelling, arithmetic, and broad reading tests. Based on the findings, the authors concluded that comorbid groups, ADHD + Ext + Int group and ADHD + Ext group, were associated with worse behavioral patterns than all other groups.

Limitations of the combined variable approach. Although the combined variable approach has contributed to the literature, this approach has many limitations (Dinero, 1996; Royston, Altman, & Sauerbrei, 2006; Taylor & Yu, 2002). The first limitation is that the authors attempt to conclude that a different group of students exist (i.e., a group of students with combined behavioral problems) and that their effects are stronger than the effects of a group of students with only one behavioral problem. Nevertheless, they were unable to determine whether the results support the existence of a group with combined behavioral problems or interactions between the behavioral problems. Secondly, because the authors dichotomized the continuous variables to create the combined variable,

this approach resulted in a loss of statistical power and efficiency. For example, when the authors dichotomized the continuous variables, the probability of results with false positive findings may have increased because their ability to detect real associations between the variables was lost. Thirdly, this approach resulted in ambiguous interpretation of the results because of their arbitrary classification of the categories. For example, Farmer (2001) used a lax standard to identify the behaviorally problematic students (e.g., .75 SD above the mean), Gresham et al. (1998) used two different standards to identify the behaviorally problematic students (e.g., 1 and 2 SD above the mean), and August et al. (1996) used the most conservative standard to identify the behaviorally problematic students (e.g., students with diagnosed disorders based on the DSM criteria). The findings were not consistent across the studies and cannot be generalized because the authors used different classification of the categories. Given that they have yet to identify the exact cut-off scores to define students with combined behavioral problems, it is difficult to draw conclusions from any of these studies.

Uncombined variable approach. Uncombined variable approach is an alternative method used to examine the effects of multiple behavioral problems. The many limitations associated with using the combined variable approach led more recent researchers to use the second approach, uncombined variable approach, to study the effects of multiple behavioral problems. Uncombined variable approach examines the separate effects of multiple independent variables on the dependent variable (Pedhazur, 1997). This approach has been proven to be much more insightful when studying multiple behavioral problems and does not

have the limitations associated with the combined variable approach (Barriga et al, 2002; Duncan et al., 2007; Farmer & Bierman, 2002; Janosz, LeBlanc, Boulerice, & Tremblay, 1997; McLeod & Kaiser, 2004).

Duncan et al. (2007) examined many variables, school-entry readiness, attention, and socio-emotional skills (e.g., externalizing and internalizing behaviors), in an effort to identify the predictors of later academic performance. Using an impressive sample of six large-scale longitudinal studies from across the United States, Great Britain, and Canada, the authors separately analyzed each sample and conducted a meta-analysis of all the samples. Students' school-entry readiness, attention, and socio-emotional behaviors were obtained at the time that they entered elementary school, age 5 or 6, and were based on mothers' reports, teachers' reports, and observations of the students. The students' academic performance outcome was obtained three and five years later, which encompassed their math and reading test scores and teachers' ratings of the students' math and reading performance.

Regression results from the six separate analyses indicated that students with higher school-entry reading skills, higher school-entry math skills, and higher attentive levels consistently had higher reading and math test scores. In contrast, students' externalizing and internalizing behaviors did not consistently predict later academic performance across the six samples; similar results emerged from the meta-analysis of all the samples. The authors found that attentive behaviors significantly predicted academic performance after controlling for the students' externalizing and internalizing behaviors. Contrary to the

authors' expectations, they found that neither externalizing behaviors nor internalizing behaviors significantly predicted academic performance after controlling for attentive behaviors. Results were similar across sex and socioeconomic backgrounds.

Similar behavioral variables were investigated among a different sample of students ($N = 58$) who were enrolled in an alternative school in an urban area of a large city (Barriga et al., 2002). The students' ages ranged from 11 to 19 years (mean age = 15 years) and were referred to the alternative school for a variety of reasons (e.g., disruptive and aggressive behaviors, depressive behaviors, poor interpersonal skills, truancy, and school phobia). Barriga et al. examined the association between a variety of behavioral problems and academic performance of these students.

The students' behavioral problems (e.g., withdrawal, somatic complaints, anxiety/depression, social problems, thought problems, inattentive problems, delinquent behaviors, and aggressive behaviors) were measured by teacher rating scales. The students' academic performance was measured from three individually administered achievement subtests (e.g., reading, spelling, and arithmetic achievement) from the Wide Range Achievement Test, Third Edition-WRAT3. Multiple regression analyses were used to assess the associations between behavioral problems and academic performance. The authors found that inattentive behavioral problems significantly predicted overall academic performance after controlling for withdrawn behaviors, somatic complaints,

delinquent behaviors, and aggressive behaviors. Results were similar across sex and ethnicity.

Farmer and Bierman (2002) examined the precursors and consequences of behavioral problems on later social and academic performance among 754 students from different states. Precursor behaviors such as inattentive, externalizing, and internalizing behaviors were obtained in the students' kindergarten school year from teacher and parent reports. In the spring of the first grade year and the third grade year, the students' problematic behaviors were reported by their teachers through interviews. Subsequently, the students' report card grades were obtained from the school records and the students' social preferences (i.e., the degree of positive peer relations or interactions as measured by their classmates' reports) at the end of grade three.

Initial correlations indicated that students who were more inattentive and aggressive in kindergarten and students who were more aggressive and withdrawn in first grade had significantly lower academic grades and were less preferred by their peers in the third grade. Results from the multiple regression analyses indicated that kindergarten levels of withdrawn behaviors significantly predicted the academic performance of the students in the third grade after controlling for aggressive and inattentive behaviors. Similarly, kindergarten levels of aggressive behaviors significantly predicted the academic performance in the third grade after controlling for withdrawn and inattentive behaviors. Conversely, kindergarten levels of inattentive behaviors did not significantly predict the

academic performance in the third grade after controlling for aggressive and withdrawn behaviors.

In a longitudinal study of over 14 years, McLeod and Kaiser (2004) explored the effects of early childhood externalizing and internalizing behavioral problems on educational attainment in adulthood. They assessed students' externalizing and internalizing problems according to parents' reports at ages 6 through 8. These students' educational attainment was then monitored for the next 14 years.

First, they examined the effects of externalizing and internalizing behaviors on educational level separately. When no background controls were included in the models, the authors found that students who had high internalizing and externalizing problems were significantly less likely to graduate from high school; however, only externalizing problems significantly predicted lower college enrollment. When all of the background controls were included in the models (i.e., student's race, sex, birth weight, and age, and mother's delinquency, academic aptitude, self-esteem, age at time of birth, education level, marital status, and poverty duration), similar results were found.

Next, to examine the effects of externalizing and internalizing behaviors together on high school degree receipt, hierarchical regression analyses were conducted. When no background controls were included in the models, externalizing problems significantly predicted high school degree receipt beyond internalizing problems; however, internalizing problems did not predict high school degree receipt beyond externalizing problems. Similar results were

reported when all of the background controls were included in the models. Finally, similar analyses were conducted to examine the effects of externalizing and internalizing behaviors together on college enrollment. When no background controls were included in the models, externalizing problems significantly predicted college enrollment beyond internalizing problems; however, internalizing problems did not predict college enrollment beyond externalizing problems. When all of the background controls were included in the models, neither externalizing nor internalizing problems significantly predicted college enrollment. Based on their findings, the authors surmised that even though both internalizing and externalizing behaviors predicted later educational attainment, externalizing behaviors were more influential and continued to affect educational attainment long after high school.

Janosz et al. (1997) longitudinally examined the most powerful predictors of school dropout among two different samples of 12 to 16 year old students; $N = 791$ in the 1974 sample and $N = 791$ in the 1985 sample. A year prior to the end of the students' graduation, information on the students' school experiences, family experiences, leisure activities, peer relations, beliefs, deviant behaviors, and personality were obtained via a self-administered Social and Personal Inventory. Initial regression analyses were performed for both samples to reduce the numbers of variables to include in the final models, so nonsignificant predictors were dropped from the models. To determine that best predictor of school dropout, the authors used the stepwise regression procedure to obtain the

largest partial regression coefficient net of all school, family, social, behavioral, and psychological predictors.

Results were similar for both the 1974 and 1985 samples, in that, the two best predictors of school dropout were school and family experiences. Next, multiple hierarchical regression models were used to examine the prediction of behavioral problems on school drop-out. Results from the 1974 sample were different from the 1985 sample. In the 1974 sample, results indicated that high levels of internalizing behaviors (i.e., withdrawn behaviors) significantly predicted school drop-out beyond school experience, family experience, and aggressive behaviors; further, high levels of aggressive behavioral problems significantly predicted school drop-out beyond school experience, family experience, and internalizing behaviors. In contrast, results were not the same in the 1985 sample. Results indicated that neither high levels aggressive behaviors nor high levels of internalizing behaviors predicted school drop-out beyond school experience, family experience, and other behavioral problems.

Summary of multiple behavioral problems and academic performance. Taken together, researchers have examined the effects of multiple behavioral problems on academic performance in different ways, the construction of a combined variable approach and the uncombined variable approach. Although both methods add to our understanding of behavioral problems differently, their results have led to inconsistent findings and lack of generalization across studies. The construction of a combined variable approach has many limitations: lack of validity in the construction of a new variable (i.e.,

comorbid behavioral problems), loss of statistical power and efficiency because of the dichotomization of continuous variables to create new variable, and inconclusive results because of the arbitrary standards in the classification of behavioral problems; however, the uncombined approach does not have any of those limitations. Therefore, to appropriately investigate the effects of multiple behavioral problems on academic performance as proposed in the present study, the uncombined approach will be utilized.

Overall, research on the effects of multiple behavioral problems on the students' academic performance using the uncombined approach produced varied results. For instance, only inattentive behaviors predicted academic performance in the same year (Barriga et al., 2002) and five years later net of externalizing and internalizing behaviors (Duncan et al., 2007). Conversely, externalizing and internalizing behaviors predicted academic performance three years later net of inattentive behaviors (Farmer & Bierman, 2002). Similarly, externalizing and internalizing behaviors predicted later school drop-out after controlling for behavioral problems in one sample; however, results were not the same in the second sample (Janosz et al., 1997). More inconsistent results were found; externalizing behaviors significantly predicted later high school degree receipt after controlling for internalizing behaviors, but internalizing behaviors did not predict later high school receipt after controlling for externalizing behaviors. Furthermore, neither externalizing nor internalizing behaviors predicted later college enrollment after controlling for other behavioral problems (McLeod & Kaiser, 2004).

The inconsistencies among these studies may be due to inadequate statistical controls. A variety of other behavioral problems may have led to their reported results. Without accounting for the students' other behavioral problems, it is difficult for the authors to be confident in their findings.

Classroom-Level Behavioral Effects and Cross-Level Interaction Effects on Academic Performance

Many researchers have studied and reported on the effects of behavioral problems on students' academic performance. Lewin's (1936) formulation, $B = f(P, E)$, holds that the behavior is the function of the person and their environment. Therefore, children's development is a result of an interaction between the individual characteristics of the children and their environments. Among the various contexts that the children interact with, the classroom environment is one of the primary settings in which the children develop behaviorally and socially. Children spend a large amount of time learning, interacting, and socializing within the classroom; thus the children's immediate environment is instrumental to their development. Therefore, researchers wanted to determine whether classroom-level behaviors may differentially affect individual behaviors of the students (Alexander et al., 1993; Barth et al., 2004; DeRosier et al., 1994; Kellam et al., 1998; Koth et al., 2008; Petras et al., 2011).

Among the three main behavioral problems within general education classrooms, externalizing, internalizing and inattentive behaviors, externalizing behavioral problems is the behavioral variable to examine at the classroom level (Barth et al., 2004). Conceptually, students with externalizing behavior present to

others as aggressive and disruptive overt behaviors. The teacher and other peers in the classroom are more likely to be distracted by students who are overtly disruptive and obtrusive; hence, classrooms with high levels of externalizing behaviors are more likely to affect individual students. For instance, when the classroom behaviors consist of many overt, externalizing behaviors, the teacher has to stop the academic lesson and spend instructional time to intervene in the externalizing behaviors. The academic instruction and learning in the classroom are impeded because the teacher and peers are distracted by the externalizing behaviors. On the other hand, students with internalizing or inattentive behaviors exhibit covert behaviors that are not as noticeable to others. The teacher and classroom peers are not distracted by students with behavioral problems that are covert (i.e., simply looking outside the window or being preoccupied by their feelings of nervousness or sadness; Warner-Rogers, Taylor, Taylor, & Sandberg, 2000). Many students with internalizing and inattentive behaviors are ignored in the classroom context (Henricsson & Rydell, 2004). Classrooms with high levels of internalizing or inattentive behaviors are not likely to affect individual students. Therefore, it is of value to examine the effects of classroom-level externalizing behaviors on the students' academic development. Moreover, prior studies have mainly examined the effects of externalizing behaviors (Alexander et al., 1993; Barth et al., 2004; DeRosier et al., 1994; Kellam et al., 1998; Koth et al., 2008; Petras et al., 2011).

Classroom-level behavioral effects. DeRosier et al. (1994) examined the influence of social context on the aggressive behaviors of 125 African American

boys in first through third grades. The students were observed for aggressive or nonaggressive behaviors throughout five play group sessions. Aggressive behavior is defined as a verbal or physical act by one child with the intention to harm, threaten, or offend others. The authors used repeated measures MANOVA and regression analyses to assess the context of aggressive behaviors. First, they wanted to examine the context of the group prior to an aggressive episode; results indicated that immediately before an aggressive episode the group context consisted of more active, more aversive, more competitive, less cohesive, and more affectively negative behaviors. Next, they wanted to examine what context predicted continued aggression after the occurrence of an aggressive episode; results indicated that when two aggressive boys increasingly interacted with each other in a group, the boys in that group were more likely to continue behaving aggressively. Moreover, a context with higher levels of aversive behaviors also predicted continued aggressive behaviors. From their study, the authors concluded that aggressive social context predicts more aggressive individual behaviors.

Using an analytical strategy that is more appropriate to study the influences of classroom context on individual behaviors, Barth et al. (2004) used multilevel models to examine how classroom composition affected students' aggression, peer relations, and academic focus over two years. The sample included 589 fourth grade students clustered in 65 classrooms. Classroom-level environment was measured by aggregated scores of students' aggression, poor peer relations, and poor academic focus. Multiple multilevel models were used in their study.

First, a two-level HLM model was used to determine whether classroom environment predicted individual peer relations and academic focus; results indicated that negative classroom environments significantly predicted poorer individual peer relations and poorer individual academic focus for the current school year (fourth grade) and the following school year (fifth grade).

Second, three-level HLM models were used to examine whether the school environment (i.e., school-level measures of poverty and academic performance) and classroom-level aggression predicted individual aggressive behaviors. Results indicated that classroom-level of aggression significantly predicted individual aggressive behaviors for the current school year (fourth grade) and the following school year (fifth grade). School-level analyses implied that schools with higher levels of poverty and lower test scores significantly predicted more individual aggressive behaviors only for the current school year (fourth grade); similar school-level results were not found the following school year.

Finally, two-level HLM models were used to examine whether their fifth grade classroom-level environments predicted individual behaviors after controlling for their fourth grade behaviors; results indicated that negative classroom environments significantly predicted higher individual aggression, poorer peer relations, and poorer academic focus net of their behaviors from the prior school year, sex, and race. Overall, the authors concluded that classroom environments are influential on individual behaviors for both the current school year and the following school year. However, school environments did not have

long lasting effects on individual behaviors; poorer school environments were observed to affect individual behaviors for the current school year and not the following school year.

Another study investigated the effects of classroom-level climate on individual behaviors and found significant classroom effects (Koth et al., 2008). Koth et al. used multilevel models to examine the effects of classroom-level variables, such as teacher characteristics, class size, and concentration of students with behavioral problems, on students' perceptions of school order and discipline and academic motivation. Using a sample of 2,468 students in the fifth grade clustered in 120 classrooms from 37 elementary schools, Koth et al. examined individual, classroom and school influences on students' perceptions of orderliness. They found that students perceived more disorder (and less academic motivation) if they were in classrooms with a higher percentage of disruptive students. Results indicated that the clustering of aggressive students within a classroom may have changed the classroom-level context, such that the large number of disruptive peers may have negatively influenced the individuals' academic motivation and perception of their classroom.

