Exploring the Relationship Between Reading and Behavior Problems in Elementary-Aged Children

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DEDICATION

This work is dedicated to my endlessly supportive and encouraging parents, Michael and Kelly Price, my incredibly loving and encouraging partner, Santiago Ruiz, my dearest friends and colleagues in graduate school, Addison Welch, Amber Shuster, Danielle Shine, and Caroline Cole, and my incredibly helpful and guiding advisor, Dr. Christopher Skinner. I could not have started this dissertation without their support, let alone complete it. I thank them from the bottom of my heart for helping me achieve all my successes during graduate school.

ABSTRACT

Reading and behavior difficulties have long been linked in the literature, with each problem having an adverse effect on students' academic success when experienced individually and in combination. Given that the problems are closely linked and lead to unfavorable outcomes for students, it is important for researchers to understand how each problem influences the development and potential mitigation of the other problem. This dissertation includes four chapters. Chapter One is a review of reading challenges, internalizing and externalizing behavior difficulties, and the association between the two problems. Chapter Two describes a study in which the impact of externalizing and internalizing behavior problems on reading remediation was investigated. Chapter Three describes a study in which the developmental timeline of reading and behavior problems (e.g., which came first) was traced in elementary-aged students. Chapter Four discusses the implications, limitations, and future research directions related to the study of concurrent reading and behavior problems.

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CHAPTER ONE

Review of the Literature: Reading and Behavior Problems that Impair Students' Academic Performance

Review of the Literature: Reading and Behavior Problems that Impair Students' Academic Performance

Reading is a fundamental skill that is crucial for lifelong learning and academic success. Until the end of third grade, most students are still building reading skills. After that, students must effectively apply their reading skills to master content in other subject areas. (The Annie E. Casey Foundation, 2010; Freed et al., 2017; Kent et al., 2017). Thus, reading is the basis for all knowledge acquisition. To promote academic success down the line, it is important that students master foundational reading skills early in their school careers. Students who do not master early reading skills face various adverse outcomes, including broad academic underachievement, reduced vocational opportunities, and worsened health outcomes (The Annie E. Casey Foundation, 2010; DeWalt and Pignone, 2005). In contrast, proficient readers earn better grades in school, have increased educational and vocational opportunities, and are better prepared to handle health-related challenges (The Annie E. Casey Foundation, 2010; DeWalt & Pignone, 2005).

To become proficient readers, students must first master pre-reading skills, including letter knowledge and phonemic and phonological awareness (Acha et al., 2024; National Reading Panel, 2000). Letter knowledge involves the understanding that letters have names and specific sounds (Acha et al., 2024). Students with letter knowledge are often effective at letter-sound mappings (e.g., matching sounds to letters), and they develop orthographic fluency, decoding, and word reading skills more quickly and easily than their peers (Acha et al., 2024). Phonemic awareness involves knowledge of individual phonemes, or sounds, in a spoken language. Similarly, phonological awareness involves knowledge of speech at the sentence, word, and

syllable levels. Students with strong phonemic and phonological awareness can recognize and manipulate phonemes within spoken words (National Reading Panel, 2000).

Effective recognition and manipulation of phonemes requires students to master several skills, including phoneme isolation, identification, categorization, blending, segmentation, and deletion. Phoneme isolation requires students to recognize individual sounds within words (e.g., the first sound in “bike” is /b/). Similarly, phoneme identification requires students to identify common sounds across words (e.g., dad and dog both start with /d/). Students with phoneme categorization skills can recognize non-matching sounds in a sequence of words. For example, when given the sequence “run, rug, bug,” students with strong phoneme categorization skills can identify “bug” as the odd word. Phoneme blending requires students to listen to a sequence of sounds and combine them to form a real word, and phoneme segmentation requires students to break words down into individual sounds. Phoneme deletion skills require students to recognize words when sounds have been removed from them (e.g., what is “bread” without /b/).

Students who receive effective instruction in letter knowledge, phonemic awareness, and phonological awareness are more likely to develop early proficiency in these skills. Students with early proficiency in these skills are also more likely to develop effective reading skills over time than students who do not receive instruction in these areas (National Reading Panel, 2000). For example, students with letter knowledge and phonemic/phonological awareness are strong decoders. They can translate printed words into speech by applying their knowledge of how letters and sounds correspond, and by sounding out words to decipher them (Foorman et al., 2016). According to the National Reading Panel (2000), phonemic awareness and letter knowledge are two of the best predictors of how well students will learn to read once they enter school.

Once students master pre-reading skills, they can begin to develop reading fluency. Fluent readers can read texts quickly, accurately, and automatically, using appropriate tone, pauses, and expression (National Reading Panel, 2000). Although pre-reading skills are essential for building fluency, having strong skills in those areas does not automatically lead to fluency. Instead, reading fluency must be taught to students, who must then practice their fluency skills by reading both silently and aloud. Several strategies can be used to master these skills. One common approach is through frequent oral reading practice, including repeated readings and paired readings. Repeated readings require students to read passages aloud several times, which improves their ability to quickly and accurately read texts through frequent practice. Similarly, paired readings require students to read aloud to each other or alongside each other; when using this strategy, more fluent readers are generally paired with less fluent readers to promote their skill development (National Reading Panel, 2000).

Another common approach for developing fluency is promoting independent or recreational reading. This strategy requires students to read extensively on their own, with minimal feedback and guidance from their instructors. Teachers incentivize students to practice reading in several ways, including through programs like Accelerated Readers (AR) and Sustained Silent Reading (SSR; National Reading Panel, 2000). The AR strategy encourages students to frequently practice reading by allowing them to earn points for taking quizzes about books that they read. Points can then be exchanged for fun rewards (e.g., toys, treats). The SSR strategy encourages students to read by offering them periods of uninterrupted quiet time each day, during which they can read whatever they prefer. According to the National Reading Panel (2000), students with strong reading fluency have greater reading achievement over time than peers with weaker reading fluency. In other words, frequent reading practice encourages reading skill development,

and reading aloud helps students develop better word recognition, speed, and accuracy in reading (Foorman et al., 2016; National Reading Panel, 2000).

When students have strong basic reading skills and reading fluency, they can begin to build skills in reading comprehension. Reading comprehension relates to the ability to understand and gain meaning from text, and it is a necessary skill for learning across subjects (Clarke et al., 2010; National Reading Panel, 2000). Reading comprehension occurs at different levels, including understanding of vocabulary words and understanding of larger passages. Teaching vocabulary is an important aspect of reading skill development as it provides a basis for learning new ideas and more complex concepts (Cummings et al., 2018). As students learn new vocabulary, their understanding of novel words is mapped onto their understanding of known words (National Reading Panel, 2000). Without a robust repertoire of known words, students have greater difficulty understanding the meaning of passages that they read. In contrast, students with more well-developed vocabularies often find it easier to understand and learn from written texts than peers with less-developed vocabularies (Cummings et al., 2018).

Having strong vocabulary knowledge is related to improved comprehension of larger texts (National Reading Panel, 2000). When students are familiar with the meaning of words within texts, they can better understand the meaning of a larger written passage or narrative. According to the National Reading Panel (2000), reading comprehension is an active process during which students recognize words, connect them to other words and ideas in a passage, and derive greater meaning from the whole passage. Students with reading comprehension skills construct mental representations of what they read, which helps them to remember and use information effectively. Thus, students with strong reading comprehension skills often have better academic outcomes than students who struggle to comprehend texts (National Reading Panel, 2000).

There are several factors that influence students' abilities to develop reading skills. For example, students with a diagnosis of dyslexia have difficulties with word recognition, decoding, and fluency, which makes it more difficult for them to learn words and comprehend texts (Peterson & Pennington, 2012). Language impairments also negatively impact the development of reading skills, as deficits in phonological awareness and spoken language make it more difficult for students to learn words and gain meaning from texts (Loucas et al., 2015). English Language Learners (ELL) are also known to have greater difficulty developing reading skills in English than peers who speak English as their native language, as ELL populations must learn a new language from the ground-up (e.g., developing a phonemic and phonological awareness in a new language, then fluency and comprehension). Other factors that could adversely impact reading development include a lack of adequate instruction, socioeconomic factors (e.g., poverty, resources), and environmental factors (e.g., how well reading is promoted and supported in the community).

Academic Impact of Internalizing and Externalizing Behavior Problems

Academic success requires more than well-developed academic skills. To develop skills across subjects, students must behave adaptively enough at school to access instruction. Students who struggle to engage in adaptive behavior at school have difficulty functioning in academic settings, which adversely impacts their ability to master skills and learn academic content. There are several types of behaviors that can be problematic at school, which are often classified as either internalizing or externalizing behavior problems (Achenbach & Edelbrock, 1978).

Internalizing Behavior Problems

Internalizing behavior problems, sometimes referred to as "overcontrolled behaviors," relate to problems and challenges that stem from quiet, maladaptive, inwardly-focused emotions

(Achenbach & Edelbrock, 1978). These problems can be difficult for teachers and service providers to detect, as they are not always immediately observable from children's behavior at school (Aguilar-Yamuza et al., 2023). Because internalizing behavior problems often do not result in overt disruptive behavior, they are sometimes viewed as less problematic by teachers and parents (Tandon et al., 2009). However, they still pose a significant problem for children affected by internalizing symptoms. According to Achenbach and Edelbrock (1978), some of the most prevalent symptoms of internalizing behavior problems include anxiety, shyness, fear, avoidance, nervousness, worry, and sadness. More recent research has started to differentiate internalizing behavior problems into further categories, mainly described as anxious disorders and depressive disorders (Tandon et al., 2009).

Anxious disorders are some of the most common mental health problems in school-aged children, and they can cause significant stress and impairment for those affected, both in school and outside of school (Tandon et al., 2009; McLoone et al., 2006; Van Ameringen et al., 2003). Some types of anxiety disorders experienced by school-aged children include generalized anxiety, separation anxiety, social phobias, specific phobias, obsessive compulsive disorders, and panic disorders (Spence, 1998). In younger children, problems such as separation anxiety are most clearly identifiable, but as children age, social anxieties and more generalized fears become more common and noticeable (McLoone et al., 2006; Spence, 1998). Students who struggle with anxious disorders experience a variety of symptoms, both cognitively and somatically. Some cognitive symptoms of anxiety include excessive fear and worrying, difficulty concentrating, irritability, and emotional distress (McLoone et al., 2006). Some somatic symptoms include fatigue, restlessness, sleep disturbances, muscle tension, and nausea (McLoone et al., 2006).

When children experience symptoms of anxiety in school, their ability to function in the academic setting is adversely affected (Van Ameringen et al., 2003). For example, young students who experience separation anxiety may fear leaving their caregivers, and thus may experience school refusal that impacts their ability to learn and engage with schoolwork (McLoone et al., 2006). Older students with more generalized fears and social anxiety experience different problems at school. Anxious students may worry about the quality of their work and their performance in class, which could lead to reduced willingness in taking risks and learning new material. Students could also fear interactions with peers and teachers or speaking and performing in front of their class, which could lead to lower academic engagement and lower achievement in school (McLoone et al., 2006). When anxious children struggle to adapt to school settings and feel distress related to their symptoms, they are more likely to experience adverse academic outcomes, including higher rates of underachievement and school drop-out (McLoone et al., 2006; Van Ameringen et al., 2003). Anxiety disorders also have high rates of comorbidity with other psychological challenges that could negatively impact students' academic functioning, including depressive disorders (McLoone et al., 2006; Spence, 1998).