Both the short- and long-term classroom behavioral effects on academic performance were investigated by Alexander et al. (1993) in a study of first through fourth grade students. At the start of the study, the teachers were asked to report on the behaviors of the classroom: Interest-Participation versus Apathy-Withdrawal (I-P), Cooperation-Compliance versus Anger-Defiance (C-C), and Attention Span versus Restlessness (A-R). The students were monitored for the

next four years, and their academic performance was measured using teacher assigned report card grades and system-wide academic test scores (i.e., California Achievement Test, Reading and Math subtests).

First, regression results from the short-term analyses indicated that classrooms with higher levels of interest-participation and higher levels of attention were significantly associated with higher report card grades and higher academic test scores net of background characteristics (i.e., sex, race, academic test scores, family SES, and parental education). Next, results from the two-year analyses indicated that classrooms with higher levels of interest-participation had significantly higher math report card grades and higher math scores two years later net of background characteristics. Finally, results from the four-year analyses indicated that classrooms with higher levels of attention had significantly higher math scores four years later net of background characteristics. No other direct effects were found. Based on the findings, the authors concluded that classroom behaviors, especially interest-participation and attention, have immediate and lasting effects on individual academic performance.

Cross-level interaction effects. Werthamer-Larsson et al. (1991) examined the effects of classroom environment on individual maladaptive behaviors (i.e., shy behaviors, aggressive behavior, and concentration problems) among a sample of 609 students in 26 first-grade classrooms. The authors assessed two classroom environments, academic and behavioral. The academic environment of the classroom was obtained from the students' report card grades (high, average, and low achieving classrooms), and behavioral environment of the

classroom was obtained from the students' conduct grades (classrooms with typical behaviors and classrooms with high levels of conduct problems). The students' maladaptive behaviors were measured via teacher reported scales.

Using hierarchical ANOVA to examine the classroom-level effects, the results indicated that low achieving classrooms were significantly associated with higher levels of shy behaviors and higher levels of aggressive behaviors net of students' demographic characteristics (i.e., sex, age, prior grades, and grade retention). Classrooms with more conduct problems were significantly associated with higher levels of shy behaviors (but not with higher levels of aggressive behavior or with higher levels of concentration problems) net of students' demographic characteristics. Next, the authors examined the interactions between individual behavior and classroom environment. They found that retained students who were in the average achieving classrooms significantly exhibited higher levels of shy behaviors, yet retained students who were in the low achieving classrooms exhibited lower levels of shy behaviors. Further, retained students who were in the classrooms with more conduct problems exhibited significantly higher levels of aggressive behaviors.

Werthamer-Larsson et al.'s (1991) individual and classroom-level interactions were also investigated in a longitudinal study (Kellam et al., 1998). Kellam et al. examined the effects of classroom-level of aggression in the first grade on the individual aggressive behaviors as students enter middle school. The total population consisted of 1,196 first grade students and 41 teachers from Baltimore City Public Schools, but only 682 students' data were obtained when

they reached middle school six years later. A series of hierarchical logistic regression were used to examine the effects of first grade individual aggressive behavior, first grade classroom-level of aggression, and their interactions on the course of aggressive behavior into middle school. Analyses were conducted separately for sex because males were found to be significantly more aggressive than females.

Results indicated that males who were initially rated as aggressive in first grade and were in a higher aggressive first grade classroom were significantly more likely to be highly aggressive in middle school compared to all other boys. Results for girls indicated that girls who were aggressive in the first grade were significantly more aggressive in middle school; but, classroom-levels of aggression did not predict individual aggressive behavior in middle school, and no interactions were found. The authors concluded from their findings that both individual and classroom-level aggression has long-term effects on individual behaviors, but the classroom-level effects may be more evident for the boys.

Contrary to the significant interactions between individual and classroom-level behaviors from Kellem et al.'s (1998) study, Petras et al. (2011) used the participants from the same population from Baltimore City Public School but did not find the same cross-level interactions between classroom-level aggression and individual aggressive behaviors on school removal. Using multilevel models, they longitudinally examined the effects of students' individual demographic characteristics, individual aggressive behaviors, and classroom-level aggression on school removal by grades 6 and 7. During the students' first grade school

year, their demographic characteristics and aggressive behaviors were obtained via school records and teacher reports. The students' school removal was defined as either short- or long-periods of being removed from school such as suspensions and expulsions, and the school removal occurrences were obtained from their school records.

Most of their results were in the expected directions. They found that high-risk students (i.e., African-American boys who receive FARM assistance) were at a much greater risk of school removal than low-risk students (i.e., Caucasian girls who do not receive FARM assistance). Students who exhibited aggressive behaviors were at a greater risk of school removal. At the classroom-level, there was an opposite effect such that students in classes with more aggression were at a lower risk of school removal.

When examining the cross-level interactions, the results were unexpected. Cross-level interactions between individual aggressive behaviors and classroom-level aggression were not associated with higher risk of school removal. Further, the authors found that students who were considered high-risk (i.e., African-American boys who receive FARM assistance with higher levels of individual aggressive behavior) and who were in the more aggressive classrooms were less likely to be removed from school, while high-risk students in less aggressive classrooms were most likely to be removed from school.

Summary of the classroom-level behavioral effects and cross-level interaction effects on academic performance. Overall, research suggests that the individual behaviors and demographic characteristics significantly affect later

students' development. Mainly, students with characteristics, such as males, low FARM, low prior academic skills, and high levels of behavioral problems, tend to have more negative outcomes such as academic performance and socio-emotional behaviors (Entwisle et al., 2005; Petras et al., 2011). Similarly, research indicates that classroom context significantly affects individual development. Findings from the reviewed studies indicate that classrooms with higher levels of behavioral problems negatively affect the individual behaviors and academic performance (Barth et al., 2004; DeRosier et al., 1994; Kellam et al., 1998; Koth et al., 2008; Werthamer-Larsson et al., 1991).

Therefore, there are reasons to expect that cross-level interactions between individual negative characteristics and classroom-level aggressiveness would have significantly negative effects on students' development. This was evidenced by Werthamer-Larsson et al. (1991) and Kellam et al. (1998); however, more recently the cross-level interactions were not significant as evidenced by their colleagues (Petras et al., 2011). Lack of appropriate statistical control of other behavioral problems may have attributed to the inconsistent findings that emerged. More studies examining the effects of cross-level interactions between individual- and classroom-level behaviors on later academic development while controlling for the students' other behavioral problems can help to provide a better understanding of cross-level interactions.

Moderating Effects of Sex and FARM

Variations in the effects of behavioral problems on the students' academic performance have been reported based on the students' sex or FARM status

(Dauber, Alexander, & Entwisle, 1993; Kellam et al., 1998; McCoy & Reynolds, 1999; Petras et al., 2011). These results indicate a moderation effect of sex and FARM between behavioral problems and the students' academic performances. Therefore, examining the moderating effects of sex and FARM status on the relationship between behavioral problems and academic performance is important.

On average, males exhibit more aggressive behaviors, receive poorer academic grades, are more likely to be retained in the same grade, and are at a greater risk of dropping out of school than females (Dauber et al., 1993; Kellam et al., 1998; McCoy & Reynolds, 1999). Moreover, sex was found to affect the relationships between behaviors and academic performance. For example, Arnold (1997) found that young males who exhibited higher levels of externalizing behaviors were at a much greater risk of having academic problems than were females. On the other hand, Kellam et al. (1998) found that females' individual behaviors were not negatively affected by being in an aggressive classroom, while males were negatively affected by the classroom-levels of aggression.

The moderating effects of student's FARM status on behavioral problems and their academic performances are found in the literature. Students who receive FARM assistance compared to students who do not receive FARM assistance had less preschool experience, lower standardized testing scores, lower academic grades, and less educational attainment in adulthood (Entwisle et al., 2005). Further, the students' FARM status was found to affect the relationship between behaviors and academic performance. For instance, Petras et al. (2011) found that

the negative effects of behavioral problems on the students' academic development were exacerbated among students who receive FARM assistance compared to students who do not received FARM assistance.

Limitations of Prior Research

Many researchers who examined the effects of behavioral problems on the students' academic performance found inconsistencies among the results. The inconsistencies among the studies may be due to the following limitations. First, some studies reported results without adequate statistical controls (Breslau et al., 2009; Bub et al., 2007; Massetti et al., 2008; Masten et al., 2005; Miles & Stipek, 2006; Obradovic et al., 2010; Rabiner et al., 2004). A variety of other behavioral problems or demographic characteristics may have led to their reported results. For example, Miles and Stipek (2006) concluded that aggressive behaviors significantly predicted lower academic performance; however, Duncan et al. (2007) found that only inattentive problems significantly predicted lower academic performance after controlling the other behavioral problems (externalizing and internalizing behaviors). Without accounting for the students' other behavioral problems, it is difficult for the authors to be confident in their findings. Hence, in future research the behavioral problems in question have to be examined with the control of other confounding behavioral problems and demographic characteristics.

Secondly, some researchers studied the effects of multiple behavioral problems by constructing a combined variable from two original variables (August et al., 1996; Farmer, 2001; Gresham et al., 1998). This has many

limitations: lack of validity in the construction of a new variable, loss of statistical power and efficiency because of dichotomizing the continuous variables to create the new variable, and inconclusive results because of their arbitrary standards in the classification of behavioral problems. Hence, their results are inconclusive and lack generalizability. Alternatively, the uncombined variable approach does not have any of those limitations, and it can provide greater insight. Therefore, it is more appropriate to study the effects of multiple behavioral problems on the students' later academic performance using the uncombined variable approach (Barriga et al., 2002; Duncan et al., 2007; Farmer & Bierman, 2002; Janosz et al., 1997; McLeod & Kaiser, 2004).

Thirdly, cross-level interactions between individual variables (behavioral problems and demographic characteristics) and classroom-level behavioral context have not been well established in the literature. For example, students who have negative individual behaviors or demographic characteristics tend to have worse outcomes by being in an aggressive classroom (Kellam et al., 1998; Werthamer-Larsson et al., 1991). Nevertheless, a recent study contradicted prior cross-level interactions, such that students who have negative individual behaviors tend to have worse outcomes by being in a nonaggressive classroom (Petras et al., 2011). Lack of appropriate statistical control of other behavioral problems may have attributed to the inconsistent findings that emerged. More studies are needed to investigate the effects of cross-level interactions between individual characteristics and classroom-level context on later academic success that includes appropriate statistical control.

Finally, results from prior studies suggest sex and FARM status as moderating variables within the relationship between behavioral problems and academic performance. Kellam et al. (1998) found that males' individual behaviors were negatively affected by the classroom-levels of aggression but the same results were not found for females. Petras et al. (2011) found that the negative effects of behavioral problems on the students' academic development were exacerbated among students who receive FARM assistance compared to students who do not receive FARM assistance. Nonetheless, some studies fail to account for the effects of sex or FARM status when these behavioral and academic variables were examined (Caprara et al., 2000; Horn & Packard, 1985; Miles & Stipek, 2006; Rapport et al., 2001); hence, their results are limited. Therefore, examining the moderating effects of sex and FARM status on the relationship between behavioral problems and academic performance will be important.

Due to the limitations from prior studies, inconsistent results have been reported among studies that examined the effects of behavioral problems on the students' academic performance. Until researchers address the limitations, the results from previous studies should be interpreted cautiously. This study will address all of the discussed limitations. This present study will be the first to examine the longitudinal effects of multiple behavioral problems simultaneously and the effects of behavioral context of the classroom on the students' academic performance while controlling for the students' confounding behavioral problems among a large group of fifth grade students.

Overview of the Current Study

The broad goal of this study is to examine the effects of multiple behavioral problems on students' academic performance, three years later. The behavioral problems consist of individual externalizing, internalizing, and inattentive behaviors. The purposes of this study are: (a) to examine the effects of the classroom-level of externalizing behaviors on students' academic performance and (b) to investigate the cross-level interaction effects between individual-level behavioral problems and average classroom-level of externalizing behaviors on students' academic performance. The final purpose of this study is to examine the moderating effects of students' sex and FARM on the relationships between behavioral problems and academic performance. A multi-level examination of student-level and classroom-level effects will be conducted. The following research questions are proposed:

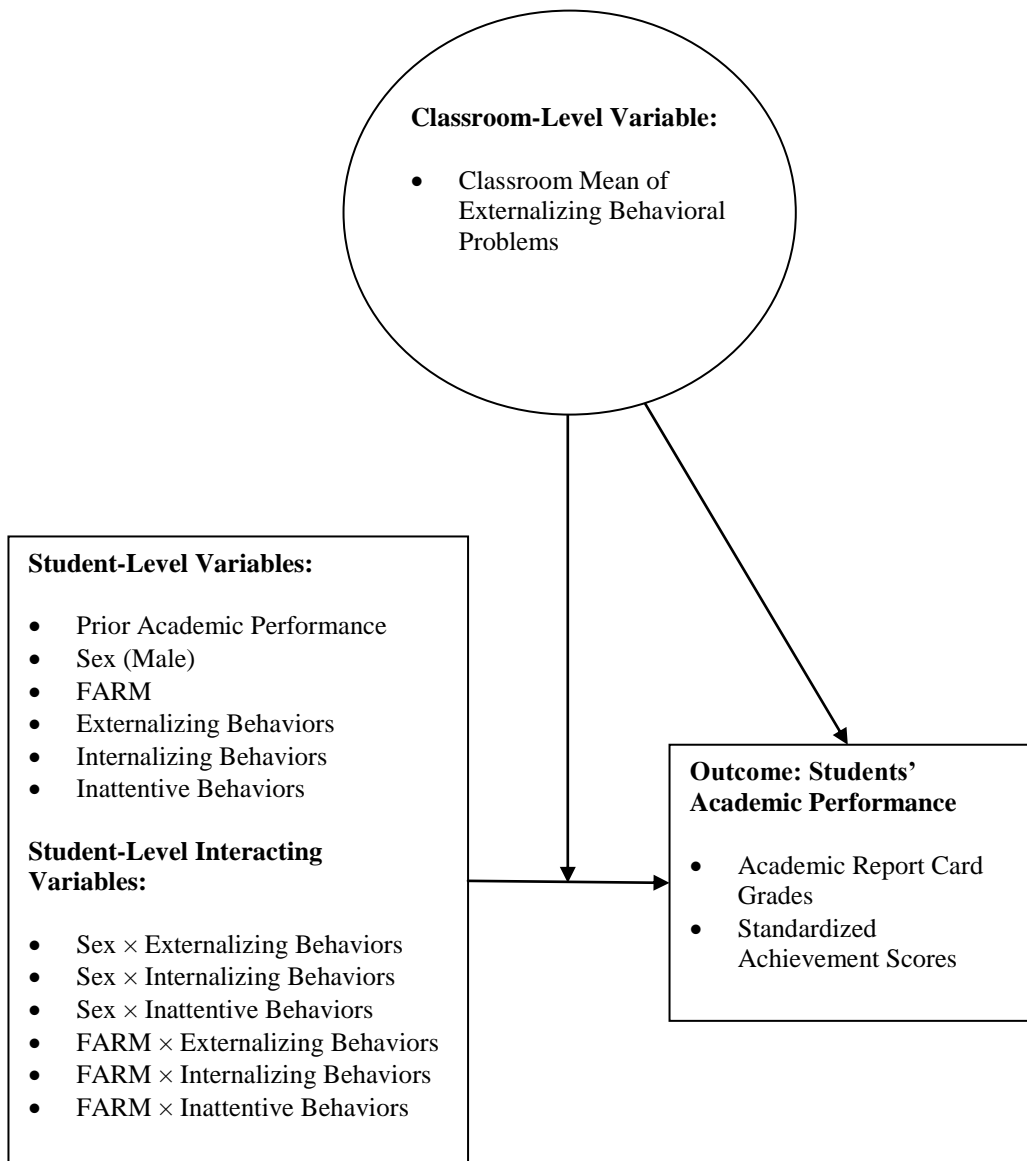
1. What is the unique effect of externalizing, internalizing or inattentive behaviors from the 2005-06 school year on academic grades and standardized tests scores three years later, 2008-09 school year, net of demographic variables and prior achievement?
2. What is the effect of being in classrooms with higher levels of externalizing behavioral problems from the 2005-06 school year on academic grades and standardized tests scores three years later, 2008-09 school year, net of other student and classroom variables?
3. Is there a cross-level interaction between average levels of classroom externalizing behaviors and the individual-level behaviors, in that, do the

- associations between behavioral problems and academic performance vary as function of classroom levels of behavioral problems?
4. Does sex or FARM moderate the relationships between behavioral problems and academic performance?