Like anxious disorders, depressive disorders are common in school-aged children and can have a significant negative impact on their academic success (Tandon et al., 2009; Kovacs et al., 1984). Some types of depressive disorders include major depressive disorders, dysthymia, and bipolar disorders, all of which are associated with cognitive and somatic symptoms that can severely impact students' functioning across settings (Tandon et al., 2009; Kovacs et al., 1984). Some cognitive symptoms of depression in children include loneliness and social withdrawal, poor self-concept, high stress levels, negative affect, and reduced cognitive ability (Kovacs et al., 1984; McCabe et al., 2011). Somatic symptoms of depression are similar to those related to

anxiety, including frequent headaches, abdominal and chest pains, digestive problems, change in appetite, fatigue, and sleep difficulties (Kovacs et al., 1984, Romero-Acosta et al., 2013).

Children who experience depressive symptoms often have adversely impacted functioning in school settings, and they experience a range of poor academic outcomes (Bernaras et al., 2011; Humensky et al., 2010). Researchers have found that students experiencing depressive symptoms have higher rates of school maladjustment, including a disinterest in attending school, poor relationships with peers and teachers, and reduced interest in learning and meeting academic goals (Bernaras et al., 2011). Depressed students also have lower rates of academic achievement, including more difficulty completing homework and classwork, lowered ability to concentrate in class, greater difficulty earning good grades, and a greater likelihood of dropping out of school (Bernaras et al., 2011; Humensky et al., 2010). Later in life, students who experience depressive symptoms also have lower rates of college attendance, higher rates of academic burnout, and greater difficulty maintaining employment than peers without depressive symptoms (Bernaras et al., 2011; Humensky et al., 2010). Thus, internalizing behavior problems (e.g., anxious and depressive disorders) pose a significant threat to students' achievement and livelihood both in and out of school.

Externalizing Behavior Problems

In contrast to internalizing behavior problems, externalizing behavior problems (e.g., "undercontrolled behaviors") relate to challenges that stem from defiant, impulsive, maladaptive emotions and behaviors that are outwardly focused (Achenbach & Edelbrock, 1978). Although these problems are generally easier for teachers to detect than internalizing symptoms, they can lead to significant disruptions in a classroom environment that make learning more difficult for externalizing students and their peers (Achenbach & Edelbrock, 1978; Hinshaw et al., 1987).

According to Achenbach and Edelbrock (1978), some prevalent symptoms of externalizing behavior problems include hyperactivity, immaturity, aggressiveness, and delinquent or conduct-disordered behaviors. Other researchers have identified two primary subcategories of externalizing behavior problems, often described as Inattentive/Hyperactive Problems and Aggressive/Conduct Problems (Hinshaw et al., 1987).

The presence of Inattentive/Hyperactive Problems can significantly impact students' ability to function adaptively at school, as well as their ability to engage appropriately with academic material (Arslan, 2019; Hinshaw et al., 1987). Students who struggle with inattention may engage in several behaviors that negatively impact their learning, including being disorganized with class materials, having difficulty remaining focused and on task, and struggling to attend well enough to instruction to comprehend what is being taught (Arslan, 2019). Similarly, students who struggle with hyperactivity may engage in behavior that disrupts learning in a classroom environment, including excessively fidgeting and talking during inappropriate times (Arslan, 2019). One condition under this externalizing domain, Attention-Deficit/Hyperactivity Disorder (ADHD), is a commonly diagnosed behavior problem experienced by children in school (Arslan, 2019). Students with ADHD often struggle significantly with self-regulation and have difficulty behaving adaptively in class environments, which may lead them to engage in behaviors such as blurting out during lessons, leaving their seats without permission, and impulsively engaging in preferred activities rather than their classwork (Arslan, 2019).

Students who blurt out in class or leave their seats may get into trouble with their teachers for non-compliance or class disruption, which sometimes leads to office referrals and dismissals from class, preventing students from accessing instruction (Daley & Birchwood, 2009). Even

when students are not dismissed from class, they may have difficulty transitioning from play to assignments, following along during class, or completing schoolwork they do not find interesting, which negatively impacts their learning and academic performance (Daley & Birchwood, 2009). They may also have difficulty with memory and executive function, which leads to poor academic outcomes and difficulty learning (Daley & Birchwood, 2009). Students who struggle with those types of problems may forget to complete assignments, have difficulty remembering details of lessons, and struggle to maintain focus during tests and timed work, which adversely impacts their academic skill development (Daley & Birchwood, 2009).

Similarly, students who experience Aggressive/Conduct Problems also struggle to function adaptively in classroom environments and engage appropriately with instruction, and as a result, they struggle to learn and build academic skills (Da Fonseca et al., 2010; Hinshaw et al., 1987). Two problems that fall under this domain, Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD), are externalizing behavior problems that can lead to significantly impaired functioning in academic settings (Arslan, 2019; Da Fonseca et al., 2010). Students struggling with these diagnoses tend to engage in purposefully defiant and aggressive behaviors, including breaking rules, challenging behavior expectations, and refusing to complete work or follow instructions (Arslan, 2019; Da Fonseca et al., 2010). For example, students with ODD or CD may have difficulty participating in class instruction and engage in maladaptive classroom behavior (e.g., arguing with teachers and peers, throwing pencils, etc.) as a means of escaping work, gaining attention, or gaining access to a preferred activity. If students cannot or will not attempt their work, their ability to build academic skills is significantly impacted (Da Fonseca et al., 2010).

Because these problems are externalized, they can affect other students' ability to learn during class, which can lead to even worse outcomes for students with behavior problems of an externalizing nature. When students disrupt class with inappropriate or aggressive behavior, they are commonly dismissed or excluded from general education settings to promote an adaptive learning environment for other students (Barker & de Lugt, 2022; Da Fonseca et al., 2010). Many students with externalizing behavior problems are served in special education environments where their behavior can be managed more effectively, even when their academic skills and performance mirror those of peers without externalizing behavior problems (Barker & de Lugt, 2022). Students engaging in more severe disruptive behavior may also face suspension or expulsion, even after a single instance of such behavior (Barker & de Lugt, 2022). When students with ODD or CD are excluded from class due to their behavior challenges, they are unable to access instruction like their peers, which can lead to reduced academic skill development over time (Barker & de Lugt, 2022).

Associations Between Reading and Behavior Problems

Researchers have determined through various studies across several decades that reading and behavior problems, both internalizing and externalizing, negatively impact academic performance and skill development in students of all ages. Researchers have also determined that reading and behavior problems frequently co-occur (Hinshaw, 1992; Morgan et al., 2008; Wehby et al., 2003). When students struggle with both reading and behavior problems, their academic skill development is adversely impacted to a more significant degree (Morgan et al., 2008; Wehby et al., 2003). Similarly, when students struggle with fundamental academic skills such as reading, their behavior problems are often intensified (Miles & Stipek, 2006).

Although some researchers have found that reading and behavior problems appear to impact each other, the directional relationship between the two is still debated in research. For example, Morgan et. all (2008) found that first graders struggling with a reading or behavior problem have an increased likelihood of developing the other problem by third grade, suggesting that the presence of a reading or behavior problem may promote development of the other problem. Causal relationships between the problems have also been debated by researchers, with most researchers positing that one problem causes the other over time. However, some researchers have suggested that reading and behavior problems could develop concurrently over time or occur simultaneously at a discrete time point (McIntosh, 2005). It is also possible that reading and behavior problems develop independently due to a separate, environmental or within-child factor, such as socioeconomic status, familial support, or access to instruction. In those cases, the true connection or causality between the two problems may be particularly difficult to identify.

Regardless of directionality or causal mechanisms, researchers have consistently proven that reading and behavior problems occur at higher-than-chance rates (Hinshaw, 1992). They have also proven that the presence of both problems leads to poor outcomes for students, including weaker responses to academic and behavioral interventions, lower grades and GPAs, and greater involvement in special education services (Wehby et al., 2005). Because reading problems, internalizing problems, and externalizing problems negatively impact students' success, and because comorbid problems may amplify each other's effects, it is important that researchers explore the connections between the problems more thoroughly and comprehensively to better inform intervention and treatment strategies.

Purpose of the Study

Abundant research has been conducted investigating the relationships between reading problems, internalizing behavior problems, and externalizing behavior problems. Researchers have found that reading and behavior problems play a significant role in students' academic performance and skill development, with each having an adverse impact on their academic success over time. When students experience problems concurrently, their learning challenges are amplified (Morgan et al., 2008; Wehby et al., 2003). However, scant research has been conducted examining the extent to which each problem (e.g., reading or behavior) affects each other, especially in the context of school-based reading and behavior remediation services. This study seeks to add to the body of research examining how reading and behavior problems interact and impact students' ability to develop reading proficiency over time. Specifically, the goal of this study is to determine if the presence of a behavior problem significantly affects students' reading skill development across a regular school year. An additional goal is to determine which problem is most commonly identified first by general education teachers, and how the presence of one problem (e.g., reading or behavior) influences the development of the other problem. Uniquely, these questions are explored within the context of a large school district that used a Multi-tier System of Support (MTSS) and Response-to-Intervention (RTI) strategies to address students' academic and behavior problems through targeted support services.

The following chapter contains an investigation of the impact of externalizing behavior problems, internalizing behavior problems, and comorbid behavior problems on elementary students' reading skill development over the course of a single school year. The third chapter investigates which type of problem (e.g., reading problems internalizing behavior problems, or

externalizing behavior problems) is identified first by teachers during a single school year. In the final chapter, the theoretical and applied implications of each study, along with ideas for future research studies, are discussed.

CHAPTER TWO

Study One: Investigating the Impact of Behavior Problems on Reading Remediation in Elementary-Aged Students

Abstract

The current retrospective study was designed to evaluate and compare the impact of externalizing and internalizing behavior problems on reading remediation in first through third grade students. As part of their multitiered systems of support efforts, the school system collected students' Acadience reading composite scores and Student Risk Screening Scale: Internalizing and Externalizing scores in Fall and Spring of the 2018-2019 school year. Students identified with reading problems in Fall were placed into four groups: students with only a reading problem, students with reading and internalizing problems, students with reading and externalizing problems, and students with reading, externalizing, and internalizing problems. A Mixed Effects ANOVA showed that at the beginning (Fall) and end (Spring) of the year, both the reading only and reading and internalizing problems had higher reading composite scores than the two groups who had reading and externalizing problems. An ANCOVA was used to analyze reading score growth across the four groups. Although all students made significant reading score gains from Fall to Spring, results showed that students with externalizing problems made significantly less growth than students with only reading problems or reading and internalizing problems. These findings suggest that the presence of an externalizing behavior problem may reduce students' reading growth over time. Discussion focused on the need for future research on reading and externalizing problems and the need to develop interventions that prevent and remedy externalizing behavior problems.

Keywords: reading problems, externalizing behavior problems, internalizing behavior problems, reading remediation, elementary school

Investigating the Impact of Behavior Problems on Reading Progress in Elementary-Aged Students

It is difficult to go a single day without needing to read something, somewhere (Levy & Hall, 2001). Information is often presented in a written format, so proficient reading skills are essential for successfully navigating life. Having strong reading skills is associated with positive life outcomes, including a lower likelihood of living in poverty, less risk of becoming involved in criminal activity, and a higher likelihood of finding gainful employment (Kunjufu, 2005; Lesnick et al., 2010; The Annie E. Casey Foundation, 2010). In contrast, having underdeveloped reading skills is associated with poor outcomes later in life. Poor readers can have difficulty performing tasks necessary for community participation, including completing paperwork and writing notes or letters for others (Maughan, 1995). Poor readers also experience higher rates of unemployment and prison incarceration (Kunjufu, 2005; Maughan, 1995).