Conceptual Model for Examining the Longitudinal Effects of Behavioral Problems on Academic Performance

The conceptual model for examining the prediction of multiple behavioral problems on students' academic performance three years later is displayed in Figure 1. The conceptual model displays the hypothesized influences on students' academic performance. The conceptual model is also a guide for the analysis. In the first stage, the student-level predictors (i.e., prior academic performance, sex, FARM, externalizing behaviors, internalizing behaviors, inattentive behaviors) from the 2005-06 school year will enter the model to determine whether the behavioral problems significantly predicts later academic performance in the 2008-09 school year beyond students' prior academic performance, sex, FARM, and other behavioral problems. Then in the second stage, the classroom average of externalizing behaviors from the 2005-06 school year will enter the model (1) to assess whether classroom average of externalizing behavioral problem from the 2005-06 school year predicts later academic performance in the 2008-09 school year and (2) to assess whether an interaction exist between student-level predictors from 2005-06 and average classroom-level externalizing behaviors from 2005-06 to affect the students' academic performance in the 2008-09 school year.

Figure 1. Conceptual Model for Examining the Longitudinal Effects of Behavioral Problems on Academic Performance.



Chapter III: Methodology

The method chapter describes in detail how this study was carried out. Descriptions of the participants, measures, variables, procedures, analysis plans, and statistical models are summarized in the following sections.

Participants

Data for this study were collected as part of a large-scale experimental investigation of the effectiveness of the Instructional Consultation Teams (IC Teams) intervention (Vu, et al., 2010; Shanahan, Vu, Vaganek, Berger, Rosenfield, & Gottfredson, 2010). Suburban public elementary schools ($N = 45$) in the mid-Atlantic region participated in the study. The study collected demographic, behavioral, and academic data annually for all students in grades kindergarten through five for four years starting in the spring of the 2005-06 school year through the 2008-09 school year. However, the current study examined only the data of students who were in the second grade during the 2005-06 school year and their academic performance in the fifth grade during the 2008-09 school year, because data were most complete for this cohort of students. Further, the second grade cohort of students was followed for more years in which academic test scores were available; the third grade cohort of students was followed for only two years, and the earlier grades had less data on academic achievement tests.

In the larger study from which data for the current study are drawn, there were 3,921 of students in the second grade during the 2005-06 school year. However, 2,706 students were included in the present study because only these

students remained at the same school for the next three years. The demographic characteristics of the students between the two sample were compared to determine whether there were differences between the second grade sample from 2005-06 ($N=3,921$) and the same group of students as they transitioned to fifth grade in the 2008-09 school year ($N=2,706$). The characteristics of the students remained the same with minor differences in the ethnicity (Caucasian: 05-06=45% and 08-09=47%; African American: 05-06=20% and 08-09=18%; and Hispanic: 05-06=24% and 08-09=23%), FARM status (students receiving FARM assistance in 05-06=31% and 08-09=28%), and ESOL status (students receiving ESOL services in 05-06=23% and 08-09=21%).

Furthermore, the U.S. Census Bureau (2004) reported that an average of 15 to 20 percent of school-aged children moved and thus leave their school in the previous year. An average 10 percent of the students from this sample move out of the school annually, which is considered below the national average. Therefore, by the end of the study, 2,706 students remained in the school and in the study. Among the students that were there in 2005-06 and remained until 2008-09 ($N = 2,706$), there were six teachers who did not complete the externalizing scale for 20 students; hence, those teachers and students were removed. Next, one of the objectives of this study is to examine the effects of classroom context on other students, and one student in a classroom does not define classroom context and cannot influence another. Therefore, an additional nine teachers and the corresponding nine students were removed from the sample because those teachers had only one student in their classroom. As a result, the

final number of participants in the present research consisted of 2,677 students nested within 193 classrooms. The student characteristics are detailed in Table 1. The characteristics of the classroom and school are detailed in Table 2.

Table 1
Student Characteristics (N = 2,677)

	<i>N</i>	<i>%</i>		<i>N</i>	<i>%</i>
Sex			FARM		
Female	1322	49%	Receiving FARM	749	28%
Male	1355	51%	Not Receiving FARM	1928	72%
Ethnicity			ESOL		
Caucasian	1269	47%	Receiving ESOL	571	21%
African American	479	18%	Not Receiving ESOL	2106	79%
Hispanic	617	23%	Special Education		
Asian	181	7%	Receiving Special Education Services	310	12%
Other	16	<1%	Not Receiving Special Education Services	2367	88%
Not specified	115	4%			
Retention					
Have been retained	47	2%			
Have not been retained	2606	98%			

Note. FARM is students receiving free and/or reduced meals. ESOL is English speakers of other languages. Student characteristics are from the 2005-06 school year.

Table 2
Classroom and School Characteristics

Characteristics	Classroom (<i>N</i> = 193)				School (<i>N</i> = 45)			
	Mean	<i>SD</i>	Min	Max	Mean	<i>SD</i>	Min	Max
Number of students	14	5	2	25	59	26	8	129
Male %	52%	16%	11%	100%	51%	8%	25%	68%
FARM %	31%	26%	0%	100%	34%	25%	0%	95%
ESOL%	22%	22%	0%	100%	24%	18%	0%	63%
Special Education %	15%	22%	0%	100%	11%	6%	0%	28%
Retention in grade %	2%	5%	0%	27%	2%	4%	0%	20%
Ethnic Minority %	56%	28%	0%	100%	58%	25%	7%	100%

Note. Male is proportion of students who are male. FARM is proportion of students receiving free and/or reduced meals. ESOL is proportion of English speakers of other languages. Special Education is proportion of students receiving special education services. Retention in grade is proportion of students retained. Ethnic minority is the proportion of students that are not Caucasian.

Measures

Students' problematic behaviors were assessed with the TRSB survey consisting of 24 items measuring externalizing, internalizing, and inattentive behaviors. The TRSB data, students' demographic characteristics, report card grades, and standardized test scores were obtained from the school district and supplied to University of Maryland, College Park research team. Descriptive statistics for students' externalizing, internalizing, and inattentive behaviors and classroom-level behaviors are summarized in Table 3. The reliabilities for the students' behavioral and academic variables are moderate to high and are also summarized in Table 3.

Table 3
Descriptive Statistics for Student-Level Behavioral and Classroom-Level Behavioral Problems

Variables	Mean	SD	Min	Max	Reliability
Outcome variables: 2008-09 ($N = 2677$)					
Academic grades	0.00	1.00	-4.33	1.35	.97 ^a
Standardized achievement	0.00	1.00	-4.10	1.65	.70 ^a
Student-level variables: 2005-06 ($N = 2677$)					
Externalizing Behavior	0.00	1.00	-0.63	5.88	.90 ^a
Internalizing Behaviors	0.00	1.00	-1.08	4.86	.85 ^a
Inattentive Behaviors	0.00	1.00	-1.30	2.84	.92 ^a
Classroom-level variables: 2005-06 ($N = 193$)					
Classroom Externalizing Behaviors	0.00	1.00	-1.28	4.04	.62 ^b

Note. ^a, alpha, measuring internal consistency. ^b, beta, measuring average reliability for level-2 units. The statistics are for fifth grade students during the 2008-09 school year, and their behavioral variables were collected when they were in the second grade during the 2005-06 school year. All student variables are standardized.

Predictive variables, externalizing, internalizing, and inattentive behaviors and classroom-level externalizing behavior, were all measured while the students were in the second grade, 2005-06 school year, and outcome variables, that is, academic grades and standardized achievement scores, were measured while the students were in the fifth grade, 2008-09 school year. All predictor and outcome variables are standardized (i.e., mean = 0 and standard deviation = 1).

Student-Level Predictive Variables

Externalizing Behavior Scale. This is an eight-item scale measuring the degree to which students have difficulty regulating their behaviors and their interactions with other people, as perceived by their teacher, in the 2005-06 school year. The externalizing behavior scale was adapted from its original form from the Teacher Observation of Child Adaptation, Revised, TOCA-R (Werthamer-Larsson, et al., 1991). The original form was named *Authority Acceptance versus Aggressive Behavior*, which consisted of seven items and had six Likert-type response options that ranged from *Almost Never* to *Almost Always*. In the original study, the reliability estimate (coefficient alpha) of the *Authority Acceptance versus Aggressive Behavior* scale was .92 in a sample of 609 students in 26 first grade classrooms.

As part of the larger randomized experiment from which these data were drawn, the original form was examined, revised, and increased to eight items to correspond with the relevance of the study. To more appropriately label the new eight items, the name was changed to *Externalizing Behaviors*, and the responses options changed from 6-point to 4-point Likert-type options (i.e., 0 = *Never/Almost Never*, 1 = *Sometimes*, 2 = *Often*, and 3 = *Very Often*). Sample items for this scale are “Defies teachers or other school personnel,” “Is physically aggressive or fights with others” and “Teases or taunts others.”

Internalizing Behavior Scale. This is an eight-item scale measuring the extent to which the students’ teachers in 2005-06 perceived that the student has “thought-oriented” problematic behaviors dealing with unwanted affects that are

directed toward the self. The internalizing behavioral scale was adapted from its original form from the Teacher Observation of Child Adaptation, Revised, TOCA-R (Werthamer-Larsson, et al., 1991). The original scale was named *Social Contact versus Shy Behavior* that consisted of four items and had six Likert-type response options that ranged from *Almost Never* to *Almost Always*. In the original study, the reliability estimate (coefficient alpha) of the *Social Contact versus Shy Behavior* scale was .85 in a sample of 609 students in 26 first grade classrooms.

As part of the larger randomized experiment, the original form was examined, revised, and increased to 8 items to correspond with the behavioral relevance of the study. To more appropriately label the new eight items, the name was changed to *Internalizing Behaviors*, and the responses options changed to 4-point Likert-type options (i.e., 0 = *Never/Almost Never*, 1 = *Sometimes*, 2 = *Often* and 3 = *Very Often*). Sample items for this scale are “Seems sad,” “Withdrawn or doesn’t get involved with others,” and “Seems anxious or worried.”

Inattentive Behavior Scale. This is an eight-item scale measuring the extent to which the students’ teachers in 2005-06 perceived that the child focuses or directs his or her undivided thought and attention toward the academic objective. The inattentive behavioral scale was adapted from its original form from the Teacher Observation of Child Adaptation, Revised, TOCA-R (Werthamer-Larsson, et al., 1991). The original form was named *Concentration Problems*, which consisted of 10 items and had six Likert-type response options that ranged from *Almost Never* to *Almost Always*. In the original study, the

reliability estimate (coefficient alpha) of the *Concentration Problems* scale was .96 in a sample of 609 students in 26 first grade classrooms.

As part of the larger randomized experiment, the original form was examined, revised, and decreased to 8 items to correspond with the relevance of the study. To more appropriately label the new eight items, the name was changed to *Inattentive Behaviors*, and the responses options changed to 4-point Likert-type options (i.e., 0 = *Never/Almost Never*, 1 = *Sometimes*, 2 = *Often* and 3 = *Very Often*). Sample items for this scale are “Accomplishes assignments independently,” “Works to overcome obstacles in schoolwork,” and “Pays attention.” The items were reversed coded for consistency in the direction of meaning, in that, higher scores would equal higher behavioral problems.

Student-Level Moderating Variables

Two demographic characteristics of the students, sex and FARM, are used to determine their moderating effects on the relationship between behavioral problems and later academic performance. Sex of the students is coded as male = 1 and female = 0. The FARM status of the students is obtained from their FARM status during the 2005-06 school year (i.e., students receiving free and reduced meal assistance), and FARM status is coded as receiving FARM assistance = 1 and not receiving FARM assistance = 0.

Student-Level Control Variables

One demographic characteristic of the students, prior academic performance, is used as a control variable. Prior academic performance is the students' report card grades from their second grade school year, 2005-06. For

the second grade students, the public school district required their teachers to assign alphabetical grades for each core subject area (i.e., math, reading, writing, science, and social studies; Prince William County Public Schools, 2004). The teacher assigned each student four grades throughout the school year (i.e., one grade for each quarter of the school year). The grading criteria were based on the students' achievement in the subject, class performance, and independence in work. The grades assigned were as follow: "S+" (consistently meets objectives), "S" (adequately meets objectives), "S-" (inconsistently meets objectives), and "N" (has difficulty meeting objectives). Appendix A defines the grading criteria in more detail.

For the purpose of this study, the alphabetical grades were converted to numerical forms as follow: "S+" = 4, "S" = 3, "S-" = 2, and "N" = 1. Then the prior academic grades were calculated by averaging across their 20 report card grades, four quarters of the year and five core subjects. The students' average report card grades for the 2005-06 school year are used as the covariates for both of the academic performance outcomes, grades and standard scores, because there were no prior SOL scores for these students.

Student-Level Outcome Variables

Academic grades are the students' report card grades from the 2008-09 school year. For the fifth grade students, the school district required their teachers to assign alphabetical grades for each core subject area (i.e., math, reading, writing, science, and social studies; Prince William County Public Schools, 2004). The teacher assigned each student 20 grades throughout the school year (i.e., one

grade for each subject for each quarter of the school year). The grading criteria were based on the students' achievement in the subject, class performance, and independence in work. The grades assigned were as follow: "A" (excellent), "B+" (very good), "B" (good), "C+" (high average), "C" (average), "D+" (below average), "D" (poor), and "F" (failure). Appendix B defines the grading criteria in more detail.

For the purpose of this study, the alphabetical grades were converted to numerical forms as follow: "A" = 4, "B+" = 3.4, "B" = 3, "C+" = 2.4, "C" = 2, "D+" = 1.4, "D" = 1, and "F" = 0. Then the academic grades were calculated by averaging across their 20 grades, four quarters and five core content areas, for the 2008-09 school year.

Standardized achievement scores are measured by a set of standardized criterion-referenced tests. The assessment is based on the Standards of Learning (SOL) in Virginia from the 2008-09 school year for the fifth grade students (Virginia Department of Education, 2005). The reading subtest consisted of 42 items with scale scores ranging from 0 to 600 ($M = 467.9$; $SD = 66.3$), and the internal consistency reliability was high, 0.89. The math subtest consisted of 50 items with scale scores ranging from 0 to 600 ($M = 455.1$; $SD = 63.8$), and the internal consistency reliability was high, 0.89. For the purpose of this study, the SOL scores were calculated by averaging across the two subtests (i.e., reading and math) and then standardized ($M = 0$; $SD = 1$).

Classroom-Level Variables

Classroom-level Externalizing Behavior. This is the average of the externalizing behavioral scale for each classroom from the 2005-06 school year. This variable was first aggregated to the classroom-level and then standardized across classrooms (i.e., mean = 0 and standard deviation = 1).

Procedures

Data on students' demographic characteristics and academic performance were provided by the program evaluation office from the school district. The data consisted of sex, ethnicity, special education classification, English Speakers of Other Language (ESOL) classification, free and/or reduced meals (FARM) classification, grade level placement, retention status, report card grades, and standardized achievement test scores (Standards of Learning, SOL). The same set of data was collected annually for four consecutive years, from 2005-06 to 2008-09.

All teachers in the participating schools were asked by the district to complete a Teacher Report on Student Behavior (TRSB) survey for each year of the study. Each student was uniquely linked to one teacher per year. Teachers responsible for teaching two or more students are included in the present study, and the teachers included general classroom teachers, special education teachers, reading specialist, and so on. The TRSB survey was administered at school using the school district's intranet. Teachers were provided time and computer access to complete the survey. For the purpose of this study, data used to identify the students' behavioral problems were from the spring of 2005-06 school year while

they were in the second grade, and data used to measure students' outcomes, academic grades and standardized tests scores, were collected at the end of the 2008-09 school year while the students were in the fifth grade. The response rates for the TRSB survey were high; 85% of the teachers from the 2005-06 school year responded and 94% of the teachers from the 2008-09 school year responded.

The objective of this study was to examine longitudinally the effects of students' behavioral problems on their academic performance. The students' externalizing, internalizing, and inattentive behaviors obtained while the students were in the second grade (2005-06 school year) was used to predict the academic performance of students while they were in the fifth grade (2008-09 school year). Next, the classroom-level behavioral problem was created using the individual students' behavioral problems that were obtained while the students were in the second grade (2005-06 school year) and then aggregated to the classroom level. Finally, the students' academic grades and standardized achievement scores from the 2008-09 school year were regressed on students' externalizing, internalizing, and inattentive behaviors and classroom-level behaviors from the 2005-06 school year using multilevel analyses.

Data Analysis

Two-level hierarchical linear models (Raudenbush & Bryk, 2002) in which students are nested within classrooms were used to test the prediction of multiple behavioral problems on academic grades and standardized scores three years later. These models were also used to examine the individual-level effects, the classroom-level behavioral effects, and the cross-level interaction effects

between individual behavioral problems and classroom-level externalizing behaviors.

The level-1 model is:

$$\begin{aligned}
 \text{Academic Performance} = & \beta_{0j} + \beta_{1j}(\text{Prior Academic Performance}) \\
 & + \beta_{2j}(\text{Male}) \\
 & + \beta_{3j}(\text{FARM}) \\
 & + \beta_{4j}(\text{Externalizing Behaviors}) \\
 & + \beta_{5j}(\text{Internalizing Behaviors}) \\
 & + \beta_{6j}(\text{Inattentive Behaviors}) + r_{ij} \quad (1)
 \end{aligned}$$

where β_{0j} is the intercept or the average covariate-adjusted student academic performance (2008-09) in the j^{th} classroom (2005-06),

β_{1j} is the slope for the regression of student academic performance (2008-09), on student prior academic performance (2005-06), in the j^{th} classroom (2005-06),

β_{2j} is the slope for the regression of student academic performance (2008-09), on male students (2005-06), in the j^{th} classroom (2005-06),

β_{3j} is the slope for the regression of student academic performance (2008-09), on student FARM (2005-06), in the j^{th} classroom (2005-06),

β_{4j} is the slope for the regression of student academic performance (2008-09) on externalizing behaviors (2005-06), in the j^{th} classroom (2005-06),

β_{5j} is the slope for the regression of student academic performance (2008-09) on internalizing behaviors (2005-06), in the j^{th} classroom (2005-06),

β_{6j} is the slope for the regression of student academic performance (2008-09) on inattentive behaviors, (2005-06), in the j^{th} classroom (2005-06), and

r_{ij} is residual error for student i in classroom j .

The level-2 model consists of 7 equations:

$$\beta_{0j} = \gamma_{00} + \gamma_{01} (\text{Class Mean of Externalizing Behaviors}) + u_{0j} \quad (2)$$

$$\beta_{1j} = \gamma_{10} \quad (3)$$

$$\beta_{2j} = \gamma_{20} \quad (4)$$

$$\beta_{3j} = \gamma_{30} \quad (5)$$

$$\beta_{4j} = \gamma_{40} + \gamma_{41} (\text{Class Mean of Externalizing Behaviors}) + u_{4j} \quad (6)$$

$$\beta_{5j} = \gamma_{50} \quad (7)$$

$$\beta_{6j} = \gamma_{60} + \gamma_{61} (\text{Class Mean of Externalizing Behaviors}) + u_{6j} \quad (8)$$

where β_{0j} is the average covariate adjusted student academic performance (2008-09) in the j^{th} classroom (2005-06),

γ_{00} is the grand mean student academic performance, 2008-09, for all classrooms from the 2005-06 school year,

γ_{01} is the increment to the average student academic performance for classroom mean of externalizing behaviors measured in the 2005-06 classroom,

γ_{10} is the average slope in the partial regression of current academic performance (2008-09) on prior performance (2005-06) for all classrooms,

γ_{20} is the average slope in the partial regression of current academic performance (2008-09) on male students (2005-06) for all classrooms,

γ_{30} is the average slope in the partial regression of current academic performance (2008-09) on FARM (2005-06) for all classrooms,

γ_{40} is the average slope in the partial regression of academic performance (2008-09) on externalizing behaviors (2005-06) for all classrooms,

γ_{41} is the increment to the slope in the partial regression of academic performance (2008-09) on externalizing behaviors (2005-06) for a unit change in classroom mean of externalizing behaviors measured in the 2005-06 classroom,

γ_{50} is the average slope in the partial regression of academic performance (2008-09) on internalizing behaviors (2005-06) for all classrooms,

γ_{60} is the average slope in the partial regression of academic performance (2008-09) on inattentive behaviors (2005-06) for all classrooms,

γ_{61} is the increment to the slope in the partial regression of academic performance (2008-09) on inattentive behaviors (2005-06) for a unit change in classroom mean of externalizing behaviors measured in the 2005-06 classroom,

W_1 is classroom-level externalizing behaviors measured in the 2005-06 classroom, and u_{0j} , u_{4j} , and u_{6j} are the residual errors for classroom j .

Due to the nature of the predictive variables, the examined variables did not have normal distributions. For example, externalizing, internalizing, and inattentive behaviors were positively skewed because most of the students were reported as having very low levels of behavioral problems and very few students were reported as exhibiting extremely high levels of behavioral problems.

Therefore, to address the skewed distribution, square root, logarithm, and inverse transformations of the data were done (Tabachnick & Fidell, 2001).

The final model for this study was based on the model-building approach. Analyses for this study proceeded in stages. The first stage examined the unconditional model with the student outcome (i.e., student grades or test scores) included in the model. The unconditional model was used to identify the

intraclass correlation (ICC). The ICC coefficient measured the proportion of variance in the outcome that was between classrooms.

The second stage examined the within-classroom model (i.e., student-level) to determine whether the students' problematic behaviors from their 2005-06 school year significantly predicted their academic performance in the 2008-09 school year. Hence, the report card grades and standardized scores were regressed on the student-level predictors (i.e., prior academic performance, male students, FARM, externalizing, internalizing, and inattentive behaviors, and student-level interacting variables) net of students' characteristics and behaviors. The student-level predictors were grand-mean centered at this stage with the exception of externalizing, internalizing, and inattentive behavioral variables which are group-mean centered. For the student-level interaction variables that were not significant, those non-significant interacting variables were removed from the final model.

Within the second stage, the three student-level behavioral variables were modeled for varying slopes. The hypotheses that the three student-level behavioral slopes were equal were tested. If the null hypothesis of equal slopes was retained, slopes were fixed in subsequent analyses and grand-mean centered. If a null hypothesis of equal slopes was rejected, slopes were group-mean centered and free to vary in subsequent analyses to allow for the modeling of varying slopes. According to the three behavioral variables, the results indicated that the slope of internalizing behavior was equal; hence, the slope of the internalizing behavior was fixed and grand-mean centered. The results indicated

that the slopes of externalizing and inattentive behaviors significantly varied; hence, the slopes of the externalizing and inattentive behaviors were group-mean centered and allowed to vary in subsequent analyses to model for the varying slopes.

The third stage of the analysis examined the between-classroom model (i.e., classroom-level). Therefore, classroom-level of mean externalizing behaviors entered the model to determine (a) whether high levels of classroom mean externalizing behaviors measured in 2005-06 predicted the academic performance obtained in 2008-09 and (b) whether the mean classroom-level of externalizing behaviors measured in 2005-06 interacted with the individual behaviors of the students measured in 2005-06 and predicted the academic performance obtained in 2008-09. Within this stage, the mean classroom-level externalizing behavioral variable was grand-mean centered.

Next, this stage examined the cross-level interactions by determining whether the classroom-level externalizing behaviors measured in 2005-06 accounted for the variability in within classroom slopes. According to the two student-level behavioral predictors that had significantly varying slopes (i.e., externalizing and inattentive behaviors), externalizing and inattentive behaviors were group-mean centered, allowed to vary, and modeled for at the classroom level.

The same two-level hierarchical linear model was used to examine the effects of multiple behavioral problems on both of the academic performance outcomes, report card grades and standardized achievement scores.

Chapter IV: Results

This chapter presents the results for this proposed study. First, the correlations among the student-level and classroom-level variables are presented. Next, given that there are two different academic performance outcome measures, academic grades and standardized achievement test scores, the main findings are presented in two sections; results presented with the academic grades as the outcome and results with the standardized achievement test scores as the outcome. In each section, first, the variance portion is presented; second, the student-level associations; third, the classroom-level associations, the cross-level associations, and finally the moderating effects.

Correlations Among Student-Level and Classroom-Level Variables

The correlations among the student-level variables are presented in Table 4. The bivariate correlations among the student-level variables varied widely, ranging from nonsignificant correlations between male students and FARM, $r = 0.01$, to significant correlations between student's academic grades and achievement scores, $r = 0.70$. The relationships were in the expected direction. Students with high academic grades also had high achievement test scores. Females, students with higher FARM, and students with higher academic grades during the 2005-06 school year had higher academic grades and higher achievement scores three years later. Furthermore, students with higher levels of externalizing, internalizing, and inattentive behavioral problems during the 2005-06 school year had lower academic grades and test scores three years later.

Behaviorally, students with externalizing behaviors were also rated by their teachers as exhibiting internalizing and inattentive behaviors.

Table 4
Correlations Among Student-Level Variables

Variables	1	2	3	4	5	6	7	8
Student-level variables								
1 (Outcome) Academic report card grades	-	0.70 **	0.61 **	-0.17 **	-0.31 **	-0.32 **	-0.25 **	-0.55 **
2 (Outcome) Standardized achievement scores		-	0.63 **	-0.09 **	-0.32 **	-0.24 **	-0.24 **	-0.50 **
3 Prior academic performance			-	-0.11 **	-0.36 **	-0.28 **	-0.37 **	-0.66 **
4 Sex (Male)				-	0.01	0.17 **	0.09 **	0.19 **
5 FARM					-	0.14 **	0.13 **	0.21 **
6 Externalizing behaviors						-	0.16 **	0.51 **
7 Internalizing behaviors							-	0.47 **
8 Inattentive behaviors								-

Note. ** = $p < 0.01$. * = $p < 0.05$. The correlations are for fifth grade students during the 2008-09 school year, and their predictor variables were collected when they were in the second grade during the 2005-06 school year.

The correlations among the classroom-level variables are presented in Table 5. The correlations among the classroom-level variables indicate similar relationship patterns. The classroom-level correlations indicated that classrooms with higher means of academic grades also had higher means of achievement test scores. Classrooms with higher academic performance were more likely to have lower means of externalizing problems during the 2005-06 school year.

Table 5
Correlations Among Classroom-Level Variables

Variables	1	2	3
Classroom-level variables			
1 (Outcome) Classroom mean of academic report card grades	-	0.61 **	-0.32 **
2 (Outcome) Classroom mean of standardized achievement scores		-	-0.43 **
3 Classroom mean of externalizing behaviors			-

Note. ** = $p < 0.01$. * = $p < 0.05$. The correlations are for fifth grade students during the 2008-09 school year, and their predictor variables were collected when they were in the second grade during the 2005-06 school year.

Results from the correlations were as expected, which further supports the need to conduct a multilevel examination of the different student behavioral problems simultaneously and their effects on the academic performance of students three years later

Results with Academic Grades as Outcome

Fully unconditional model for academic grades as the outcome. The variance components and proportion of variance that might be explained by individual and classrooms characteristics can be estimated using a fully

unconditional model. The fully unconditional model consists of the dependent variables and a random effect within r_{ij} and between u_{0j} , in this case, classrooms. The intraclass correlation (ICC), which can be calculated from the results of the fully unconditional model, is the proportion of variance in the outcome that exists between groups (Raudenbush & Bryk, 2002). As such, it provides an indicator of whether multilevel modeling might be required given the nested structure of the data. The ICC from the fully unconditional model was 0.14 which indicated that 14% of the variance in the academic grades existed between classrooms. Therefore, multilevel modeling with the students nested within the classrooms was appropriate.

Final-model with academic grades as the outcome. Table 6 presents the final model for the analysis of the student behavioral problems and academic grades. The intercepts for b_0 (average classroom academic grades), b_4 (average classroom slope for externalizing behavior), and b_6 (average classroom slope for inattentive behavior) all varied between classrooms, so the random effect for each is modeled as a function of classroom mean levels of externalizing behaviors. All level-1 variables, with the exception of externalizing behavior and inattentive behavior, are grand-mean centered. Externalizing behavior and inattentive behavior are group-mean centered. All-level two variables are grand-mean centered. The dependent variable is standardized ($M = 0$, $SD = 1$), so coefficients can be interpreted as effect sizes.

Student-level behavioral associations with academic grades. The first research question for academic grades is examined in this section; hence, this

section examines whether student-level behavioral variables, externalizing, internalizing or inattentive behaviors, from the 2005-06 school year each had a unique effect on academic grades three years later, 2008-09 school year, net of confounding variables. Table 6 presents the results for the student-level associations with academic grades. The results indicated that all except one student-level variable (internalizing behaviors) significantly predicted the students' academic grades three years later.

First, results indicated that students with higher levels of externalizing behaviors during the 2005-06 school year had a very small negative effect on subsequent academic grades three years later, coefficient = -0.06, $p < 0.01$ (based on standardized scores), controlling for the student's prior academic performance, sex, FARM, internalizing behaviors, inattentive behaviors, and classroom means of externalizing behaviors. In general, students with a one standard deviation increase of externalizing behaviors was associated with a 0.06 standard deviation decrease on their academic grades three years later after controlling for all other variables.

Next, results indicated that students with higher levels of inattentive behaviors during the 2005-06 school year had a small negative effect on academic grades three years later, coefficient = -0.25, $p < 0.001$, controlling for the student's prior academic performance, sex, FARM, externalizing behaviors, internalizing behaviors, and classroom mean levels of externalizing behaviors. This suggested that students with a one standard deviation increase of inattentive

behaviors was associated with a 0.25 standard deviation decrease on their academic grades three years later after controlling for all other variables.

Furthermore, students with higher prior academic performance during the 2005-06 school year had a large positive effect on subsequent grades three years later, coefficient = 0.85, $p < 0.001$, controlling for all other variables. Males and students who received FARM assistance had a small negative effect on academic grades three years later, coefficient = -0.14 and -0.20 with $p < 0.001$ for both, controlling for all other variables.

Classroom-level behavioral associations with academic grades. The second research question for academic grades is investigated in this section; therefore, this section examines the academic effects of being in a classroom with higher mean levels of externalizing behaviors during the 2005-06 school year, net of demographic and behavioral variables. Table 6 presents the results for the classroom-level behavioral association with academic grades (see the model for b_0 at the top of the table). The results indicate that students who were in classrooms with higher average levels of externalizing behaviors during the 2005-06 school year had a small negative effect on academic grades three years later, coefficient = -0.09, $p < 0.01$ (based on standardized scores), controlling for average student's prior academic performance, proportion of males, proportion of students who received FARM assistance, and average internalizing behaviors. Classrooms with a one standard deviation increase in mean externalizing behaviors were associated with a 0.09 standard deviation decrease on their academic grades three years later after controlling for all other variables.