Reading proficiency is also necessary for academic success in a wide range of subjects. As Allington (2002) explained, students cannot learn from sources that they cannot read; thus, reading is one of the most vital skills for students to master. Strong reading skills build a foundation for growth in other areas, including developing skills related to math, history, and science (Shanahan et al., 2011). Reading proficiency is also associated with positive academic outcomes for students, including earning better grades, lower rates of placement in special education classes, and higher rates of graduating high school and attending college (Lesnick et al., 2010; The Annie E. Casey Foundation, 2010). Students who are weak readers are more likely to experience adverse academic outcomes, including being more likely to receive special education services or be retained (Hernandez, 2011; The Annie E. Casey Foundation, 2010;

Willcutt et al., 2007). Currently, it is estimated that 80% of students diagnosed with a learning disorder struggle with reading in some capacity (Lerner et al., 1989).

Despite the wealth of data connecting proficient reading skills to positive outcomes, the National Center for Education Statistics (Irwin et al., 2023) recently reported that 66% of fourth graders and 69% of eighth graders in 2022 failed to meet proficiency standards for reading achievement on the National Assessment of Educational Progress (NAEP) assessment. Reading problems can emerge early in a student's academic career (Darney et al., 2011; Morgan et al., 2008). In early elementary school, prior to grade 3, most reading instruction focuses on teaching students foundational reading skills, including phonological awareness, decoding, and reading fluency (Nelson et al., 2003; Allington, 1983). When these skills are not mastered early, reading skill deficits worsen over time and become harder to resolve.

Additionally, once foundational skills are mastered (around third grade for most students), they begin to "read to learn" rather than "learn to read" (Chall, 1983; The Annie E. Casey Foundation, 2010). Thus, if students do not master foundational reading skills early in elementary school, they could develop deficits in other vital skills and perform poorly in multiple subjects (Stanovich, 1986). The longer reading problems persist, and the more significant these problems become, students are more likely to experience poor outcomes (Hernandez, 2011; Vaughn et al., 2015). The severity of the adverse outcomes also increases as reading problems persist (Maughan, 1995; Wehby, 2003). Because of this, it is important to resolve reading problems early, before they become more significant (Harris et al., 2009).

Behavior Problems

To effectively learn, students must engage in appropriate behavior in the classroom. However, many students also struggle with behavior problems (Hinshaw, 1992; McIntosh,

2005). There are two broad categories of problem behaviors: internalizing behavior problems and externalizing behavior problems. Internalizing behaviors are self-directed and sometimes difficult for instructors to notice (Arslan et al., 2020; Olivier et al., 2020). These behaviors include excessive worrying, having low confidence or motivation, and experiencing emotional and somatic symptoms of anxiety and depression (Achenbach and Edelbrock, 1978; Arslan et al., 2020; Morgan et al., 2009). Internalizing problems are associated with many poor academic outcomes, including increased absenteeism and earning lower GPA's (McCarty et al., 2008; Perderson et al., 2023). They are also associated with poor outcomes outside of school, including having a heightened risk of mental illness and increased difficulties with socialization (McCarty et al., 2008).

In class environments, externalizing behavior problems are often more noticeable and disruptive than internalizing problems (Achenbach & Edelbrock, 1978). Externalizing behaviors include aggressiveness and oppositionality, hyperactivity, and attention problems (Achenbach & Edelbrock, 1978; Arslan et al., 2020; Olivier et al., 2020). These behaviors are associated with poor academic outcomes, including low academic engagement, low academic achievement, and a higher risk of dropping out of school (Hinshaw, 1992; Morgan et al., 2009). Externalizing problems are also associated with poor outcomes outside of school, including having difficulty maintaining employment and having antisocial behavior problems (Kulkarni et al., 2020; Morgan et al., 2009). More serious outcomes, like being incarcerated and developing substance abuse issues, are also risks for students who demonstrate externalizing behavior problems (Moffitt, 1993).

Behavior problems can emerge in early elementary school, and earlier problem emergence is correlated with increased risk for adverse outcomes (Moffitt, 1993; Morgan et al.,

2009). While students may develop both externalizing and internalizing behavior problems, externalizing problems are more easily detected by teachers and tend to impact class functioning more significantly (Achenbach & Edelbrock, 1978; Morgan et al., 2009). For example, disruptive behavior problems are some of the most common problems seen in early elementary school (Harrison et al., 2012; Olivier et al., 2020). These behaviors include shouting out, work refusal, and difficulty remaining seated during class. These behaviors can make it difficult for the affected student to learn, as well as his or her classmates.

When behavior problems are not addressed early, they can worsen over time (Hinshaw, 1992; Moffitt, 1993). When not resolved, these problems increase the probability of poor outcomes for students both in and out of school (Morgan et al., 2009). Because behavior problems have a significant impact on students' functioning in school, teachers value resolving these problems early (Harris et al., 2009).

Concurrent Reading and Behavior Problems

Academic and behavior problems can also co-occur, and these comorbid problems have long been a focus for researchers (Wehby et al., 2003). Many researchers have found strong associations between academic problems and behavior problems (Algozzine et al., 2011; Bradshaw et al. 2008; Murray & Farrington, 2010). Specifically, poor academic achievement in early childhood is associated with increased behavioral difficulties in adolescence (Darney et al., 2012). Poor literacy skills have also been associated with an increased risk of being diagnosed with ADHD and Conduct Disorder, as well as developing anxiety and depressive symptoms (Carroll et al, 2005). Morgan et al. (2008) found that having a reading problem in first grade significantly increases a student's likelihood of demonstrating externalizing behavior problems in third grade; they also found that first graders displaying poor task engagement, which often

accompanies externalizing behavior problems, were more likely to experience reading problems in third grade. Although most estimates range widely, from less than 10% to more than 50%, the overlap between externalizing behavior problems and academic problems occurs at a higher-than-chance rate (Hinshaw, 1992).

Although reading and behavior problems are associated, the causal nature of the relationship is often debated. Still, several potential causal mechanisms explaining the association between reading and behavior problems have been identified. One theory suggests that externalizing behavior problems lead to academic problems later in life, as disruptive and avoidant behaviors prevent students from fully attending to reading instruction (Roberts et al., 2020). Supporting this theory, researchers in one study found a statistically significant progression of externalizing problems in preschool leading to academic underachievement in elementary school, further leading into internalizing problems in middle school (Burt & Roisman, 2010). In another study, researchers found that six-year-olds with behavior problems make significantly less progress in their literacy skills nine months and four years later than peers without behavior problems (Hurry et al., 2018).

In contrast, some theories suggest that early reading problems could lead to behavior problems later in life, as feelings of frustration or incompetence may lead students to engage in disruptive, escape/avoidance behaviors when reading (Roberts et al., 2020). One study supporting this theory found that children identified as poor readers in kindergarten are significantly more likely than their peers to engage in externalizing behavior problems in third and fifth grades (Morgan et al., 2009). McIntosh (2005) proposed the idea of a "coercive cycle of educational failure," in which students find academic demands to be challenging and unpleasant, so they engage in disruptive behavior to escape or avoid work. Those students are then

disciplined and often removed from class, which limits their access to instruction, causing them to fall even further behind and have aggravated behavior problems.

Regardless of the true causal mechanisms behind concurrent reading and behavior problems, the negative outcomes resulting from both problems have been well-established. Having both problems is associated with extremely poor outcomes for students, both within school and outside of school (Wehby et al., 2005). Academically, students experiencing both reading and behavior problems are less likely to respond to academic interventions that benefit their peers (Roberts et al., 2020). They also have the lowest GPAs and grades of students in all disability categories (Wagner, 1995).

Students with early cooccurring reading and behavior problems are at the greatest risk of negative outcomes in 12th grade, including having poor academic achievement across subjects, being more likely to receive special education services, and having a higher likelihood of dropping out of school (Darney et al., 2013). Outside of school, comorbid reading and behavior problems are associated with even worse outcomes. Students with reading and behavior problems are more likely to have low occupational attainment, live in poverty, and experience homelessness in the future (Morgan et al., 2009). They are also more likely to become single parents three to five years after high school, struggle with substance abuse, and become involved with the criminal justice system (Wagner, 1995).

Remedying Reading and Behavior Problems

While students struggle with poor outcomes related to comorbid reading and behavior difficulties, teachers are also particularly challenged when children present with problems in both areas (Algozzine et al., 2011; Wehby et al., 2003). Teachers report that it is difficult to improve a student's reading skills when the student engages in poor behavior during class

(National Center for Education Statistics, 2023). For example, if a student frequently leaves their seat, shouts out, or engages in unrelated activities during reading lessons, the student is unable to fully participate in and benefit from their instruction (Algozzine et al., 2011; Miles & Stibeck, 2006). Similarly, if a student struggles with reading and experiences shame or frustration related to their difficulty, they may engage in more significant disruptive and inattentive behavior (e.g., escape/avoidance), which in turn may exacerbate their reading problems (Algozzine et al., 2011; Miles & Stibeck, 2006). Thus, it is important for educators to identify reading and behavior problems early and intervene before they become more significant and compound upon each other.

Because it is difficult for teachers to independently address every problem faced by all their students, system-wide strategies to support these efforts have been identified (Sailor et. al, 2021). Response-to-Intervention (RTI) services are used in many schools to remedy students' academic and behavior problems, with problem severity guiding the intensity of intervention services (McKinney, Bartholomew, & Gray, 2010). Other services, like Positive Behavioral Interventions and Supports (PBIS), are used in many schools to reduce and prevent students' emotional and behavioral problems using socioemotional learning strategies and schoolwide behavior incentives (Bradshaw et al., 2008). These strategies provide many students with the opportunity to improve or resolve problems in an inclusive general education setting, without being unnecessarily routed into special education services. Many schools use a Multi-tier System of Support (MTSS), an integrated system of data-based interventions and pedagogical practices, to address problems with both academics and behavior (Sailor et. al, 2021). MTSS combines theories and practices from services like RTI and PBIS, and it was developed to help educators

effectively remedy and prevent students' academic and behavior problems before they become too severe to manage in a general classroom setting (Eagle et al., 2015).

In MTSS, a leveled system of service delivery is used to provide students increasing support as their academic and behavior problems become more significant (Sailor et. al, 2021). Systems are developed and implemented to support staff and students in learning all components of tiered services (George et al., 2009). Because students present with a wide variety of academic and behavior problems, with varying levels of severity, more than one intervention or instructional strategy should be available for use in each tier (McIntosh et al., 2009).

In Tier 1, which services all students, teachers provide instruction to the whole class and use generalized strategies to prevent and quickly remedy mild academic and behavior problems (McIntosh et. al, 2010a). School-wide strategies are also used to support students' academic and behavioral success. For example, to support all students, broad academic and behavioral goals may be operationalized to create clear, specific rules for students to follow (George et al., 2009). Those rules can then be posted throughout the school for easy reference. School staff also teach rules to students using specific examples and non-examples, and they use a reward system to incentivize students to follow the rules.

With MTSS, universal screening measures used to identify students who often are not responding well to Tier 1 services and are falling below expectations academically or behaviorally, (Eagle et al., 2015). These students can then receive more intensive Tier 2 services. Tier 2 services are provided to students requiring more substantial support than is provided through regular instruction (e.g., students falling below the 10^{th}-25^{th} percentile in a subject or skill area) (McIntosh et. al, 2010b). In Tier 2, targeted interventions are generally offered to small groups of students struggling with the same problem or skill deficit (Hawken et al., 2009).

Intervention sessions are short, but they are provided to students with regularity (e.g., for 20 min each day). They are also generally easy to adapt to address students' unique needs. Each student's progress is monitored while they receive Tier 2 services, and with adequate improvement, they may no longer require services beyond the primary tier (Hawken et al., 2009). If they do not make adequate progress, however, they may require a higher level of service delivery (e.g., Tier 3 services).