Cross-level interaction effects on academic grades. This section examines the third research question, whether the negative effects of prior behavioral problems on academic grades three years later are greater for students in classrooms with higher average levels of externalizing behaviors. Table 6 presents the effects of cross-level interactions (or slope models) for individual externalizing behaviors and inattentive behaviors (see the models for b_4 and b_6 at the bottom of the table). The slope for internalizing behaviors (b_5) was fixed and therefore not modeled.

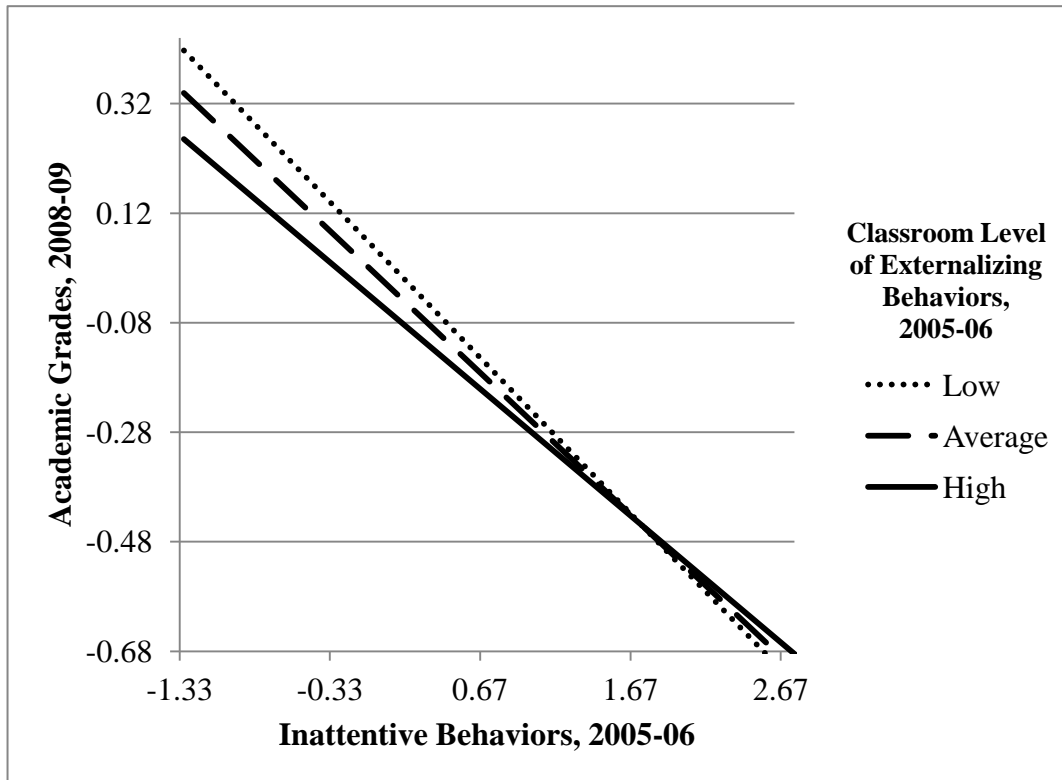
The results indicated that the negative effects of individual externalizing behaviors problems on academic grades were not significantly greater for students in classrooms with higher levels of externalizing behaviors. However, one small unexpected cross-level interaction effect was found between inattentive behavior and classroom mean of externalizing behavior, coefficient = 0.06, $p < 0.05$. This suggested that the negative effects of inattentive behaviors on academic grades were weaker for students who were in classrooms with higher average levels of externalizing behaviors ($-.25 \text{ SD} + .06 \text{ SD} = -.20 \text{ SD}$), controlling for the student's prior academic performance, sex, FARM, externalizing behavior, internalizing behaviors, and classroom mean levels of externalizing behaviors. Figure 2 displays the significant cross-level interaction.

Table 6
Final Model of the Longitudinal Effects of Behavioral Problems on Students' Academic Performance: Student Academic Report Card Grades

Variables	Coef.	Stand. Error	t-ratio	df	p-value
Academic report card grades (β_0)					
Intercept (γ_{00})	-0.02	0.03	-0.76	187	0.45
Classroom mean of externalizing behaviors (γ_{01})	-0.09	0.03	-3.04	187	<0.01
Prior academic performance slope (β_1)					
Intercept (γ_{10})	0.85	0.05	17.53	2657	<0.01
Sex (Male) slope (β_2)					
Intercept (γ_{20})	-0.14	0.03	-5.28	2657	<0.01
FARM slope (β_3)					
Intercept (γ_{30})	-0.20	0.04	-4.43	2657	<0.01
Externalizing behavior slope (β_4)					
Intercept (γ_{40})	-0.06	0.02	-2.74	187	0.01
Classroom mean of externalizing behaviors (γ_{41})	0.00	0.02	-0.12	187	0.90
Internalizing behavior slope (β_5)					
Intercept (γ_{50})	0.02	0.02	1.23	2657	0.22
Inattentive behavior slope (β_6)					
Intercept (γ_{60})	-0.25	0.02	10.09	187	<0.01
Classroom mean of externalizing behaviors (γ_{61})	0.06	0.03	2.26	187	0.03

Note. The results are for fifth grade students during the 2008-09 school year, and their predictor variables were collected when they were in the second grade during the 2005-06 school year.

Figure 2. Cross-level interaction between individual inattentive behavior and classroom-level of externalizing behaviors on subsequent academic grades of students.



Sex (Male) and FARM Status. The fourth research question on whether sex (male) and FARM status moderates the relationships between behavioral problems and academic grades is examined in this section. Table 7 presents the results for the moderating effects of sex (male) and FARM status. The intercepts for b_0 (average classroom academic grades), b_4 (average classroom slope for externalizing behavior), and b_6 (average classroom slope for inattentive behavior)

all varied between classrooms, so the random effect for each is modeled as a function of classroom mean levels of externalizing behaviors. All level-1 variables and all six moderating variables, with the exception of externalizing behavior and inattentive behavior, are grand-mean centered. Externalizing behavior and inattentive behavior are group-mean centered. All-level two variables are grand-mean centered. The dependent variable is standardized ($M = 0$, $SD = 1$), so coefficients can be interpreted as effect sizes.

According to the interacting variables tested, the results indicated that neither the sex (males) nor FARM status of the students moderated the relationships between any of the problematic behavioral variables and their academic grades. Due to the non-significant moderating effects found, the moderating variables were not included in the final model of analysis.

Table 7
Longitudinal Effects of Behavioral Problems on Students' Academic Report Card Grades: Moderating Effects of Sex (Male) and FARM Status

Variables	Coef.	Stand. Error	t-ratio	df	p-value
Sex (Male) × Externalizing behavior slope (β_7)					
Intercept (γ_{70})	-0.03	0.02	-1.27	2651	0.21
Sex (Male) × Internalizing behavior slope (β_8)					
Intercept (γ_{80})	0.00	0.02	0.27	2651	0.79
Sex (Male) × Inattentive behavior slope (β_9)					
Intercept (γ_{90})	0.02	0.02	0.80	2651	0.42
FARM × Externalizing behavior slope (β_{10})					
Intercept (γ_{100})	-0.01	0.02	-0.62	2651	0.54
FARM × Internalizing behavior slope (β_{11})					
Intercept (γ_{110})	0.01	0.02	0.46	2651	0.65
FARM × Inattentive behavior slope (β_{12})					
Intercept (γ_{120})	0.02	0.02	0.99	2651	0.32

Note. All predictor variables were from the students' baseline school year, 2005-06. The outcome, academic report card grades, was from the 2008-09 school year.

Variance components and proportions of variance explained with academic grades as outcome. Table 8 presents the variance components and proportions of variance explained with academic grades as the outcome. To determine whether the models gradually improved as the variables were included in the models, the variance components of four different models were used to estimate the proportion of variance explained within (i.e., at the individual student level) and between classrooms.

The first model was the fully unconditional model, and it included only the outcome variable, academic grades, in the model. The ICC from the fully unconditional model was 0.14 which indicated that 14% of the variance in the academic grades existed between classrooms. The second model was the within-classroom with demographic variables model, and it included the three demographic variables at level-1 (prior academic grades, sex, and FARM status). The second model explained 42% of the within-classroom variance and 14% of the between-classroom variance. The third model was the within-classroom with demographic and behavioral variables model, and it included the three demographic variables and three behavioral variables at level-1 (externalizing, internalizing, and inattentive behaviors in addition to prior academic grades, sex, and FARM status). The third model explained an additional 6% (total 48%) of the within-classroom variance and an additional 11% (total 25%) of the between-classroom variance. Finally, the fourth and final model was the between-classroom model, and it included all six variables at level-1 (prior academic grades, sex, FARM status, and externalizing, internalizing, and inattentive behaviors) and classroom mean of externalizing behaviors at level-2. Given that the final model did not add any additional level-1 variables, the final model did not explain any additional within-school variance, as the final model explained a total of 48% of the within-classroom variance. Because the final model added one level-2 variable, the final model explained an additional 4% (total 29%) of the between-classroom variance.

Overall, the examination of proportion of variance indicated that the individual demographic characteristics of the students accounted for the most variance for the student's academic grades. Next, although the addition of the behavioral variables at level-1 accounted for some additional variance, the additional variance accounted for by the behavioral variables was very small. Finally, the additional variable added to level-2 (classroom average level of externalizing behaviors) did not explain additional between-classroom variance but accounted for a very small proportion of between-classroom variance of the student's academic grades.

Table 8
Variance Components and Proportion of Variance Explained for Student's Academic Performance: Academic Grades

	Models			
	Unconditional	Within-Classroom: Demographic Variables	Within-Classroom: Behavioral Variables	Between-Classroom
Sigma squared (σ^2)	0.86	0.50	0.45	0.45
Tau (τ)	0.14	0.12	0.10	0.10
Intraclass Correlation (ICC)	0.14			
Variance Explained: Proportion of σ^2 explained		0.42	0.48	0.48
Proportion of τ explained		0.14	0.25	0.29

Note. σ^2 = within-class variance, τ = between class variance. Intraclass correlation is the proportion of total variance in the outcome between classes. ICC is computed as follows: $ICC = \tau \text{ unconditional} / (\tau \text{ unconditional} + \sigma^2 \text{ unconditional})$. Proportion of σ^2 explained is computed as follows: $(\sigma^2 \text{ unconditional} - \sigma^2 \text{ final}) / \sigma^2 \text{ unconditional}$. Proportion of τ explained is computed as follows: $(\tau \text{ unconditional} - \tau \text{ final}) / \tau \text{ unconditional}$.

Results with Standardized Achievement Test Scores as Outcome

Fully unconditional model for standardized achievement test scores as the outcome. The variance components and proportion of variance that might be explained by individual and classrooms characteristics can be estimated using a fully unconditional model. The fully unconditional model consists of the dependent variables and a random effect within r_{ij} and between u_{0j} , in this case, classrooms. The intraclass correlation (ICC), which can be calculated from the

results of the fully unconditional model, is the proportion of variance in the outcome that exists between groups (Raudenbush & Bryk, 2002). As such, it provides an indicator of whether multilevel modeling might be required given the nested structure of the data. The ICC from the fully unconditional model was 0.12 which indicated that 12% of the variance in the standardized achievement test scores existed between classrooms. Therefore, multilevel modeling with the students nested within the classrooms was appropriate.

Final-model with standardized achievement test scores as the outcome. Table 9 presents the final model for the analysis of the student behavioral problems and standardized achievement test scores. The intercepts for b_0 (average classroom achievement test scores), b_4 (average classroom slope for externalizing behavior), and b_6 (average classroom slope for inattentive behavior) all varied between classrooms, so the random effect for each is modeled as a function of classroom mean levels of externalizing behaviors. All level-1 variables, with the exception of externalizing behavior and inattentive behavior, are grand-mean centered. Externalizing behavior and inattentive behavior are group-mean centered. All-level two variables are grand-mean centered. The dependent variable is standardized ($M = 0$, $SD = 1$), so coefficients can be interpreted as effect sizes.

Student-level behavioral associations with standardized achievement test scores. The first research question for achievement test scores is examined in this section; hence, this section examines whether student-level behavioral variables, externalizing, internalizing or inattentive behaviors, from the 2005-06

school year each had a unique effect on standardized achievement test scores three years later, 2008-09 school year, net of confounding variables. Table 9 presents the results for the student-level associations with standardized achievement test scores. The results indicated that two demographic variables and one behavioral variable significantly predicted the students' standardized achievement test scores three years later.

The results indicated that student-level inattentive behaviors significantly predicted the students' achievement test scores three years later. Students with higher levels of inattentive behaviors during the 2005-06 school year had a small negative effect on achievement test scores in the 2008-09 school year, coefficient = -0.18, $p < 0.001$, controlling for the student's prior academic performance, sex, FARM, internalizing behaviors, and classroom mean of externalizing behaviors. This suggested that students with a one standard deviation increase of inattentive behaviors was associated with a 0.18 standard deviation decrease on their achievement test scores three years later after controlling for all other variables.

Results from the student-level analysis also indicated that students with higher prior academic grades during the 2005-06 school year had a large positive effect on achievement scores in the 2008-09 school year, coefficient = 1.03, $p < 0.001$. Further, students who received FARM assistance had a small negative effect on achievement test scores in the 2008-09 school year, coefficient = -0.19, $p < 0.001$, controlling for the student's prior academic performance, sex, FARM, internalizing behaviors, and classroom mean of externalizing behaviors.

Classroom-level behavioral associations with standardized achievement test scores. The second research question for standardized achievement test scores is investigated in this section; therefore, this section examines the academic effects of being in a classroom with higher mean levels of externalizing behaviors during the 2005-06 school year, net of demographic and behavioral variables. Table 9 presents the results for the classroom-level behavioral association with standardized achievement test scores (see the model for b_0 at the top of the table). The results indicate that students who were in classrooms with higher average levels of externalizing behaviors during the 2005-06 school year had a small negative effect on standardized achievement test scores three years later, coefficient = -0.07 , $p < 0.05$ (based on standardized scores), controlling for average student's prior academic performance, proportion of males, proportion of students who received FARM assistance, and average internalizing behaviors. Classrooms with a one standard deviation increase in mean externalizing behaviors were associated with a 0.07 standard deviation decrease on their standardized achievement test scores three years later after controlling for all other variables.

Cross-level interaction effects on standardized achievement test scores. The third research question for standardized achievement test scores is investigated in this section, specifically, this section examines whether the negative effects of prior behavioral problems on standardized achievement test scores three years later are greater for students in classrooms with higher average levels of externalizing behaviors. Table 9 presents the effects of cross-level

interactions (or slope models) for individual externalizing behaviors and inattentive behaviors (see the models for b_4 and b_6 at the bottom of the table). The slope for internalizing behaviors (b_5) was fixed and therefore not modeled.

The results indicated that the negative effects of individual externalizing and inattentive behaviors problems on standardized achievement test scores were not significantly greater for students in classrooms with higher levels of externalizing behaviors, controlling for the student's prior academic performance, sex, FARM, internalizing behaviors.

Table 9
Final Model of the Longitudinal Effects of Behavioral Problems on Students' Academic Performance: Standardized Achievement Scores

Variables	Coef.	Stand. Error	<i>t</i> -ratio	df	<i>p</i> -value
Standardized Achievement Scores (β_0)					
Intercept (γ_{00})	-0.03	0.02	-1.40	184	0.16
Classroom mean of externalizing behaviors (γ_{01})	-0.07	0.04	-1.99	184	<0.05
Prior academic performance slope (β_1)					
Intercept (γ_{10})	1.03	0.05	20.09	2542	<0.01
Sex slope (β_2)					
Intercept (γ_{20})	-0.02	0.03	-0.49	2542	0.63
FARM slope (β_3)					
Intercept (γ_{30})	-0.19	0.04	-4.61	2542	<0.01
Externalizing behavior slope (β_4)					
Intercept (γ_{40})	0.01	0.02	0.44	184	0.66
Classroom mean of externalizing behaviors (γ_{41})	0.00	0.03	0.10	184	0.92
Internalizing behavior slope (β_5)					
Intercept (γ_{50})	0.02	0.02	0.91	2542	0.36
Inattentive behavior slope (β_6)					
Intercept (γ_{60})	-0.18	0.03	-6.65	184	<0.01
Classroom mean of externalizing behaviors (γ_{61})	0.01	0.03	0.35	184	0.73

Note. The results are for fifth grade students during the 2008-09 school year, and their predictor variables were collected when they were in the second grade during the 2005-06 school year.