Students with more significant problems who do not respond to Tier 2 interventions (e.g., students falling below the 5^{th}-10^{th} percentile in a subject or skill area) are offered Tier 3 intervention services, which typically involve more intensive, individualized support than Tier 2 services (McIntosh et. al, 2010c). At this level, academic and behavioral supports are often integrated to enhance students' outcomes. When a significant academic and/or behavior problem is identified in a student, and the student demonstrates a lack of response to Tier 1 and Tier 2 services, the student's need for more thorough resources and greater hands-on support is apparent. To make progress on academic and behavioral skill deficits in Tier 3, each deficit area must be identified, and specific strategies and recommendations for each deficit should be provided (Scott et al., 2009). Instructors should explicitly describe how skills should be taught to students, and they should clearly state the consequences or outcomes associated with meeting or not meeting goals. Instructors should also monitor and evaluate students' progress with each skill and should be prepared to adapt interventions and goals as necessary to best support students' growth (Scott et al., 2009).

The effectiveness of MTSS in remedying academic and behavior problems is well-documented in literature (Lane & Menzies, 2003; Sadler & Sugai, 2009). Lane and Menzies (2005) found that students with academic, behavioral, and comorbid concerns made significantly

more progress on curriculum-based reading and writing measures than typical peers when exposed to a schoolwide reading and behavior intervention. Similarly, other researchers found that schoolwide behavior interventions and universal prevention strategies reduced the severity of students' externalizing and internalizing behavior problems (Malti et al., 2011; Muratori et al., 2019). Students with both reading and behavior problems face more significant challenges than peers and require more intensive, comprehensive support. Researchers have found that when behavior and reading interventions are integrated through MTSS, student outcomes are significantly improved in both areas (McIntosh et al., 2006; Sadler & Sugai, 2009).

Purpose of the Present Study

Some researchers have investigated how having a reading or behavior problem impacts students' likelihood of developing the other problem over time (McMichael, 1979; Roberts et. al, 2019). However, little research has been conducted investigating how the presence of one problem (e.g., reading or behavior) affects how well MTSS can remedy the other problem, when a student experiences them simultaneously. The primary purpose of this study is to determine if having a behavior problem decreases the likelihood that MTSS will be successful in remediating a concurrent reading problem.

Thus, in the current study we used MTSS data to analyze and compare reading progress of four groups of students in grades one through three. All four groups had a documented reading problem at the beginning of the school year. One group had no documented behavior problem at the beginning of the year. A second group had a documented externalizing behavior problem at the beginning of the school year, but no internalizing problem. A third group had a documented internalizing problem at the beginning of the year, but no externalizing problem. The final group had all three problems at the beginning of the school year (i.e., reading, externalizing, and

internalizing). Based on previous research, we hypothesized that students with reading and behavior problems would make less reading progress than those with only reading problems over the course of a typical school year.

Method

Participants and Setting

The analysis was conducted with a dataset from a western United States school district during the 2018-2019 school year. The sample population included 1,823 elementary aged students; 637 were in first grade, 506 were in second grade, and 680 were in third grade. Across grades, 48.7% of students were male and 51.3% were female. Caucasian students comprised 61.1% of the sample population, while 38.9% identified as Minority students. For the analysis, students were separated into four groups based on their reading and behavior problems at the start of the school year (Reading Only, Reading/Internalizing, Reading/Externalizing, Reading/Externalizing/Internalizing).

The Reading Only (RO) group consisted of 645 students between first and third grade. Of these students, 260 were in first grade (40.3%), 148 were in second grade (22.9%), and 237 were in third grade (36.7%). Male students comprised 40.2% of the group and female students comprised 59.8%. Most students (62.8%) were Caucasian, but 37.2% identified as Minority students. The Reading/Internalizing (RI) group consisted of 316 students in first through third grade. In this group, 119 students were in first grade (37.7%), 94 students were in second grade (29.7%), and 103 students were in third grade (32.6%). Male students comprised 37.3% of the group and female students comprised 62.7%. The group was primarily Caucasian (63.9%), and 36.1% of the group identified as Minority students. The Reading/Externalizing (RE) group consisted of 359 first- through third-grade students. In this group, 108 students were in first

grade (30.1%), 107 students were in second grade (29.8%), and 144 students were in third grade (40.1%). Male students comprised 61.0% of the group and female students comprised 39.0%. Most students were Caucasian (57.9%), and 42.1% identified as minority students. The Reading/Externalizing/Internalizing (REI) group consisted of 503 students between first and third grades. Of the students, 105 were in first grade (29.8%), 157 were in second grade (31.2%), and 196 were in third grade (39.0%). Male students comprised 58.1% of the sample and female students comprised 41.9%. The group was primarily Caucasian (59.2%), and 40.8% of the group identified as minority students.

During the 2018-2019 school year, the district had comprehensive MTSS within their schools. A robust, tiered system for identifying and remediating academic problems (e.g., reading difficulties) was in place when data was collected for this study. Students were identified as having reading difficulty based on their Acadience Reading benchmark scores throughout the school year, and if they needed additional supports to make adequate reading progress, they received supplemental Tier 2 or Tier 3 reading intervention services through the school's RTI system. Teachers were assigned to deliver remediation instruction to students, and time to receive supplemental services was built into the regular school day.

The MTSS for emotional and behavioral problems was also well-developed when data was collected for this survey. To identify students with internalizing and externalizing problems, teachers completed a screening instrument (e.g., the Student Risk Screening Scale: Internalizing and Externalizing) rating each students' behavior in Fall, Winter, and Spring. Students in need of services, based on teachers' ratings, received support via a structured system of intervention delivery. For example, when teachers struggled with high numbers of externalizers in their classroom and reached out for support, they received informal consultation (Tier 1) on classroom

management from behavior consultants at their school. When individual students struggled with notable behavior problems, school staff members met to discuss necessary changes to their program planning. A structured referral process for behavior problems and standardized intervention procedures (e.g., Tier 2 and Tier 3 services) for behavior remediation were used to assist students with more significant behavior problems.

Measures and Data Collection

The independent variable of the study is each student's group at the beginning of the school year (RO, RI, RE, REI). Students were grouped based on their Fall reading composite score (RCS) benchmark from Acadience Reading, as well as their Fall scores for internalizing and externalizing behaviors on the teacher-rated Student Risk Screening Scale: Internalizing and Externalizing. The dependent variable of the study is students' RCS growth on Acadience Reading benchmarks between Fall and Spring of the 2018-2019 school year.

Acadience Reading RCS Benchmark Assessments.

RCS benchmark assessments from Acadience Reading were used to determine each student's group for the analysis. They were also used to determine students' reading score growth between Fall and Spring. Acadience Reading provides several measures assessing kindergarten through sixth-grade students' basic early literacy skills, which are foundational skills necessary to become an effective reader (Good et al., 2019). The measures serve as brief, efficient indicators of students' progress toward mastering basic early literacy skills, including phonemic awareness, phonics, accurate and fluent reading of connected text, vocabulary and language skills, and reading comprehension. Specific measures provided by Acadience Reading include First Sound Fluency (FSF), Letter Naming Fluency (LNF), Phoneme Segmentation Fluency (PSF), Nonsense Word Fluency (NWF), Oral Reading Fluency (ORF), Retell, and

Maze. For all measures, grade-level benchmark assessments are used three times a year to identify students at risk of reading difficulties who may need additional support to develop their reading skills (Good et al., 2019).

The Acadience Reading RCS benchmarks provide an overall estimate of students' reading proficiency by combining their scores on several other Acadience Reading measures. Measures included in the RCS benchmarks differ for each grade and vary by time of year (Good et al., 2019). For first grade, the Fall RCS benchmark includes LNF, PSF, and NWF measures, while the Winter and Spring RCS benchmarks include NWF and ORF measures. For second grade, the Fall RCS benchmark includes NWF and ORF measures, while the Winter and Spring RCS benchmarks include only ORF measures. For third grade, the Fall RCS benchmark includes ORF, Retell, and Maze measures for Fall, Winter, and Spring (Good et al., 2019).

Acadience Reading RCS measures were found to have acceptable reliability and validity for all grades (Good et al., 2019). For first grade, the RCS Cronbach's alpha coefficient was 0.95 for alternate form reliability, 0.94 for test-retest reliability, and 0.99 for inter-rater reliability. The predictive validity coefficient at the beginning of the year was strong (r = 0.79), and discriminant validity was also strong (d = 1.11). For second grade, the RCS Cronbach's alpha coefficient was 0.92 for alternate form reliability, 0.81 for test-retest reliability, and 0.98 for inter-rater reliability. The predictive validity coefficient (r = 0.86) and discriminant validity coefficient (d = 1.79) at the beginning of the year were both strong. For third grade, the RCS Cronbach's alpha coefficient was 0.95 for alternate form reliability, but no other reliability tests were conducted. The predictive validity coefficient at the beginning of the year was strong (r = 0.91), and discriminant validity was also strong (d = 1.80) (Good et al., 2019).

Because the measures used to calculate Acadience Reading RCS benchmarks vary by grade and time of year, direct score growth comparisons cannot be made across grades or over time. However, because benchmark goals and cut points are established using consistent logic and procedures across grades and time periods, the percentage of students scoring in each benchmark category (e.g., at or above benchmark, below benchmark, or well below benchmark) can be directly compared (Good et al., 2019). To determine RCS benchmark cut points, researchers created scatterplots, ran logistic regressions, and created receiver operator characteristic curves for each grade at each time point.

For first grade RCS, the cut score for "At or Above Benchmark" was 113+ in Fall, 130+ in Winter, and 155+ in Spring. The cut score for "Below Benchmark" was 97 in Fall, 100 in Winter, and 111 in Spring. Scores below those cut scores were considered "Well Below Benchmark." For second grade RCS, the cut score for "At or Above Benchmark" was 141+ in Fall, 190+ in Winter, and 238+ in Spring. The cut score for "Below Benchmark" was 109 in Fall, 145 in Winter, and 180 in Spring. Scores below those cut scores were considered "Well Below Benchmark." For third grade RCS, the cut score for "At or Above Benchmark" was 220+ in Fall, 285+ in Winter, and 330+ in Spring. The cut score for "Below Benchmark" was 180 in Fall, 235 in Winter, and 280 in Spring. Scores below those cut scores were considered "Well Below Benchmark."

Cut points indicate skill levels below which students are likely to require additional services to meet grade-level reading goals. Students scoring at or above benchmark are likely to respond well to core support (e.g., Tier 1 intervention), and students in this category have 80% to 90% odds of achieving subsequent early literacy goals. Students scoring below benchmark are likely to need strategic support (e.g., Tier 2 intervention) to meet reading goals, and they have

40% to 60% odds of achieving early literacy goals later in life. Students scoring well below benchmark are likely to require intensive support (e.g., Tier 3 intervention) to meet reading goals, and they have 10% to 20% odds of achieving subsequent early literacy goals (Good et al., 2019).

For this study, students completed Acadience Reading benchmark testing to assess their reading skills in Fall, Winter, and Spring of the school year. During each benchmark test session, students sat in a quiet, standardized environment with their teachers and completed various reading assessments, with the specific assessments administered differing by grade and by time of year. Several different areas of their reading skills were measured by their teachers, who were trained in proper test implementation and scoring. Once students completed benchmark testing and their teachers scored their performance across tasks, teachers submitted students' scores to a computer program that calculated their overall reading composite score (RCS). When students did not meet RCS benchmark cut points, appropriate parties were notified, and students received appropriate support (e.g., Tier 2 or Tier 3 services) through RTI instruction.

Acadience Reading RCS cut points were also used to determine students' groups for this study's data analysis. Students were considered to have reading problems if they did not meet benchmark goals, meaning they scored below or well below benchmark on Fall RCS measures. Students who were classified as being "at or above benchmark" on Fall RCS measures were not included in this analysis.

Student Risk Screening Scale: Internalizing and Externalizing.

The Student Risk Screening Scale: Internalizing and Externalizing (SRSS:IE) was also used to determine each student's group for the analysis. The SRSS:IE is a universal screening tool used in schools to briefly assess students for internalizing and externalizing behavior

problems (Menzies & Lane, 2011). It is an adaptation of the Student Risk Screening Scale, which only assessed for externalizing behavior problems (Drummond; 1994). The SRSS:IE consists of seven items for teachers to complete relating to students' externalizing behaviors, including problems like stealing, cheating, and being aggressive. It also includes five items relating to students' internalizing behaviors, including appearing shy, anxious, and emotionally flat. (Lane et al., 2015). Teachers rate students' behaviors on each of the 12 items using a 4-point Likert scale, with 0 being "never" and 3 being "frequently." (Lane et al., 2015). Items are totaled for the internalizing and externalizing scales, and cut scores are then used to identify which students may be at risk for externalizing or internalizing behavior problems. For internalizing behavior problems, scores of 0-1 indicate low risk, scores of 2-3 indicate moderate risk, and scores of 4-15 indicate high risk. For externalizing behavior problems, scores of 0-3 indicate low risk, scores of 4-8 indicate moderate risk, and scores of 9-21 indicate high risk (Lane et al., 2015).

Menzies and Lane (2011) evaluated the psychometric properties of the SRSS:IE in urban and suburban elementary schools, sampling students ranging from kindergarten to sixth grade. They found that the SRSS:IE had acceptable reliability for both the internalizing and externalizing behavior subscales. Items measuring externalizing behavior problems had a Cronbach's alpha coefficient of 0.84, and items measuring internalizing behavior problems had a Cronbach's alpha coefficient of 0.72. Lane et al. (2019) also found the SRSS:IE to have acceptable predictive validity for both the internalizing and externalizing subscales. Specifically, researchers found that students with higher internalizing and externalizing behavior scores visited the nurse more often, had more in-school suspensions, and had lower scores on measures of academic progress, including oral reading fluency measures.

Lane et al. (2012) also found the SRSS:IE to have adequate convergent validity. In a study comparing elementary students' SRSS:IE scores to their scores on a similar measure (e.g., the Strengths and Difficulties Questionnaire [SDQ]; Goodman, 1997), researchers found that externalizing behavior subscale scores were significantly correlated ($r = 0.75$) with their total SDQ scores. Students' internalizing behavior subscale scores were also significantly correlated ($r = 0.49$) with their total SDQ scores.

For this study, during a series of district-wide Building Leadership Team meetings, several leading staff members (e.g., building principals, achievement coaches, teacher leaders, school psychologists, and other related service providers) were trained on SRSS:IE administration, interpretation, and grouping guidelines. Next, they returned to their home schools and instructed teachers on SRSS:IE procedures and expectations. Before starting data collection, parents and caregivers were informed about the study and screening tool, and they were given the option to opt out of the study. Teachers used the SRSS:IE to screen students in their homeroom class three times across the school year (e.g., Fall, Winter, and Spring). Teachers completed the scales using an online data system, which compiled students' scores for each of the three rating periods. The data system automatically summed and graphed students' scores for the internalizing and externalizing subscales and shared the data with appropriate parties. When many students in a classroom were rated highly for internalizing or externalizing behavior problems, instructional coaches and behavior consultants informally consulted with those teachers to support their Tier 1 instruction. For students identified as at-risk based on their cut scores, intervention teams met to discuss further program planning to address their instructional needs.

Students were also grouped based on their cut scores for the data analysis. Students with "moderate" or "high" externalizing behavior problems, in addition to reading problems, were sorted into the RE group. Similarly, students with reading problems and "moderate" or "high" internalizing behavior problems were sorted into the RI group. If students had reading problems and "moderate" or "high" scores for both internalizing and externalizing behavior problems, they were sorted into the REI group. Students with reading problems who had "low" scores for internalizing and externalizing behavior problems were sorted into the RO group.

Design and Analysis

A retrospective, causal-comparative design was used to determine the effect of students' externalizing and internalizing behavior problems on their reading composite score growth over the course of a regular school year. To analyze the data, a mixed effects analysis of variance (ANOVA) was first used to determine if groups' reading composite scores were different over time. To control for group reading differences at the beginning of the school year, an analysis of covariance (ANCOVA) was later used to analyze differences in RCS growth between the groups. Additional crosstabulation tables were also created to determine the numbers and percentages of students who improved their benchmark category, remained in the same benchmark category, or dropped a benchmark category from Fall to Spring.

Results

A 2x4 Mixed Effects ANOVA, with one within-subjects factor (Time; Fall, Spring) and one between-subject factor (Reading Group; RO, RI, RE, REI), was conducted with all grades to investigate whether changes in students' reading scores over time differed by which group they belonged to in Fall. For each group, assumptions of normality and sphericity were met. Levene's Test for Equality of Variance was significant for Fall Reading scores ($p < 0.001$), however, so the

assumption of variance was not met. Upon further analysis, it was found that groups with externalizing behavior problems had significantly lower reading scores in Fall than groups without externalizing behavior problems. To address this violation, and to correct for group RCS differences at the beginning of the school year, an ANCOVA was used to examine differences in RCS growth between the four reading groups. Students' Fall reading composite scores were used as the covariate variable. For this analysis, all assumptions were met. Results were considered significant at the $p < 0.05$ level for each analysis of variance, and Bonferroni corrections were used to account for multiple comparisons. Additionally, 16 students from the sample population did not have complete data profiles; thus, they were excluded for any analyses.

Mixed Effects ANOVA

All tables and figures are located in the appendix. Table 1 summarizes the mixed effects ANOVA results for all grades. When analyzing all grades, a significant interaction effect between Time and Reading Group was found, $F(3, 1803)=19.830$, $p < 0.001$. A small effect size of $\eta^2=0.032$ was also found.

Figure 1 depicts data means for groups by time. Means and standard deviations for each group across Fall and Spring assessment dates are depicted in Table 2. To further analyze differences between the groups at both time points, post-hoc pairwise comparisons for Time and Reading group were conducted using *f*-tests. Pairwise comparisons for Time indicated that each group's RCS significantly improved from Fall to Spring. For the RO group, scores increased 102.72 points ($p < 0.001$) between Fall and Spring. The RI group's scores increased 92.71 points ($p < 0.001$). The RE and REI groups saw similar score increases. Between Fall and Spring, the RE group had a 70.30-point ($p < 0.001$) increase in scores, and the REI group had a 71.52-point increase ($p < 0.001$).

Pairwise comparisons for Reading Group indicated that at both Fall and Spring timepoints, there were statistically significant differences in scores between the groups. In Fall, The RO group had significantly higher scores than the RE *(*$p < 0.001$) and REI ($p < 0.001$) groups. Similarly, the RI group had significantly higher scores than the RE ($p = 0.038$) and REI ($p < 0.001$) groups. However, the RO and RI groups did not significantly differ ($p = 0.142$). The RE and RI groups also did not differ from each other ($p = 0.428$). In Spring, similar results were found. The RO group and the RI group both had significantly higher scores than the RE ($p < 0.001$) and REI ($p < 0.001$) groups, but they did not differ from each other ($p = 0.107$). The RE and REI groups also did not differ from each other ($p = 1.000$).

ANCOVA

In the mixed effects ANOVA, it was found that groups with externalizing behavior problems (e.g., RE, REI) differed significantly from groups without externalizing behavior problems (e.g., RO, RI) in Fall. However, the RE and REI groups did not significantly differ, and the RO and RI groups also did not significantly differ from each other. This suggests that at the start of the school year, the presence of an externalizing behavior problem contributed to RCS differences between the groups. Thus, to control for group reading differences at the beginning of the year, a one-way ANCOVA was conducted with all grades to investigate whether students' RCS growth differed by which reading group they belonged to in Fall. For the analysis, reading group (RO, RI, RE, or REI) was used as the independent variable, RCS growth was used as the dependent variable, and students' reading composite scores in Fall were used as a control variable. Levene's Test and normality checks were conducted, and all assumptions were met for the analysis.

When analyzing differences between groups across all grades, a significant difference in RCS growth was found between the four groups, $F(3, 1802) = 7.479$, $p < 0.001$. A small effect size of $\eta^2 = 0.012$ was also found. Table 3 summarizes the ANCOVA results for all grades. Means and standard deviations of RCS growth for each group are depicted in Table 2. To determine which groups significantly differed in their RCS growth between Fall and Spring, post-hoc pairwise comparisons were conducted using f-tests. Table 4 summarizes the differences between the groups' growth scores. The RO group's RCS growth was significantly greater than the RE group's growth ($p < 0.001$) and the REI group's growth ($p = 0.003$), but not the RI group's growth ($p = 1.000$). The RI group's RCS growth was also significantly greater than the RE group's growth ($p = 0.038$), but not the REI group's growth ($p = 0.308$). RCS growth between the RE and REI groups did not significantly differ ($p = 1.000$).

Crosstabulations

Table 5 displays the results of crosstabulation tables showing how many students in each group improved their benchmark category, remained in the same benchmark category, or dropped a benchmark category between Fall and Spring time points. Figure 1 depicts the proportions across groups. The tables were created to evaluate the real-world, functional impact of reading and behavior problems on students' reading progress. Of the 644 students in the RO group, 345 students (53.57%) improved at least one benchmark category, while 265 students (41.15%) remained in the same category and 34 students (5.28%) dropped a category. The RI group was comprised of 313 students, and 150 students (47.92%) improved their category, 145 students (46.33%) remained in the same category, and 18 students (5.75%) dropped a category. Fewer students with externalizing behavior problems saw improvement in their benchmark category over time than students without externalizing behavior problems. Of the 356 students in

the RE group, 100 students (28.09%) improved their category, 233 students (65.45%) remained in the same category, and 23 students (6.46%) dropped a category. The REI group was comprised of 494 students, and 143 students (28.95%) improved their category, 326 students (65.99%) remained in the same category, and 25 students (5.06%) dropped a category. To determine if the percentage of students who improved their benchmark category significantly differed across groups, tests of proportions were conducted. Results, listed in Table 6, showed that the RO and RI groups had significantly more students improve their benchmark categories than the RE and REI groups ($p < 0.001$). The RO and RI groups ($p = 0.101$) and the RE and REI groups ($p = 0.787$) did not have significantly different numbers of students who improved their benchmark category.

Discussion

The primary purpose of this study was to determine if the presence of a behavior problem hindered efforts to remedy reading skill deficits. Specifically, we compared reading composite scores (RCS) between Fall and Spring across four groups of students in first through third grades. The four groups included students with reading problems only (RO), reading and internalizing problems (RI), reading and externalizing problems (RE), and reading, externalizing, and internalizing problems (REI) at the beginning of the school year (e.g., Fall assessments).

The initial analysis revealed significant differences in reading scores over time. Between Fall and Spring, all groups significantly improved their RCS. These results suggest that the MTSS being applied to remedy reading skill deficits was effective in improving students' reading skills over the course of the school year. The initial analysis also revealed significant differences in reading scores across groups. Specifically, the RO and RI groups had significantly higher RCS than the RE and REI groups during both Fall and Spring assessments. However, the RO and RI

groups and the RE and REI groups did not significantly differ. These findings suggest that students with reading and externalizing behavior problems started the school with weaker reading skills than students without externalizing behavior problems. Furthermore, the pattern persisted at the end of the year, after all students received reading remediation services via MTSS. Although all students experienced significant skill improvement under MTSS, students with externalizing behavior problems started and ended the year with greater reading skill deficits than peers without externalizing behavior problems.

We also compared RCS growth across the four groups, removing the variance associated with beginning-of-year RCS. The results showed that students without externalizing behavior problems (e.g., RO and RI groups) showed significantly greater RCS growth over the course of the school year than students with only reading and externalizing behavior problems (e.g., the RE group). Students with only reading and internalizing behavior problems (e.g., the RI group) showed significantly greater RCS growth than students with reading and externalizing behavior problems (e.g., the RE group), but not students with reading, externalizing, and internalizing behavior problems (e.g., the REI group). No statistically significant differences were found in RCS growth between students in the RO and RI groups or the RE and REI groups. The results suggest that the presence of an externalizing problem hindered reading remediation efforts applied via MTSS, but the presence of an internalizing behavior problem did not significantly, adversely impact reading remediation efforts to the same degree.