Sex (Male) and FARM Status. The fourth research question on whether sex (male) and FARM status moderates the relationships between behavioral problems and standardized achievement test scores is examined in this section. Table 10 presents the results for the moderating effects of sex (male) and FARM status. The intercepts for b_0 (average classroom achievement test scores), b_4 (average classroom slope for externalizing behavior), and b_6 (average classroom slope for inattentive behavior) all varied between classrooms, so the random effect for each is modeled as a function of classroom mean levels of externalizing behaviors. All level-1 variables and all six moderating variables, with the exception of externalizing behavior and inattentive behavior, are grand-mean centered. Externalizing behavior and inattentive behavior are group-mean centered. All-level two variables are grand-mean centered. The dependent variable is standardized ($M = 0$, $SD = 1$), so coefficients can be interpreted as effect sizes.

According to the interacting variables tested, one significant moderating effect emerged. The results indicated that student's sex had a small moderating effect on the relationship between the students' inattentive behavior from the 2005-06 school year and their achievement test scores three years later in the 2008-09 school year, coefficient = 0.04, $p < 0.05$, effect size = 0.08. However, the hypothesis that the negative effects of inattentive behavior on later academic scores would be stronger for males compared the female was not as expected. On the contrary, results indicated that the negative effects of inattentive behaviors from the 2005-06 school year on their achievement scores three years later in the

2008-09 school year were stronger for females compared to males. No other moderating effects were found.

To enable to the final model to be more sensitive to the effects of the behavioral variables, the five moderating variables that were not significant were removed from the final model of analysis. Once the five moderating variables were removed from the model, student's sex no longer had a significant moderating effect on the relationship between the students' inattentive behavior from the 2005-06 school year and their achievement test scores three years later in the 2008-09 school year, coefficient = 0.02, $p = 0.18$, effect size = 0.04.

Table 10
Longitudinal Effects of Behavioral Problems on Students' Standardized Achievement Test Scores (2008-09): Moderating Effects of Sex (Male) and FARM Status

Variables	Coef.	Stand. Error	t-ratio	df	p-value
Sex (Male) × Externalizing behavior slope (β_7)					
Intercept (γ_{70})	-0.02	0.02	-1.04	2536	0.30
Sex (Male) × Internalizing behavior slope (β_8)					
Intercept (γ_{80})	-0.02	0.02	-1.09	2536	0.28
Sex (Male) × Inattentive behavior slope (β_9) [†]					
Intercept (γ_{90})	0.04	0.02	2.09	2536	0.04
FARM × Externalizing behavior slope (β_{10})					
Intercept (γ_{100})	0.01	0.02	0.28	2536	0.78
FARM × Internalizing behavior slope (β_{11})					
Intercept (γ_{110})	0.00	0.02	0.23	2536	0.82
FARM × Inattentive behavior slope (β_{12})					
Intercept (γ_{120})	0.00	0.03	-0.05	2536	0.96

Note. All predictor variables were from the students' baseline school year, 2005-06. The outcome, standardized achievement test scores, was from the 2008-09 school year. † means sex no longer had a significant moderating effect on the relationship between the students' inattentive behavior from the 2005-06 school year and their achievement test scores three years later in the 2008-09 school year, coefficient = 0.02, p = 0.18, effect size = 0.04, in the final model.

Variance components and proportions of variance explained with standardized achievement test scores as outcome. Table 11 presents the variance components and proportions of variance explained with standardized achievement test scores as the outcome. To determine whether the models gradually improved as the variables were included in the models, the variance components of four different models were used to estimate the proportion of

variance explained within (i.e., at the individual student level) and between classrooms.

The first model was the fully unconditional model, and it included only the outcome variable, standardized achievement test scores, in the model. The ICC from the fully unconditional model was 0.12 which indicated that 12% of the variance in the standardized achievement test scores existed between classrooms. The second model was the within-classroom with demographic variables model, and it included the three demographic variables at level-1 (prior academic grades, sex, and FARM status). The second model explained 41% of the within-classroom variance and 30% of the between-classroom variance. The third model was the within-classroom with demographic and behavioral variables model, and it included the three demographic variables and three behavioral variables at level-1 (externalizing, internalizing, and inattentive behaviors in addition to prior academic grades, sex, and FARM status). The third model explained an additional 3% (total 44%) of the within-classroom variance and an additional 9% (total 39%) of the between-classroom variance. Finally, the fourth and final model was the between-classroom model, and it included all six variables at level-1 (prior academic grades, sex, FARM status, and externalizing, internalizing, and inattentive behaviors) and classroom mean of externalizing behaviors at level-2. Given that the final model did not add any additional level-1 variables, the final model did not explain any additional within-school variance, as the final model explained a total of 44% of the within-classroom variance. Because the final

model added one level-2 variable, the final model explained an additional 2% (total 41%) of the between-classroom variance.

Overall, the examination of proportion of variance indicated that the individual demographic characteristics of the students accounted for the most variance for the student's achievement test scores. Next, although the addition of the behavioral variables at level-1 accounted for some additional variance, the additional variance accounted for by the behavioral variables was very small. Finally, the additional variable added to level-2 (classroom average level of externalizing behaviors) did not explain additional between-classroom variance but accounted for a very small proportion of between-classroom variance of the student's academic grades.

Table 11
Variance Components and Proportion of Variance Explained for Student's Academic Performance: Standardized Achievement Test Scores

	Models			
	Unconditional	Within-Classroom: Demographic Variables	Within-Classroom: Behavioral Variables	Between-Classroom
Sigma squared (σ^2)	0.89	0.52	0.50	0.50
Tau (τ)	0.12	0.08	0.07	0.07
Intraclass Correlation (ICC)	0.12			
Variance Explained: Proportion of σ^2 explained		0.41	0.44	0.44
Proportion of τ explained		0.30	0.39	0.41

Note. σ^2 = within-class variance, τ = between class variance. Intraclass correlation is the proportion of total variance in the outcome between classes. ICC is computed as follows: $ICC = \tau \text{ unconditional} / (\tau \text{ unconditional} + \sigma^2 \text{ unconditional})$. Proportion of σ^2 explained is computed as follows: $(\sigma^2 \text{ unconditional} - \sigma^2 \text{ final}) / \sigma^2 \text{ unconditional}$. Proportion of τ explained is computed as follows: $(\tau \text{ unconditional} - \tau \text{ final}) / \tau \text{ unconditional}$.

Supplementary Analysis with Transformed Data

Given that the behavioral variables had positively skewed distributions, the behavioral variables (externalizing, internalizing, and inattentive behaviors) were transformed and analyzed. The three behavioral variables were differentially transformed and examined because the severity of the skewed distribution was different for each variable. Multiple types (square root, logarithm, and inverse) of transformations were conducted on the behavioral

variables. The logarithm transformation proved to be the best transformation for the externalizing behavioral variable and the square root transformation proved to be the best transformation for the internalizing behavioral variable because they alleviated the positively skewed data and improved their distribution. According to the inattentive behavioral variable, multiple types of transformations were attempted but none proved to improve the distribution. The distribution of the inattentive behavioral variable was only slightly positively skewed with a very small deviation from the zero (i.e., 0.3, comparing the skew statistic to twice its standard error). Therefore, evidence proved that the inattentive behavioral variable did not warrant a transformation.

Supplementary results with academic grades as outcome.

Supplementary analyses were conducted using the transformed variables (i.e., logarithm transformation of externalizing behaviors and square root transformation of internalizing behaviors) with the academic grades as outcomes to determine whether the supplementary results were consistent with the non-transformed results. Appendix E presents the results using the transformed variables. The results were consistent with the results obtained from the non-transformed variables. Nevertheless, the effects of prior externalizing behaviors on the academic grades three years later using the logarithm transformed data (coefficient = -0.17, $p < 0.05$) were stronger than the effects of prior externalizing behaviors on later academic grades using the non-transformed data (coefficient = -0.06, $p < 0.05$). Moreover, internalizing behaviors did not significantly affect the students' academic grades three years later (i.e., non-transformed coefficient =

0.02, $p = 0.22$; square root transformed coefficient = 0.03, $p = 0.64$). Finally, inattentive behaviors did not undergo transformation; hence, the results remained as significant predictors of the students' academic grades three years later (i.e., model with non-transformed variables = -0.25, $p < 0.01$; model with transformed variables = -0.23, $p < 0.01$). As a result, there is support for the findings obtained from this study in spite of the skewed distributions of the behavioral variables.

Supplementary results with standardized achievement test scores as outcome. Supplementary analyses were conducted using the transformed variables (i.e., logarithm transformation of externalizing behaviors and square root transformation of internalizing behaviors) with the standardized achievement test scores as outcomes to determine whether the supplementary results were consistent with the non-transformed results. Appendix F presents the results using the transformed variables. Results using the transformed variables were similar to the results obtained from the non-transformed variables. Specifically, externalizing behaviors did not significantly affect the students' achievement scores three years later (i.e., non-transformed coefficient = 0.01, $p = 0.66$; logarithm transformed coefficient = -0.02, $p = 0.79$). Moreover, internalizing behaviors did not significantly affect the students' academic grades three years later (i.e., non-transformed coefficient = 0.02, $p = 0.36$; square root transformed coefficient = 0.08, $p = 0.23$). Finally, inattentive behaviors did not undergo transformation; hence, the results remained as significant predictors of the students' academic grades three years later (i.e., model with non-transformed variables = -0.18, $p < 0.01$; model with transformed variables = -0.15, $p < 0.01$).

As a result, there is support for the findings obtained from this study in spite of the skewed distributions of the behavioral variables.

Sensitivity analysis for the moderation effects. Overall, results from the examination of student's sex and FARM as possible moderators in the relationship between behavioral problems and later academic performance indicated that neither sex nor FARM moderated the relationships between behavioral problems and subsequent academic performance as expected. Therefore, sensitivity analyses were conducted to examine and provide more confidence in the results. The interaction terms were created by multiplying the two variables together with the behavioral variable centered on its mean. Given that the moderating variables were entered uncentered into the model, the results are invariant to how the interaction terms are constructed or centered in the model. The results from the sensitivity analyses are provided in Appendix G. To conduct the sensitivity analyses, the moderation variables (i.e., sex \times externalizing behaviors, sex \times internalizing behaviors, sex \times inattentive behaviors, FARM \times externalizing behaviors, FARM \times internalizing behaviors, and FARM \times inattentive behaviors) were centered differently (i.e., uncentered) at level-1 during the within model examination.

Results from the sensitivity analyses were consistent with the results obtained from the main analysis for both types of academic performance outcomes (academic grades and achievement scores). Neither sex nor FARM significantly moderated the relationship between behavioral problems and subsequent academic report card grades. Similarly, neither sex nor FARM

significantly moderated the relationship between behavioral problems and subsequent later achievement test scores.

Results across two different types of academic performance outcomes.

For further confidence in the results from this study, two different measures of student academic performance were used to determine the effects of behavioral problems, academic grades and standardized achievement test scores. Most results were consistently found across both the academic grades and standardized achievement test scores.

First, results indicated that students with higher levels of inattentive behavioral problems had significantly lower academic performance (both academic grades and achievement test scores) three years later net of student demographic and behavioral variables. Second, results indicated that students in classes with higher levels of average externalizing behavioral problems significantly predicted lower academic performance (both academic grades and achievement test scores) three years later net of student demographic and behavioral variables. Third, results indicated that students with higher levels of academic performance three years earlier had significantly higher levels of academic performance three years later net of student demographic and behavioral variables. Finally, results indicated that students who received FARM assistance three years earlier had significantly lower academic performance three years later net of student demographic and behavioral variables.

There were three inconsistent findings across the two different types of academic performance measures. First, students with higher levels of

externalizing behaviors had significantly lower academic grades three years later net of student demographic and behavioral variables. Similar results were not obtained when achievement test scores were used as outcome measures. Second, the cross-level interaction effect between inattentive behaviors and classroom mean of externalizing behaviors was only significant with academic grades as the outcome and not with achievement test scores as the outcome. The findings indicated that students with inattentive behaviors being placed in classrooms with lower average levels of externalizing behaviors had significantly lower academic grades three years later net of student demographic and behavioral variables. Finally, males had significantly lower academic grades three years later compared to females net of student demographic and behavioral variables; however, these findings were not replicated when the students' achievement test scores were used as the outcome.

Taken altogether, more confident conclusions can be drawn from the results that were consistent across both types of academic performance outcomes, mainly the negative effects of inattentive behaviors and classroom levels of externalizing behaviors. Nevertheless, results that were inconsistently found across the two types of academic performance measures should be cautiously interpreted.

Chapter V: Discussion

The present study used multi-level hierarchical linear regression models (a) to examine the longitudinal effects of behavioral problems (i.e., externalizing, internalizing, and inattentive behaviors) on students' academic performance after three years, (b) to examine the classroom-level externalizing behavioral effects and cross-level interaction effects (i.e., between individual student-level behavioral problem and classroom-level externalizing behavioral problems) on students' academic performance after three years, and (c) to examine the possible moderating effects of students' sex and FARM on the effects of behavioral problems.

Multiple Behavioral Problems and Academic Performance

When multiple behavioral problems were studied simultaneously (externalizing, internalizing, and inattentive behaviors from the 2005-06 school year), inattentive behaviors had unique negative effects on the academic performance of students three years later after accounting for the students' and classroom behaviors. Overall results indicate that inattentive behaviors emerge as the strongest predictor of later academic performance compared to externalizing or internalizing behaviors. Similar significant results were obtained across the two different measures of academic performance.

First, the results from this study are consistent with Breslau et al. (2009) and Duncan et al.'s (2007) findings indicating that inattentive behavioral problems significantly and uniquely predicted negative academic performance after controlling for the students' other confounding behavioral problems

(internalizing and inattentive behaviors). This suggests that the students' inattentive behaviors such as paying attention and completing classroom assignments independently are strong and stable predictors of academic difficulties. The results obtained here support the theoretical assumption that students' inability to focus on the classroom instruction and attend to the academic task prevents the students from obtaining the academic content. As a result, students with inattentive behaviors fail to learn academic skills and are unable to perform as expected on the classroom assignments and assessments (Breslau et al., 2009).

Secondly, the results from this study only partially supported Farmer and Bierman's (2002) and McLeod and Kaiser's (2004) findings indicating that externalizing behaviors significantly predicted negative academic performance after controlling for the students' internalizing and inattentive behaviors. The significant results were only found when academic grades reported by the teacher were used as the outcome. When a more objective measure of academic performance (i.e., achievement test scores) was used as the outcome, the significant findings were not replicated. Prior research has indicated that teacher report card grades reflect many non-academic performance factors such as student characteristics, personality, or behaviors (Brookhart, 1993). Given the limitation regarding the construct validity of teacher report of academic grades, the unique negative effects of externalizing behaviors on their academic performance should be considered in light of the inconsistent results across different measures of academic performance.

Finally, the results from this study did not reflect previous findings (Masseti et al., 2008), in that internalizing behaviors did not significantly predict students' academic performance after controlling for their externalizing and inattentive problems. Similar results were obtained across the two different measures of academic performance. The results obtained here suggest that when multiple behavioral problems are examined simultaneously, the teacher's perception of the students' internalizing behaviors such as feeling sad, worried, or anxious are not disruptive enough to interfere with the students' classroom or test performance.

Overall, the results obtained from this study provided evidence that when multiple behavioral problems are studied simultaneously, the students' inattentive behaviors emerged as the strongest predictor of academic underperformance net of their prior academic performance, background characteristic, other behavioral problems, and classroom behaviors. Although small, ranging from $-.25$ SD to $-.18$ SD for academic grades and achievement respectively, the effect of inattentive behavior is five or more times the effects of externalizing behavior and internalizing behavior.