In addition to comparing RCS growth, we also compared student movement across reading benchmark categories over the school year as they received various supports. To further determine the functional impact of MTSS on students' RCS growth over the course of a school year, crosstabulation tables were created to assess how many students in each reading group

(e.g., RO, RI, RE, REI) improved their benchmark category, remained in the same benchmark category, or dropped a benchmark category between Fall and Spring. Across all groups, very few students (>7%) dropped a benchmark category over the course of the school year. This suggests that MTSS was effective in preventing students' reading skill deficits from worsening as the year progressed.

For the RO and RI groups, more students improved at least one benchmark category than remained in the same benchmark category. In contrast, for the RE and REI groups, more students retained their benchmark category during end-of-year assessments than improved their benchmark category. This suggests that the presence of an externalizing behavior problem hindered reading remediation efforts to the extent that, even when their raw scores significantly increased, students' reading benchmark scores did not also increase. In other words, although MTSS was effective in improving students' reading scores to a statistically significant degree, those improvements were not large enough to reflect in benchmark category increases for most students with externalizing behavior problems. Although teachers made meaningful improvements in their students' reading skills, those efforts may not be recognized via standardized measurements of reading growth (e.g., benchmark scores) that agencies and school districts use to evaluate MTSS and teacher efficacy.

Implications, Limitations, and Future Research

In this study, MTSS efforts were used to improve students' reading skills over the course of a school year. All students started off the school year with a reading problem. Some students also started with an externalizing problem, internalizing problem, or both behavior problems. It was found that regardless of the presence of an internalizing or externalizing behavior problem, all groups made significant improvement in their reading composite scores over the course of the

school year, suggesting that MTSS was effective in remedying students' reading skill deficits. These results support previous research demonstrating the efficacy of MTSS in remedying academic deficits when students also have behavior problems (Lane & Menzies, 2003; Lane & Menzies, 2005; Sadler & Sugai, 2009). When teachers provide students with reading problems appropriate supports and interventions to address their areas of need, students can make significant improvements in their reading skills, even if they have behavior problems that make reading remediation more challenging.

While all groups in the study made significant RCS growth across the year, the presence of a concurrent behavior problem was associated with differences in reading composite scores between the groups at both measured time points. Specifically, it was found that at the start of the school year, before general instruction and reading remediation efforts could fully begin, students with externalizing problems already had significantly lower reading composite scores than students without externalizing problems. This supports findings from previous research indicating that externalizing behavior problems can significantly impact academic skill development at an early age (Harris et al., 2009; Morgan et al., 2008). Although causation can not be inferred, current findings suggest that externalizing behavior problems may have adversely impacted reading skill development before students began first grade. Thus, future researchers should investigate the effects externalizing behavior problems on reading or pre-reading skill development in students in kindergarten and pre-kindergarten.

It was also found that students with externalizing problems had significantly lower reading composite scores at the end of the school year than students without externalizing problems. Despite receiving reading remediation services, students with externalizing problems still had significantly lower reading scores in Spring than peers without externalizing problems.

This finding suggests that while all students benefitted from reading intervention services, students with externalizing problems did not benefit from typical intervention procedures sufficiently enough to reduce or eliminate their peer-comparative reading skill deficits, as their problems persisted over time. Previous researchers have found similar results, suggesting that students with externalizing problems may require different or additional intervention services than their peers to remedy their reading deficits across the course of a school year (Olivier et al., 2020; Roberts et al., 2020; Sadler & Sugai, 2009).

The presence of an externalizing behavior problem also impacted how much growth was made by each group across the course of the school year. Students with externalizing problems made significantly less RCS growth across the year than peers without externalizing problems, though all groups made significant progress in their reading skill development. Additionally, students with externalizing problems primarily remained in the same reading benchmark category across the school year, while most students without externalizing problems improved their reading benchmark category. These results suggest that educators were more successful in remedying reading skill deficits when students did not also have externalizing behavior problems. Results also suggest that failure to remedy externalizing problems may contribute to the growth of reading skill deficits across school years.

These findings support previous research studies suggesting that students with externalizing behavior problems are less likely to respond to academic skill remediation efforts and may need different or more intensive strategies to promote and support their progress (Bradshaw et al., 2008; Harris et al., 2009; Olivier et al., 2020). Specifically, to remediate academic skill deficits most effectively, students with externalizing behavior problems would likely benefit from interventions addressing both their reading and behavior problems

concurrently, rather than independently (Harris et al., 2009; Wehby et al., 2005). The findings also support research suggesting that there are differences in academic performance between students with internalizing problems and externalizing problems, with externalizers generally demonstrating worse performance overall and being less responsive to remedial interventions (Arslan et al., 2021; Olivier et al., 2020).

Lane et al. (2012) suggested that there are notable differences in academic performance between students with externalizing and internalizing problems, in addition to differences between students with a behavior problem and without a behavior problem. Results from this study support this hypothesis. Students with externalizing problems had significantly lower reading scores and RCS growth than students without externalizing problems. However, students with internalizing problems did not have significantly different reading scores or RCS growth than students without internalizing problems. While students with reading and internalizing behavior problems showed less RCS growth that students with only reading problems, these differences were not statistically significant This suggests that internalizing problems had little impacts on teachers' efforts to remedy reading skill deficits. These results support research suggesting that efforts to remedy reading deficits in students with internalizing, but not externalizing, problems may not require more intensive or different interventions (Nelson et al., 2004). Specifically, students with internalizing behavior problems may be more likely to respond to reading remediation efforts at a similar level to peers without internalizing behavior problems.

Other Limitations and Future Research

This post-hoc study was not designed to investigate casual theories or mechanisms. Thus, future research is needed to determine why externalizing behavior problems hinder reading skill remediation efforts. Additionally, future research is needed to better understand the different

impacts externalizing and internalizing behavior problems have on reading remediation efforts within MTSS.

There are several other limitations present in this study that should be addressed in future research studies. First, the reading composite score measure that was used to determine students' score growth was different across grades and time points (Good et al., 2019). Thus, direct score comparisons over time and across grades could not be conducted. To address this problem, a different type of reading measure that is more consistent across time and grades could be used to assess students' progress. The measure used to identify students as having internalizing or externalizing behavior problems was another limitation in this study. The SRSS:IE is a brief screening measure that is completed by classroom teachers (Menzies & Lane, 2011). Because it is a screening measure rather than a more involved assessment tool, scores are less reliable, and behaviors may have been over or underreported by teachers (Lane et al., 2015). Scores may be more representative of behavior on specific days or over short time periods rather than stable, long-term representations of the students' behavior. For example, teachers may have identified more students with internalizing behavior problems in Fall of the school year because they were struggling to transition back to school from summer and adjust to their new classroom, rather than having genuine internalizing behavior problems. To address this problem, more robust instruments could be used to measure students' behavior problems.

Another limitation in the study was the small number of grades assessed in a single school district, despite the large sample size. This constituted an external validity problem for the study. Only first- through third-grade students were included in this analysis, so the impact of behavior problems on reading progress was only evaluated in early elementary school settings and populations. While a great deal of reading development and skill gain occurs in these grades

(Chall, 1983), learning is lifelong, and the effects of reading interventions with students in upper elementary grades and beyond should also be examined. Additionally, because the nature of internalizing and externalizing behavior problems changes with age (Arslan et al., 2021), it would be beneficial to evaluate the impact of both behavior problems on different groups of students. To address this problem, future researchers should expand the grades included in the analysis. They should also include students from different school systems, especially those with more well-developed RTI systems for behavior remediation.

The population used for this study was another limitation. Students were mostly Caucasian, and they hailed from a single state in the western United States. Data regarding which students were English language learners (ELL) or which students received special education services were also not considered for this study. In future studies, researchers should use a more diverse population to examine the impact of behavior problems on reading skill development, with a smaller proportion of Caucasian students included in the sample. Researchers should also consider conducting the study across multiple states, particularly states in different regions of the country. This would strengthen the generalizability of results. Researchers should also collect data on ELL students and students receiving special education services, to determine how those factors impact RCS growth and score differences across reading groups.

An additional limitation of the study was splitting students into groups based on the presence of externalizing or internalizing problems, but not splitting them into subgroups based on their problem presentation. For example, when evaluating the impact of externalizing behavior problems on reading remediation efforts, it would be helpful to examine differences in behaviors associated with attention difficulties (e.g., blurting in class, exiting one's seat) compared to behaviors associated with conduct problems (e.g., arguing with one's teacher, work

refusal). Differences in reading skill development and response to intervention between these groups is of vital importance, as the groups have different outcomes; students with conduct problems often fare worse, academically and in life, than students with only attention or hyperactivity problems (Achenbach & Edelbrock, 1978; Hinshaw, 1992; Morgan et al., 2009). This suggests that different interventions may be necessary for each group to most effectively meet their needs, even though both groups are considered to have externalizing problems. In future research studies, in addition to more comprehensive measures being used, researchers should consider splitting students into more specific groups based on the presentation of their externalizing and internalizing problems. For externalizing problems, they may consider a group for ADHD-type externalizers and Conduct-Disordered externalizers, as previously mentioned. For internalizing problems, researchers may consider creating a group for anxious-type problems and depressive-type problems.

Another limitation of the study was the way behavior intervention was provided to students. While students with reading problems automatically received appropriate RTI services for their level of reading difficulty, students with behavior problems were not automatically provided with additional behavior support services. Behavior consultants assisted teachers in managing student behaviors, and student teams met to discuss program planning options for students with more significant behavior problems, but that did not guarantee that students received the adequate level of intervention to address their needs. Thus, students' behavior could not be remediated in a manner that is structured, measurable, and supported by research. This also constituted an external validity problem, as results may not generalize to schools with well-developed MTSS for behavior. Previous researchers have also concluded that to most effectively remediate academic problems when students struggle with behavior, their behavior problems

also need to be addressed through intervention (Harris et al., 2009; Lane et al., 2012). Future researchers should consider replicating this study in school districts with robust MTSS for both reading and behavior. In future studies, more thorough measurement of behavior intervention should also be conducted, and a more structured behavior intervention system should be developed.

Finally, the retrospective nature of the study was a limitation. Because data was analyzed after it was collected, and because researchers did not manipulate an independent variable, a causal relationship between variables and outcomes cannot be determined. In future studies, a more experimental design with a control group and a treatment group may be used to draw more concrete conclusions about the relationship between behavior problems and reading problems in elementary aged students.

CHAPTER THREE

Study Two: Concurrent Reading and Behavior Problems: A Timeline of Problem Emergence

Abstract

The current retrospective study was designed to evaluate which problem (e.g., reading, or behavior) in first through third grade students was identified first by teachers during a regular school year. It was also designed to investigate how the initial presence of one problem could lead to the later development of the other problem. The school system collected students' Acadience reading composite scores and Student Risk Screening Scale: Internalizing and Externalizing scores in Fall, Winter, and Spring of the 2018-2019 school year. Students' scores were traced back through previous timepoints (e.g., Winter, Fall) to determine if one problem was identified before the other problem. Students with one problem identified first were grouped into two categories: Reading Problems First or Behavior Problems First. Researchers then analyzed what type of behavior problem (e.g., internalizing or externalizing) followed and preceded reading problems. Researchers also compared the likelihood of developing one problem later in the school year if students started the year off with the other problem. Tests of Proportions were conducted to determine statistically significant differences in proportions across the groups. Results showed that reading and behavior problems were identified first at similar rates. No significant differences were found between the types of behavior problems following and preceding reading problems. However, it was found that if a student started the year off with a reading or behavior problem, they were significantly more likely than peers to develop the other problem across the school year. Discussion focused on the need for future research on reading and behavior problem development, as well as remediation efforts.

Keywords: reading problems, externalizing behavior problems, internalizing behavior problems, developmental timeline, prediction, elementary school

Concurrent Reading and Behavior Problems: Timeline of Emergence

Students who struggle to read earn lower grades and are more likely to require special education services or to be retained than peers without reading challenges (Hernandez, 2011; The Annie E. Casey Foundation, 2010; Willcutt et al., 2007). When reading difficulties start early and are not resolved through intervention, they can persist and worsen over time, leading to more severe, unfavorable outcomes for students (Hernandez, 2011; Vaughn et al., 2015, Wehby, 2003). Thus, it is important that reading problems are mitigated early in a student's academic career to promote skill development and avoid adverse outcomes (Harris et al., 2009).

Behavior problems (e.g., externalizing or internalizing behaviors) can also lead to adverse outcomes for students. Externalizing behavior problems are outwardly focused and include under-controlled, maladaptive behaviors such as inattentiveness, hyperactivity, and aggression (Achenbach & Edelbrock, 1978). Students struggling with externalizing behaviors may be less academically engaged and have an increased risk of drop-out or failure to graduate from high school (Hinshaw, 1992; Morgan et al., 2009). In contrast, internalizing behavior problems are more inwardly focused and include overcontrolled emotions and behaviors, such as feeling anxious, depressed, or overwhelmed (Achenbach & Edelbrock, 1978). When students struggle with internalizing behaviors, they can also experience poor academic outcomes, including earning lower grades than their peers and facing increased absences from school (Carty et al., 2008; Perderson et al., 2023). Much like reading problems, when behavior problems emerge early in a student's life and are not remedied, students face an increased risk of experiencing unfavorable outcomes at school (Moffitt, 1993; Morgan et al., 2009). Therefore, it is important that teachers address students' behavior problems soon after they emerge (Harris et al., 2009).

Several researchers have found that reading problems and behavior problems are closely linked and can co-occur at high rates (Carroll et al., 2005; Hinshaw, 1992; Wehby et al., 2003). For example, researchers have found that students with reading challenges are at a significantly higher risk of developing problems such as ADHD, conduct disorders, anxiety, and depression (Carroll et al., 2005). When reading and behavior problems co-occur, students can experience negative outcomes beyond those experienced by students facing only one problem (Wehby et al., 2005). Thus, students with concurrent problems may require different, or more intensive, intervention strategies than peers struggling with only a reading or behavior problem (Lane & Menzies, 2005; Wehby et al., 2003).

To develop effective intervention strategies, it is important that researchers and educators determine how a reading or behavior problem could potentially lead to the development of the other problem, over time. For example, Morgan et al. (2008) found that first graders with reading problems have a significantly higher likelihood of developing externalizing behavior problems by third grade; first grade students demonstrating poor task engagement also have a higher likelihood of developing reading skill deficits by third grade. By determining which problem occurs first, researchers and educators could enhance their ability to predict the development of the other problem, which may enhance their ability to develop and deliver supports that may prevent the occurrence of this second problem.

Which Comes First: Behavior or Reading Problems

Researchers have posited many theories about which problem emerges first in students, but Hinshaw (1992) proposed four potential broad explanations. First, it is possible that reading problems emerge first and influence the development of behavioral problems. Second, behavioral problems could emerge first and influence reading problem development. Third,

neither type of problem (e.g., reading or behavior) could emerge first, and both could develop tangentially. Fourth, it is possible that neither problem influences the development of the other problem, and extraneous variables (e.g., socioeconomic status, access to instruction) influence their development, instead.

Researchers have suggested how reading problems could influence the development of behavior problems (Carroll et al., 2005; Morgan et al., 2009; Roberts et al., 2020). Carroll et al. (2005) found that having poor literacy skills early in life was associated with an increased risk of receiving diagnoses like ADHD and Conduct Disorder later in life, which are strongly associated with externalizing behaviors. Morgan et al. (2009) found that when students are identified as poor readers in kindergarten, they are significantly more likely to exhibit externalizing behavior problems in third and fifth grades than peers without reading challenges. Roberts et al. (2020) suggested that when students struggle with reading, they may experience feelings of frustration or incompetence that leave them more likely to engage in disruptive behaviors during reading instruction, which could evolve into behavior problems requiring additional intervention.

Researchers have also described how behavior problems could lead to the development of reading problems (Burt & Roisman, 2010; Hurry et al., 2018; Roberts et al., 2020). Roberts et al. (2020) suggested that when students engage in disruptive and avoidant behaviors during class, they are unable to adequately attend to reading instruction, and their reading skill development falters. Burt and Roisman (2010) found that the presence of externalizing behavior problems in preschool leads to widespread academic underachievement in elementary school, including the development of reading skill deficits. Hurry et al. (2018) found that six-year-old students struggling with externalizing behavior problems made significantly less progress in their literacy

skill development than peers without reading problems, and deficits were still present both nine months and four years following their initial study.

In Chapter Two of this dissertation, we conducted a retrospective study analyzing reading skill growth in early elementary students who had reading skill deficit and a behavior problem within a school district that applied MTSS to address academic and behavior problems. Results showed that reading skill development was significantly lower in students who had externalizing behavior problems than those who had internalizing behavior problems. This study suggests that a specific type of behavior problem may influence the development of reading problems, with externalizing behavior problems having a significant, negative impact on reading skill remediation.

McIntosh (2005) introduced the concept of a "coercive cycle of educational failure," which suggests that when students find academic tasks (e.g., reading) to be too unpleasant or challenging, they escape or avoid their work through disruptive behavior. Poor behavior then leads to discipline for students (e.g., removal from class), which limits their opportunities to build reading skills. This coercive cycle can occur regardless of whether a student has been diagnosed with a reading problem or identified as having a behavior problem requiring intervention. When students' access to instruction is limited due to their behavior challenges, the deficit in their reading skills grows over time. As students fall further behind, their behavior problems are exacerbated, which further limits their access to instruction and ability to strengthen their reading skills (McIntosh, 2005). In this manner, reading problems and behavior problems could exacerbate each other's development.

While many researchers have theorized that the presence of one problem (e.g., reading or behavior) influences the progression of the other problem, it is possible that there is no direct

connection between the development of reading and behavior challenges. Instead, extraneous variables, such as socioeconomic status, attention difficulties, or language delay may lead to the development of both problems (Hinshaw, 1992). In a national study of kindergarteners, conducted from 1998 to 1999, students' socioeconomic status (SES) was found to have a significant impact on both their reading skill development and the behavior problems they experienced, with students from lower-SES backgrounds experiencing greater reading difficulties and more behavior problems than peers from higher-SES backgrounds (NCES, 2000). Similarly, Silva et al. (1987) found that students identified with language delays in their preschool years were significantly more likely than their peers to experience reading challenges and behavior problems by 11 years of age.

Purpose of the Present Study

Researchers have shown that reading and behavior problems are closely linked, regardless of the causal mechanisms behind their development (Hinshaw, 1992). Reading and behavior problems have also been shown to co-occur at high rates, leading to significant, adverse outcomes for affected students (Carroll et al., 2005; Hinshaw, 1992; Wehby et al., 2003). Because students face more significant challenges when reading and behavior problems are experienced simultaneously, this study was designed to analyze the relationship between reading and behavior problems, with a focus on the sequential identification of the two problems. This analysis could be used to support or refute theories regarding causal relationships between reading and behavior problems. Additionally, this analysis could inform prevention and remediation practices. As we found in Chapter Two that the type of reading problem (e.g., externalizing versus internalizing) impacted reading skill remediation, part of our analysis also included behavior problem type.

Specifically, we sequentially analyzed behavior and reading skill data for first- through third-grade students. Data was collected from a single school district during one school year, during which MTSS was applied to prevent and remedy academic and behavior problems. Our first two analyses were designed to determine if the identification of a reading or behavior problem was more likely to occur when students had been previously identified with the other problem. Next, we analyzed data on students with concurrent behavior and reading problems to determine the sequence of problem identification (e.g., reading first or behavior first). When behavior problems were identified before reading problems, we then analyzed data to determine if one type of behavior problem (e.g., externalizing or internalizing) was more likely to be identified before a reading problem. When reading problems were identified first, we analyzed data to determine if one type of behavior problem was most likely to be later identified.

Method

Participants and Setting

This analysis was conducted with a dataset from a western United States school district during the 2018-2019 school year. The sample population included 7,227 first- through third-grade students; 2,361 were in first grade, 2,352 were in second grade, and 2,514 were in third grade. In the first-grade group, 52.0% of students were male and 48.0% were female. Caucasian students comprised 73.2% of the sample, while 26.8% identified as Minority students. Across second graders, 51.3% of students were male and 48.7% of students were female. Most students were Caucasian (72.7%), while Minority students comprised the remainder of the group (27.3%). In the third-grade group, 49.7% of students were male and 50.3% were female. Caucasian students comprised 73.0% of the sample, while 27.0% identified as minority students.

Data was collected during the 2018-2019 school year. During the year, the school district was applying MTSS within their schools, including systems for identifying and remediating reading and behavior problems. To informally identify students with behavior challenges (e.g., internalizing or externalizing problems), teachers rated students' behavior using the Student Risk Screening Scale: Internalizing and Externalizing (SRSS:IE) in Fall, Winter, and Spring. Students in need of services received behavioral support primarily through traditional classroom management strategies (Tier 1), check-in/check-out services (Tier 2), or targeted behavioral interventions (Tier 3) developed through consultation with school-based behavioral consultants, school psychologists, applied behavior analysts, or school counselors.

MTSS for identifying and remediating reading problems was well-developed at the time of data collection. Acadience Reading benchmark scores were measured throughout the school year (e.g., during Fall, Winter, and Spring) and were used to identify students as having reading difficulties. Students who needed additional support received services through a three-tiered intervention system based on the school's RTI design. Teachers delivered supplemental remediation instruction to students during set times that were built into the regular school day.

Measures and Data Collection

The independent variable of the study is students' reading and behavior problems at various times across a single school year (e.g., Fall, Winter, or Spring). Students were grouped based on their reading composite score (RCS) benchmarks from Acadience Reading, as well as their scores for internalizing and externalizing behaviors on the teacher-rated Student Risk Screening Scale: Internalizing and Externalizing. The dependent variable for the first two analyses is the percentage of students who are identified with a reading or behavior problem after their initial identification of the other problem. The dependent variable for the next analyses is

which problem (e.g., reading or behavior) is identified first in students' records, occurring in either Fall or Winter data and ratings.

Acadience Reading RCS Benchmark Assessments.

To determine students' reading skills at each measured time point, RCS benchmark assessments from Acadience Reading were used. As described in the previous chapter, Acadience Reading provides several measures to assess kindergarten through sixth-grade students' literacy skills, including First Sound Fluency (FSF), Letter Naming Fluency (LNF), Phoneme Segmentation Fluency (PSF), Nonsense Word Fluency (NWF), Oral Reading Fluency (ORF), Retell, and Maze. The Acadience RCS benchmark combines students' scores across these measures to provide an overall estimate of their reading proficiency, with measures included in the RCS benchmark varying by grade and time of year (Good et al., 2019). Because the included measures vary, direct score growth comparisons cannot be made over the three time points or across grades; however, benchmark goals and cut points were established using consistent logic and procedures, so the percentage of students falling within each benchmark category can be directly compared. For all grades, the Acadience Reading RCS measure was found to have acceptable reliability and validity (Good et al., 2019).