Nevertheless, it should be noted that the differences in the reliability estimate of the slopes for the externalizing and inattentive behavioral variables may have contributed to their results. The reliability estimate for the slope of the externalizing behavioral variable (i.e., academic grades as the outcome, lambda coefficient = 0.05; achievement test scores, lambda coefficient = 0.06) was lower than the reliability estimate for the slope of the inattentive behavioral variable

(i.e., academic grades as the outcome, lambda coefficient = 0.23; achievement test scores, lambda coefficient = 0.23). Given that the reliability estimate of the slope for the externalizing behavioral variable was low, it is more difficult to detect strong and consistent effects especially across the two different outcomes.

However, the reliability estimate of the slope for the inattentive behavioral variable was higher, which makes it easier to detect significant effects. Secondly, the reliability estimate is also a function of variability between classrooms; hence, variables with higher reliability estimates may be more susceptible to classroom influences. Finally, the skewed distribution of the externalizing behavioral variable may have suppressed the effects of externalizing behaviors.

Classroom-Level Behaviors and Academic Performance

The classroom behavioral context for externalizing behavior was examined, and results obtained from this study indicated that the classroom context of the students from the 2005-06 school year was a significant predictor of the individual students' academic performance (both academic grades and achievement test scores) three years later during the 2008-09 school year. Nevertheless, the effects of the average externalizing behavioral classroom are very small, effect sizes ranging from $-.09$ SD to $-.07$ SD for academic grades and achievement respectively. Therefore, the results here provide some support for previous research showing that more disruptive and aggressive classroom contexts have negative effects on the student's individual academic development years later (Barth et al., 2004; DeRosier et al., 1994; Koth et al., 2008).

The overall contextual results suggest that when a student is in a classroom with higher levels of disruptive or aggressive behaviors, as measured by the externalizing scale, a student's academic behaviors are influenced negatively. A classroom with higher levels of disruption and aggression limits the effectiveness of classroom instruction because the students are more inclined to be distracted by their peer's behaviors and the teachers are spending more classroom time implementing behavioral management skills. As a result, this classroom context prevents many of the students from efficiently acquiring academic content, and hence, displaying their knowledge.

Cross-Level Interactions and Academic Performance

Given that the individual students' externalizing behaviors, inattentive behaviors, and the classroom-level of externalizing behaviors negatively affected their academic performance, the interaction between the student-level and classroom-level of behaviors were investigated. Prior research suggested that the negative academic effects of students with behavioral problems will be greater by being in a disruptive classroom (Kellam et al., 1998). However, the results from this study indicated that none of the cross-level interactions affected the students' academic performance as expected. Only the cross-level interaction for average classroom externalizing behavior and individual inattentive behavior was statistically significant, but the coefficient was positive and very small (effect size = .06).

Nevertheless, it should be noted that the high correlations among the slopes of the variables and the low lambdas may have contributed to the failure to

detect cross-level interactions or stronger cross-level interactions. As a result of the high correlations between the slopes of the variables (i.e., academic grades as the outcome, tau as correlations between the slope of externalizing and inattentive behaviors = -0.60; achievement test scores, tau as correlations between the slope of externalizing and inattentive behaviors = -0.70), the slopes of the behavioral variables are not distinct from each other which makes it difficult to disentangle and to determine whether there are cross-level interactions.

The results obtained from this study are consistent with the unexpected cross-level interaction findings from Petras et al.'s (2011) study. More specifically, the negative academic effects of students' inattentive behavioral problems were greater for students in classrooms with lower levels of externalizing behaviors. A possible explanation for this finding could involve whether the student "fits in" with his or her context. When an inattentive student is placed in a classroom with lower levels of behavioral problems, that student and his behaviors are more likely to stand out. Because that student does not fit in that context (i.e., where most of the students are well behaved), that inattentive student may be more likely to be ostracized by his peers and/or removed from the classroom by the teacher. As a result, that inattentive student misses out on many of the learning opportunities while the other students in the classroom are continuing to focus on their academic lessons.

On the other hand, when an inattentive student is placed in a classroom with higher levels of behavioral problems, that student fits in with the other students that are equally disruptive. Because there are high levels of disruptive

behaviors in the overall classroom, the teacher is more likely to spend instructional time implementing behavior management skills to the whole classroom. Hence, all of the students in that setting are equally missing out on learning opportunities (recall the negative coefficient for average externalizing behaviors in the intercept model). Therefore, the negative effects of having inattentive behaviors on their grades are not as strong for students in classroom with high levels of disruptive behaviors compared to students in classrooms with low levels of disruptive behaviors.

Moderating Effects of Sex and FARM

Student's sex and FARM were examined to determine whether they moderated the negative effects of behavioral problems on later academic performance. Previous research indicated that the negative effects of behavioral problems on their academic performance will be greater for males and students with lower FARM than for females and students with higher FARM (Entwisle et al., 2005; Kellam et al., 1998; Petras et al., 2011). Nevertheless, neither student sex nor FARM status moderated the relationship between behavioral problems on later academic performance.

Limitations

The results should be considered in light of the limitations of this study. The first limitation is lack of generalizability beyond elementary school grades. This study was conducted with a sample of elementary public school students that participated in an intervention for four years. Findings from this study can only predict whether students' externalizing, internalizing, and inattentive problems

during their early elementary school years will significantly affect their academic development after three years, during their later elementary school years, for these schools. The results from this study cannot generalize to students in the middle or high school years, only, and with caution, to similar elementary schools. The development of students' behavioral problems, classroom environmental problems, and academic development may have differential patterns for older students. Nevertheless, prior studies have examined these effects beyond middle school (Kellam et al., 1998), high school (Janosz et al., 1997; McLeod & Kaiser, 2004), and even into adulthood (Masten et al, 2005; Obradovic et al., 2010). Hence, these longitudinal results should be replicated in future studies to further support the significant long-term effects of early behavioral problems on later school success.

The second limitation is that the teacher-report method was used to collect information on students' behaviors and academic grades. This method assumes that the teachers' reports reflect the actual behaviors of the students and grades in the classroom. The teachers' responses may be biased assessments, as teachers report on students' behaviors and grades may have been influenced by any number of potential teacher biases. For instance, the grades the students receive may reflect the teachers' perception of the students' behaviors. If future research incorporates additional measures, such as classroom observations of students' actual behaviors, other teachers' observations of the students' behaviors, or peer ratings of students' behavior, then concerns about the validity with which these constructs are measured could be attenuated.

An additional caution should be emphasized with the students' prior academic grades that were used to control the students' prior academic performance. The students' prior academic grades as reported by their teachers may have been confounded by the students' behaviors. Based on the school system's grading criteria, the teachers were also asked to include their perception of the students' behavior, "classroom performance" and "independence in work." Moreover, the teachers were asked to assign the prior academic grades towards the end of the school year which was about the same time that the teachers were asked to complete the students' behavioral problems.

The third limitation is the specification of the model used to analyze the results does not permit confident conclusions about causality. Although this study used a variety of behavioral problems to predict the academic development of students, the list of variables studied here are far from complete. There are many other individual and classroom variables that may be important to the process of academic development that was not accounted for in this study. For instance, I did not account for the classroom context with high levels of externalizing behaviors in year two or year three of the study or the students' behavioral problems in year two or year three of the study. Future research should use more robust statistical methods to allow for causal inferences.

Finally, a potential limitation is that the results are based on a sample of suburban public elementary schools in the mid-Atlantic region. This school system volunteered to participate in an experimental investigation of a school

wide intervention. The extent to which these results based on this sample can be generalized to other schools that differ in their demography is not known.

Implications for Research and Practice

This study was the first to examine the longitudinal effects of multiple behavioral problems simultaneously and the effects of behavioral context of the classroom on the students' academic performance while controlling for the students' confounding behavioral problems among a large group of fifth-grade students.

The results from this study have research implications. The results evidenced that when multiple behavioral problems are studied simultaneously, it mitigates the varying results from studies that examined the behavioral problems separately. The results here identified the unique effects of various behavioral problems on later academic performance of students. Therefore, more confidence should be given to the results obtained from studies that accounted for the students' confounding behavioral problems. Nevertheless, this study did not examine the combined effects or the possible interaction effects between behavioral problems. Given the importance of how these behavioral variables interact to effect the academic development of students, future studies should investigate the combined effects of behavioral variables as well as replicate the unique effects of various behavioral problems.

Furthermore, the results from this study have implications for practice. Given the limited resources in the educational field, the results from this study may be used to guide educational personnel on how to best utilize resources. This

study indicates that special focus should be given to students with individual inattentive behaviors and classrooms with high levels of externalizing behaviors because they are the strongest predictors of academic performance. It may be difficult for teachers to identify the students with higher levels of inattentive behaviors. School psychologist can aid the teachers in providing an early behavioral screening method to identify students who are at-risk for inattentive behavioral problems.

The presence of inattentive behaviors such as difficulty staying on task and being easily distracted during the early elementary school years signals academic difficulties in their later elementary school years. Priority should be given to students with inattentive behaviors (above students with externalizing and internalizing behaviors), and student behavioral screenings as early as second grade may help to identify students with attention difficulties. School professionals may be able to mitigate the students' behavioral difficulties and academic struggles by providing those students with behavioral and academic interventions at an earlier age. Furthermore, these students have distinctive problems associated with their inattentive behaviors and require different strategies to cope with their effects, so the interventions should be unique to the students' inattentive behavioral needs.

Finally, the significant effects of classroom-level behavioral problems reveal that the contextual environment of the students helps determine their academic success in the future. Students being placed in a classroom environment where there are high levels of externalizing behaviors such as

physical aggression, verbal teasing, defiance of teachers, etc. during the early elementary school years signal an increase in academic struggles and minimizes successful achievement years afterwards. The placement of the students' classroom for the academic year is an important decision because the students will remain in that classroom surrounded by their peers for the whole school year. To prevent the negative effects of being in an aggressive classroom context, attention should be given to the even distribution of aggressive and disruptive students among classrooms. Ultimately, the practice of clustering these disruptive students together in one classroom should be avoided. Furthermore, it is necessary to address the individual externalizing behaviors of the students within these classrooms as well as addressing the whole group level of externalizing behavioral problems.

Future Research

The findings from this study have led to many questions regarding the longitudinal effects of behavioral problems on later academic development. Many recommendations are provided for future studies to further study this topic. First, the results from this study are limited to students in elementary school and cannot generalize to students in the middle or high school. The development of students' behavioral problems, classroom environmental problems, and academic development have differential patterns for older students. Future studies should examine the long-term effects of early behavioral problems on later school success among students in middle and high school.

Second, this study only investigated the unique effects of multiple behavioral problems simultaneously at level-1. Future studies should examine the multiple behavioral problems to determine whether there are interactions between and among the behavioral variables at level-1 and how they affect the academic development of the students.

Third, given the complexity and interrelationships among the three behavioral variables, this study only examined the effects of externalizing behaviors at level-2. Future studies should examine the unique effects all three behavioral variables at level-2 to determine the significance of being in a classroom with higher mean levels of internalizing behaviors and being in a classroom with higher mean levels of inattentive behaviors.

Fourth, many students with behavioral problems present with learning difficulties in the classroom as well. The directional relationship between behaviors and academic performance remains unclear. Students may be misbehaving in class as a result of deficient academic skills, or students may not be learning in class as a result of their disruptive and distracting behaviors. Future studies should account for the confounding effects of the student's learning difficulties and model the causal relationship between behaviors and academic performance.

Fifth, teachers, parents, and students rarely consistently report on the behaviors or academic performance within the school setting; future studies should improve the validity of the behavioral and academic measures of the their

studies by incorporating the parents' perceptions, the student's individual perceptions, and direct classroom observations.

Finally, this study examined the longitudinal effects of multiple behavioral problems on the student's later academic performance using the static model approach, in that, this model assumes that the growth of the behaviors is linear. Future studies should investigate the longitudinal effects of multiple behavioral problems on the student's later academic performance using a non-static approach and/or examine the incremental growth of the behavioral problems after each year via growth curve modeling.

Appendix A

Grading Criteria for Core Subjects: Kindergarten through Second Grades

GRADE	ACHIEVEMENT IN SUBJECT	CLASS PERFORMANCE	INDEPENDENCE IN WORK
S+	<ul style="list-style-type: none"> - consistently meets objectives - outstanding achievement and sustains mastery of the subject area - superior level of performance 	<ul style="list-style-type: none"> - fully participates and demonstrates effort in all class activities - exhibits originality in thinking, expression, and work products 	<ul style="list-style-type: none"> - assumes responsibility for behavior and assignments - is self-directed
S	<ul style="list-style-type: none"> - adequately meets objectives - achieves the majority of the grade level objectives - achieves sufficient subject mastery 	<ul style="list-style-type: none"> - willingly participates and demonstrates effort in class activities 	<ul style="list-style-type: none"> - is self-directed - occasionally requires individual attention
S-	<ul style="list-style-type: none"> - inconsistently meets objectives - frequently falls below the average level of achievement - needs teacher support and can meet most objectives with more time and assistance 	<ul style="list-style-type: none"> - inconsistently participates and demonstrates effort in class activities 	<ul style="list-style-type: none"> - frequently requires individual attention
N	<ul style="list-style-type: none"> - has difficulty meeting objectives at this time - most objectives are not being met, even when teacher support or extra time to learn are given 	<ul style="list-style-type: none"> - consistently requires teacher direction and encouragement to participate in class activities - demonstrates little effort in class activities 	<ul style="list-style-type: none"> - consistently requires teacher direction and encouragement to complete tasks

Appendix B

Grading Criteria for Core Subjects: Third through Fifth Grades

GRADE	NUMBER RANGE	ACHIEVEMENT IN SUBJECT	CLASS PERFORMANCE	INDEPENDENCE IN WORK
A Excellent	93 – 100 %	<ul style="list-style-type: none"> - demonstrates outstanding achievement and mastery of the subject area - evidences understanding and appreciation of the fundamental concepts of the subject area - exercises superior ability in problem solving and in arriving at logical conclusions - expresses ideas clearly both orally and in writing 	<ul style="list-style-type: none"> - fully participates and demonstrates effort in all class activities - exhibits originality in thinking, expression, and work products - submits all work on or before due date - displays neatness, legibility, and accuracy in work 	<ul style="list-style-type: none"> - is self-directed - shows originality in preparation of assignments - consistently contributes independent work in addition to required assignments - submits all work on or before due date
B+ Very Good	90 – 92 %	<ul style="list-style-type: none"> - demonstrates very good achievement and mastery of the subject area - evidences understanding and appreciation of the fundamental concepts of the subject area - expresses ideas clearly both orally and in writing 	<ul style="list-style-type: none"> - usually participates and demonstrates effort in class activities - exhibits originality in thinking, expression, and work products - submits all work on or before due date - displays neatness, legibility, and accuracy in work 	<ul style="list-style-type: none"> - completes assignments on time, thoroughly and accurately - is self-directed - sometimes contributes independent work in addition to required assignments
B Good	84 – 89 %	<ul style="list-style-type: none"> - demonstrates above average achievement and mastery - usually evidences understanding and appreciation of the fundamental concepts of the subject area 	<ul style="list-style-type: none"> - usually participates and demonstrates effort in class activities - usually submits work on or before due date - displays neatness, legibility, and accuracy in work 	<ul style="list-style-type: none"> - usually completes assignments on time, thoroughly and accurately - is self-directed - sometimes contributes independent work in addition to required assignments

GRADE	NUMBER RANGE	ACHIEVEMENT IN SUBJECT	CLASS PERFORMANCE	INDEPENDENCE IN WORK
C+ High Average	81 – 83 %	<ul style="list-style-type: none"> - achieves sufficient subject mastery to proceed to the next level - objectives are usually mastered, but not always 	<ul style="list-style-type: none"> - sometimes participates and demonstrates effort in class activities - inconsistently submits work on due date - does not always display neatness, legibility, and accuracy in work 	<ul style="list-style-type: none"> - usually completes assignments on time - is sometimes self-directed, but sometimes needs encouragement to complete tasks
C Average	74 – 80 %	<ul style="list-style-type: none"> - achieves sufficient subject mastery to proceed to the next level - objectives are sometimes mastered, but not always 	<ul style="list-style-type: none"> - sometimes participates and demonstrates effort in class activities - inconsistently submits work on due date - does not always display neatness, legibility, and accuracy in work 	<ul style="list-style-type: none"> - sometimes completes assignments on time - is sometimes self-directed, but sometimes needs encouragement to complete tasks
D+ Below Average	71 – 73 %	<ul style="list-style-type: none"> - frequently falls below the average level of achievement - lacks sufficient subject mastery to proceed to the next level 	<ul style="list-style-type: none"> - often does not participate and demonstrate effort in class activities - submits poor work, but effort is in evidence 	<ul style="list-style-type: none"> - frequently requires individual direction - often does not complete assignments on time, or at all
D Poor	65 – 70 %	<ul style="list-style-type: none"> - demonstrates limited achievement of grade level objectives - consistently falls below grade level requirements 	<ul style="list-style-type: none"> - may be irregular in attendance and generally fails to make up missed work - shows little interest in class and rarely contributes 	<ul style="list-style-type: none"> - seldom completes an undertaking without teacher direction and encouragement
F Failure	64 % and below	<ul style="list-style-type: none"> - fails to meet minimum requirements 	<ul style="list-style-type: none"> - frequently fails to complete assignments - demonstrates little or no effort - may have excessive unexcused absences - fails to complete 65% of the assigned, evaluated work 	<ul style="list-style-type: none"> - seldom completes an undertaking without teacher direction and encouragement

Appendix C

Student Behavioral Rating Scales

Scale	Item
Externalizing Behavioral Problems	
1)	Defies teachers or other school personnel
2)	Argues or quarrels with others
3)	Teases or taunts others
4)	Takes others property without permission
5)	Is physically aggressive or fights with others
6)	Gossips or spreads rumors
7)	Is disruptive
8)	Breaks rules
Internalizing Behavioral Problems	
1)	Interacts with teachers (reverse score)
2)	Seems sad
3)	Makes friends easily (reverse score)
4)	Withdrawn doesn't get involved with others
5)	Seems anxious or worried
6)	Shy or timid around classmates or adults
7)	Socializes or interacts with classmates (reverse score)
8)	Is a loner
Inattentive Behavioral Problems	
1)	Easily distracted
2)	Accomplishes assignments independently (reverse score)
3)	Eager to learn (reverse score)
4)	Works to overcome obstacles in schoolwork (reverse score)
5)	Says things like "I can't do it" when work is difficult
6)	Stays on task (reverse score)
7)	Pays attention (reverse score)
8)	Learns up to ability (reverse score)
<p><i>Response Categories 0 = Never/Almost Never, 1 = Sometimes, 2 = Often, 3 = Very Often</i></p>	

Appendix D

Final Model of the Longitudinal Effects of Behavioral Variables on Student
Academic Report Card Grades: Supplementary Analysis with Transformed Data

Variables	Coef.	Stand. Error	<i>t</i> -ratio	df	<i>p</i> - value
Academic report card grades (β_0)					
Intercept (γ_{00})	-0.07	0.03	-2.23	187	0.03
Classroom mean of externalizing behaviors (γ_{01})	-0.04	0.04	-1.04	187	0.30
Prior academic performance slope (β_1)					
Intercept (γ_{10})	0.80	0.07	11.29	1354	<0.01
Sex (Male) slope (β_2)					
Intercept (γ_{20})	-0.19	0.04	-4.72	1354	<0.01
FARM slope (β_3)					
Intercept (γ_{30})	-0.17	0.06	-2.99	1354	<0.01
Externalizing behavior slope (β_4) ^a					
Intercept (γ_{40})	-0.17	0.07	-2.53	187	0.01
Classroom mean of externalizing behaviors (γ_{41})	-0.03	0.10	-0.28	187	0.78
Internalizing behavior slope (β_5) ^b					
Intercept (γ_{50})	0.03	0.07	0.47	1354	0.64
Inattentive behavior slope (β_6)					
Intercept (γ_{60})	-0.23	0.04	-6.00	187	<0.01
Classroom mean of externalizing behaviors (γ_{61})	0.04	0.03	1.24	187	0.22

Note. The results are for fifth grade students during the 2008-09 school year, and their predictor variables were collected when they were in the second grade during the 2005-06 school year. *a* indicates that the externalizing behavioral variable was transformed using the logarithm transformation. *b* indicates that the internalizing behavioral variable was transformed using the square root transformation.

Appendix E

Final Model of the Longitudinal Effects of Behavioral Variables on Student

Standardized Achievement Scores:

Supplementary Analysis with Transformed Data

Variables	Coef.	Stand. Error	t-ratio	df	p- value
Standardized Achievement Scores (β_0)					
Intercept (γ_{00})	-0.05	0.03	-1.57	183	0.12
Classroom mean of externalizing behaviors (γ_{01})	-0.02	0.05	-0.35	183	0.73
Prior academic performance slope (β_1)					
Intercept (γ_{10})	1.00	0.07	14.27	1280	<0.01
Sex (Male) slope (β_2)					
Intercept (γ_{20})	-0.03	0.04	-0.78	1280	0.44
FARM slope (β_3)					
Intercept (γ_{30})	-0.17	0.06	-2.94	1280	<0.01
Externalizing behavior slope (β_4) ^a					
Intercept (γ_{40})	-0.02	0.07	-0.27	183	0.79
Classroom mean of externalizing behaviors (γ_{41})	0.07	0.12	0.60	183	0.55
Internalizing behavior slope (β_5) ^b					
Intercept (γ_{50})	0.08	0.07	1.21	1280	0.23
Inattentive behavior slope (β_6)					
Intercept (γ_{60})	-0.15	0.04	-3.73	183	<0.01
Classroom mean of externalizing behaviors (γ_{61})	-0.02	0.04	-0.59	183	0.55

Note. The results are for fifth grade students during the 2008-09 school year, and their predictor variables were collected when they were in the second grade during the 2005-06 school year. ^a indicates that the externalizing behavioral variable was transformed using the logarithm transformation. ^b indicates that the internalizing behavioral variable was transformed using the square root transformation.

Appendix F

Sensitivity Analysis for the Moderating Effects of Sex (Male) and FARM
Between Behavioral Problems and Academic Performance

Variables	Coef.	Stand. Error	t-ratio	df	p-value
Outcome: Academic Report Card Grades					
Sex × Externalizing behavior slope (β_7)					
Intercept (γ_{70})	-0.03	0.02	-1.59	2654	0.11
Sex × Internalizing behavior slope (β_8)					
Intercept (γ_{80})	0.01	0.02	0.47	2654	0.64
Sex × Inattentive behavior slope (β_9)					
Intercept (γ_{90})	0.01	0.02	0.72	2654	0.47
FARM × Externalizing behavior slope (β_{10})					
Intercept (γ_{100})	-0.01	0.02	-0.53	2654	0.59
FARM × Internalizing behavior slope (β_{11})					
Intercept (γ_{110})	0.01	0.02	0.38	2654	0.71
FARM × Inattentive behavior slope (β_{12})					
Intercept (γ_{120})	0.03	0.02	1.33	2654	0.18
Outcome: Standardized Achievement Test Scores					
Sex × Externalizing behavior slope (β_7)					
Intercept (γ_{70})	-0.02	0.02	-1.18	2539	0.24
Sex × Internalizing behavior slope (β_8)					
Intercept (γ_{80})	-0.01	0.02	-0.90	2539	0.37
Sex × Inattentive behavior slope (β_9)					
Intercept (γ_{90})	0.04	0.02	2.06	2539	0.04
FARM × Externalizing behavior slope (β_{10})					
Intercept (γ_{100})	0.01	0.02	0.41	2539	0.69
FARM × Internalizing behavior slope (β_{11})					
Intercept (γ_{110})	0.00	0.02	-0.03	2539	0.98
FARM × Inattentive behavior slope (β_{12})					
Intercept (γ_{120})	0.00	0.03	0.07	2539	0.94

Note. All moderating variables were uncentered and added to the within-model.

Appendix G

Table of Literature Review

Externalizing Behaviors and Academic Performance						
	Study	Sample	Independent Variables	Dependent Variables	Duration	Results
1	Miles & Stipek, 2006	k and 1st grade	aggressive behavior	achievement: literacy difficulties	same year, 2 years, and 4 years later.	There were short-term significant results but no long term results.
2	Arnold, 1997	low income boys (ages 3-6)	externalizing	expressive, receptive, vocabulary, recognition	same year	boys with externalizing behaviors significantly predicted academic problems
3	Masten et al, 2005	age 8-12	externalizing	GPA; parent & self reports	longitudinal (7, 10, 20 years)	externalizing behaviors significantly predicted academics 7 years but not 10 or 20 years later
4	Obradovic, Burt, & Masten, 2010	age 8-12	externalizing	GPA; parent & self reports	longitudinal (7, 10, 20 years)	externalizing behaviors significantly predicted academics 7 years but not 10 or 20 years later
5	Caprara, Barbaranelli, Pastorelli, Bandora, & Zimbardo, 2000;	3rd grade (Rome, Italy)	physical & verbal aggression	teacher report on academic	longitudinal (5 years)	externalizing behaviors did not predict academic even after controlling for prior academic

Internalizing Behaviors and Academic Performance						
Study	Sample	Independent Variables	Dependent Variables	Duration	Results	
1	Horn & Packard, 1985	k-1st grade	various behaviors (includes internalizing, externalizing, and inattentive behaviors)	reading achievement	Con-current and 1 year later	internalizing and attention behaviors are the strongest and significant predictors of achievement
2	Rapport, Denney, Chung, & Hustace, 2001;	2nd-9th grades (age 7-15)	internalizing	academic (reading, math, language)	3-4 years later	internalizing behaviors indirectly affected later achievement via cognitive functioning (vigilance & memory test)
3	Masseti et al., 2008	age 3-5	internalizing	reading & math test scores	Longitudinal (8 years later)	internalizing behavior significantly predicted achievement 8 years later

Externalizing and Internalizing Behaviors and Academic Performance						
Study		Sample	Independent Variables	Dependent Variables	Duration	Results
1	Henricsson & Rydell, 2004	1st grade (Sweden)	externalizing, internalizing, & social competence	self-perception of achievement in school	2 years later	externalizing behaviors significantly predicted achievement perception 2 years later
2	Bub, McCartney & Willet, 2007	preschool (age 2-4)	externalization & internalization	cog. ability and ach. skills (WJ)	1 year later	externalizing and internalizing behaviors significantly predicted academics' internalizing behaviors significantly predicted growth rate.
3	Rabiner, Murrar, Schmid & Malone, 2004;	1st grade	externalizing, internalizing, & attention	academic (reading, math, writing)	same year	all sign & attention was strongest significant predictor of academics; ethnicity differences (relationship stronger for white and black students)

Inattentive Behaviors and Academic Performance						
Study		Sample	Independent Variables	Dependent Variables	Duration	Results
1	Finn, Pannozzo, & Voelkl, 1995;	4th grade	attention	normed & criterion reference test	same year	inattention significantly predicted academic
2	Finn, Pannozzo, & Voelkl, 1995;	K grade	externalizing, internalizing, & attention	reading achievement	Longitudinal (5 years later)	inattention significantly predicted later reading achievement
3	Breslau et al, 2009	1st grade (age 6)	externalizing, internalizing, & attention	math & reading score	10-11 years later	only attention significantly predicted academic years later even after controlling for externalizing and internalizing behaviors

Multiple Behavioral Problems and Academic Performance: Combined Variable Approach						
Study		Sample	Independent Variables	Dependent Variables	Duration	Results
1	Farmer, 2001	1st grade	externalizing, internalizing,	cognitive (WISC) cognitive (WISC)	same year 2 years later	academic differences: Ext+Int is greater than Internalizing and control groups Groups with no disorder significantly predicted academic <i>Diagnosis Criteria: .75 SD above the mean to be in group</i>
2	Gresham, MacMillan, Bocian, Ward, & Forness, 1998	3rd grade	externalizing, internalizing, & hyperactivity	math & reading scores	1 year later	hyperactivity+conduct problems are greater than internalizing and externalizing, control for both social and academic problems <i>Diagnosis Criteria: Hyper+CP = 2 SD above the mean; Ext+Int = 1 SD above the mean</i>
3	August, Realmuto, MacDonald, Nugent, & Crosby, 1996	1st-4th grade	externalizing, internalizing, & attention	reading, math, spelling, intelligence tests	same year	no significant academic findings among the groups; add and externalizing is strongest on behavioral outcome <i>Diagnosis Criteria: diagnosed disorders based on DSM criteria.</i>

Multiple Behavioral Problems and Academic Performance: Uncombined Variable Approach						
Study	Sample	Independent Variables	Dependent Variables	Duration	Results	
1	Duncan et al, 2007	age 5-6	externalizing, internalizing, & attention	math and reading scores & grades	3 & 5 years later	only attention significantly predicted academics, after controlling for externalizing and internalizing (NOT vice versa) <i>no sex or SES differences</i>
2	Barriga et al, 2002	11-19 yr (av=15) alternative school	externalizing, internalizing, & attention	read, math, spell, achievement (WRAT3)	same year	only attention significantly predicted academics, after controlling for externalizing and internalizing (NOT vice versa) <i>no sex or SES differences</i>
3	Farmer & Bierman, 2002	K grade	externalizing, internalizing, & attention	report card grades	1 & 3 years later	externalizing and internalizing significantly predicted academics beyond attention (NOT vice versa)
4	McLeod & Kaiser, 2004	age 6-8	externalizing, internalizing	high school degree & college enrollment	longitudinal 14 years	1) externalization significantly predicted high school degree above internalizing (NOT vice versa); 2) No sign with college enrollment
5	Janosz, LeBlanc, Boulerice, & Tremblay, 1997	age 12-16 (2 samples)	externalization and internalization, student demographics	school drop out	about 4 years later	externalization and internalization significantly predicted drop-out above internalizing & externalizing only for the first sample (NOT second sample)

Classroom-Level Behaviors and Academic Performance						
Study	Sample	Independent Variables	Dependent Variables	Duration	Results	
1	DeRosier, Cillessen, Coie, & Dodge, 1994	grade 1-3; AA boys	aggressive group context	aggressive individual behaviors	same year	aggressive context significantly predicted individual behaviors
2	Barth, Dunlap, Dane, Lochman, & Wells, 2004	4th grade	classroom context (aggressive, peer relations, & academic focus)	aggressive, peer relations, & academic focus	same year & 1 yr later	class-level of aggression significantly predicts individual aggression for their current school year (fourth grade) and the following school year (fifth grade)
3	Koth, Bradshaw, & Leaf, 2008	5th grade	classroom context (behavior problem, teacher, class size)	school order & discipline & academic motivation	same year	class with high disruptive students significantly predict more disorder & less academic motivation
4	Alexander, Entwisle, & Dauber, 1993	grade 1-4	Class (withdrawal, anger, inattention)	report card grades & CAT	short and long term (1, 2, 4 years later)	attention & interest/participation significantly predict short & long term academic

Cross Level Interactions and Academic Performance						
Study	Sample	Independent Variables	Dependent Variables	Duration	Results	
1	Werthamer-Larsson, Kellam, & Wheeler, 1991	1st grade	retention interacts with Class (academic, Conduct Problem behaviors)	behaviors (shy, aggression, concentration)	same year	retained student and Conduct Problem classes significantly predicts behaviors
2	Kellam, Ling, Merisca, Brown, & Ialongo, 1998	1st grade	individual aggression & class aggression	individual aggression	6 years later	aggressive student being in an aggressive class significantly predict aggression in middle school (only for BOYS) <i>gender differences (interactions sign for boys not for girls)</i>
3	Petras, Masyn, Buckley, Ialongo, & Kellam, 2011	1st grade	student aggression & class aggression	school removal	6 years later	High-risk students interacts with low aggressive class significantly predicts school removal <i>high-risk (i.e., Afr-Am boys who receive FARM with aggressive behavior)</i>

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