Students could be classified into three categories based on their RCS benchmark scores: at or above benchmark, below benchmark, or well below benchmark. To assess their reading skills and determine their RCS benchmark score, students completed their assessments in a quiet, standardized environment alongside their teacher and peers in Fall, Winter, and Spring of a regular school year. Students who did not score "at or above benchmark" on this assessment received remediation services through their school's RTI system, receiving either Tier 2 or Tier 3

support services. For this study, students were identified as having a reading problem if they were classified as being "below benchmark" or "well below benchmark" at either time point.

Student Risk Screening Scale: Internalizing and Externalizing.

To determine students' behavioral functioning at each time point, the Student Risk Screening Scale: Internalizing and Externalizing (SRSS:IE) was completed by teachers in Fall, Winter, and Spring of a regular school year. As described in the previous chapter, the SRSS:IE is a universal screening tool adapted from the Student Risk Screening Scale, which assessed only externalizing behavior problems (Drummond, 1994). The SRSS:IE, consisting of seven items related to externalizing behaviors and five items relating to internalizing behaviors, can be used by teachers to briefly assess students for both types of behavior problems (Menzies & Lane, 2011). The SRSS:IE was found to have acceptable reliability and validity for both the internalizing and externalizing subscales (Lane et al., 2012; Lane et al., 2019; Menzies & Lane, 2011).

A 4-point Likert scale, with 0 being "never" and 3 being "frequently," is used for teachers to rate students' behavior on each of the 12 items. Items are then totaled for both the internalizing and externalizing scales, and students are identified as being at risk for behavior problems by comparing them to cut scores, which vary for internalizing and externalizing behavior problems. For both problems, students can be identified as "low risk," "moderate risk," or "high risk." (Lane et al., 2015). When students were identified as having a behavior problem, a tiered intervention system was used to address and remediate maladaptive behaviors. In more severe cases, school-based behavior consultants met with teachers to address classroom management strategies and develop targeted program planning and intervention strategies for the

impacted students. For this study, students were identified as having a behavior problem if their internalizing or externalizing behavior scores were classified as “moderate” or “high” risk.

Design and Analysis

Several analyses were conducted during this study. Our first two analyses were designed to determine if students who had been identified with a reading or behavior problem were more likely to be identified with the other problem over the course of the school year than students who had not been previously identified with either problem. Thus, we tested for significant differences in the proportion of students who were identified with a reading problem in Fall or Winter, who then were later identified with a behavior problem in Winter or Spring, versus the proportion of students who were never identified with reading problem in the Fall or Winter but were identified with a behavior problem in Winter or Spring. Additionally, we tested for significant differences in the proportion of students who were identified with a behavior problem in Fall or Winter, who were later identified with a reading problem in Winter or Spring, versus the proportion of students who were never identified with a behavior problem in Fall or Winter but were later identified with a reading problem in the Winter or Spring.

Our next analyses were designed to determine which problem, reading or behavior, was more likely to be identified first in students’ records. Only students with a concurrent reading and behavior problem (e.g., either internalizing, externalizing, or both) in Winter or Spring of a regular school year were included in these analyses. Once the sample was established, researchers traced students’ reading and behavior scores back through previously measured timepoints (i.e., Fall and Winter) to evaluate if one problem was identified before the other problem. We then tested for significant differences in the proportion of students who were identified with reading problems first versus behavior problems first.

Finally, we tested for significant differences regarding behavior problem type (e.g., internalizing or externalizing). For the group who were identified with a reading problem before a behavior problem, we tested for significant differences in which type of behavior problem (e.g., internalizing or externalizing) followed. Similarly, for the group who were identified with a behavior problem before a reading problem, we tested for significant differences in which type of behavior problem preceded the reading problem. Again, tests of proportions were used to determine significant differences between the groups.

Results

Several analyses and calculations were conducted to determine if being identified with one problem first (e.g., reading or behavior) significantly increased the likelihood of being identified with the other problem later in the school year. As seen in Figure 3, researchers initially investigated if being identified with a reading problem early in the year increased the probability of later being identified with a behavior problem. Of the 897 students who were identified with a reading problem in Fall or Winter, 334 students developed a behavior problem by Winter or Spring. Thus, the probability of developing a behavior problem after presenting with a reading problem was 37.24%. This was compared to the proportion of students who developed a behavior problem without having an initial reading problem. Of the 4,860 students who did not have a reading problem in Fall or Winter, 774 developed a behavior problem by Winter or Spring. Therefore, the probability of developing a behavior problem without being identified with an initial reading problem is 15.84%. A test of proportions showed that a significantly greater proportion of students were identified with a behavior problem if they had been previously identified with a reading problem ($z = 14.95$, $p < 0.001$). This suggests that

having a reading problem significantly increases the likelihood of developing a behavior problem later in the school year.

Next, as seen in Figure 4, we investigated if being identified with a behavior problem increased the probability of later being identified with a reading problem. Of the 2,224 students who were identified with a reading problem in Winter or Spring, 307 students had previously been identified with a behavior problem in Fall or Winter. Thus, the probability of developing a behavior problem after presenting with a reading problem was 13.80%. This was compared to the proportion of students who developed a reading problem without having an initial behavior problem. Of the 3,529 students who did not have a behavior problem in Fall or Winter, 212 students developed a reading problem by Winter or Spring. Therefore, the probability of developing a reading problem without being identified with an initial behavior problem is 6.01%. A test of proportions showed that significantly more students were identified with a reading problem if they had been previously identified with a behavior problem ($z = 10.05$, $p < 0.001$). This suggests that having a behavior problem significantly increases the likelihood of developing a reading problem later in the school year.

Next, we conducted a series of analyses designed to determine the sequence of problem emergence for students identified with both reading and behavior problems. Of the 7,227 students included in the study, 641 were identified as having simultaneous reading and behavior problems in either Winter or Spring of the school year. These 641 students served as our sample for our next analyses. First, we traced back through students' records and determined that 334 of the 641 students fell into the Reading Problem First group, while 307 students fell into the Behavior Problem First group. As shown in Figure 5, tests of proportions revealed that there was

no significant difference in the number of students in each group ($z = 1.508$, $p = 0.131$), meaning that reading problems and behavior problems were first identified at similar rates.

We then investigated which type of behavior problem (e.g., externalizing or internalizing) was more frequently identified after reading problems were identified first. We found that after a reading problem was identified (Fall and Winter), 126 students were later identified (Winter and Spring) with an internalizing problem, 129 students were identified with a subsequent externalizing problem, and 79 students were identified with both behavior problems simultaneously (see Figure 6). Tests of proportions indicated that simultaneous identification was less likely to occur than both internalizing ($z = 3.943$, $p < 0.001$) and externalizing identification ($z = 4.178$, $p < 0.001$), but there was no significant difference in identification rates between the internalizing and externalizing behavior groups ($z = 0.239$, $p = 0.810$). This suggests that for student with initial reading problems, internalizing and externalizing problems are likely to develop next at similar rates.

Finally, we investigated which type of behavior problem was first identified before reading problems were later identified. We found that 109 students were identified with internalizing problems before reading problems, 94 students were identified with externalizing problems first, and 104 students were simultaneously identified with both behavior problems before a reading problem (see Figure 7). When conducting tests of proportions, we found no significant differences between the groups. For internalizing versus externalizing problems, $z = 1.287$ ($p = 0.197$). For simultaneous behavior problems versus externalizing problems, $z = 0.863$ ($p = 0.390$). For simultaneous behavior problems versus internalizing problems, $z = 0.424$ ($p = 0.674$). This analysis suggests that reading problems are likely to develop after internalizing and externalizing behavior problems at similar rates.

Discussion

One purpose of this study was to determine if having a reading or behavior problem significantly increased the likelihood of the other problem being identified later. We found that when students have a reading problem early in the school year, they are more likely to develop a behavior problem later in the year than peers who do not have a reading problem. Similarly, it was found that when students develop a behavior problem early in the school year, they are more likely to develop a reading problem later in the year than peers who do not have a behavior problem. This suggests that having either problem first (e.g., reading or behavior) significantly increases the likelihood that the other problem will develop over the course of a single school year. This is an important finding, as it suggests that the presence of one problem could predict the development of the other problem later in a student's academic career.

We also sought to determine if one problem (e.g., reading or behavior) was identified first significantly more often than the other problem. Our analyses revealed that reading problems and behavior problems were identified first in students' records at similar rates, with no significant differences found between the Reading Problems First and Behavior Problems First groups. This finding suggests that neither problem (e.g., reading or behavior) occurs first significantly more often than the other problem, which suggests that researchers and educators should put forth equal efforts toward remedying each problem. Because both problems were found to first occur at similar rates, both problems are equally as important for educators to address in hopes that they might reduce the probability of the other problem developing.

When reading problems occurred first, we sought to determine which type of behavior problem most often developed next. The analysis also revealed that when reading problems occur first, externalizing and internalizing behavior problems develop next at similar rates, with

no significant differences found between the two types of behavior problems. This suggests that when students are struggling with a reading problem, educators should put forth equal effort into preventing internalizing and externalizing behavior problems that may later occur. When developing effective interventions for students who have reading problems, incorporating instruction regarding emotional coping skills for internalizing problems and behavior management skills for externalizing problems will be equally as beneficial for students.

Finally, when behavior problems occurred first, we sought to determine which type of behavior problem most often preceded the development of a reading problem. Our analysis revealed that when behavior problems occur first, externalizing and internalizing problems are first identified at similar rates, with no significant differences found between the groups. This suggests that students with an internalizing behavior problem and externalizing behavior problem are equally as likely to develop a reading problem later in the school year. Thus, for students with either type of behavior problem, educators should closely monitor their reading skills and incorporate effective reading intervention strategies when those students start to fall behind peers in their reading skill development.

Implications, Limitations, and Future research

Researchers have proposed numerous mechanisms that may explain why reading problems may lead to the development of behavior problems and why behavior problems may lead to the development of reading problems (Hinshaw, 1992; Hurry et al., 2018; Morgan et al., 2008). Our data showed that the initial presence of one problem increases the probability of the other problem being identified later. This finding is consistent with researchers who suggested and found support for a bidirectional hypothesis, in which the presence of each problem increases the probability of the other (Hinshaw, 1992; Morgan et al., 2009; Roberts et al., 2020).

However, current results could also be explained by other factors causing both problems (Hinshaw, 1992). Thus, these findings cannot be used to refute any of these hypotheses. Our findings are consistent with previous researchers who examined the sequential development of behavior and reading problems across several years (Hurry et al., 2018; Morgan et al., 2008). This finding extends research by showing that the early identification of either problem (e.g., reading or behavior) increases the probability that the other problem will be identified later within the same school year.

The current findings have important applied implications, as they suggest that students identified with either problem in Fall or Winter are more than twice as likely to be identified with the other problem in the same school year. This rapid development of the subsequent problem provides strong support for providing effective prevention (e.g., Tier 1) services for reading and behavior problems. Rapid development of the other problem also supports delivering effective early remediation, as rapidly remedying behavior or academic problems may reduce the probability of the other problem occurring.

This data was collected from a school district that was applying MTSS for academic and behavior problems. Our current finding suggests that attempts to remedy either problem should not include procedures that may increase the probability of the other problem occurring. For example, attempting to remedy reading skill deficits with interventions that are associated with low levels of reinforcement and high levels of aversive feedback may increase the probability of the student developing internalizing behavior problems (e.g., anxiety) and/or externalizing behavior problems (e.g., inappropriate behavior that allows students to escape academic activities). Also, attempting to address behavior problems with procedures that reduce time available to students to participate in reading instruction (e.g., suspension, going to therapy

during reading instruction) may increase the probability of students developing a reading problem. Thus, our current results support McIntosh et al. (2006), who suggested that integrated approaches to preventing and remedying academic and behavior problems may benefit students.

In Chapter Two, we examined students who had been identified with early reading problems and found that remediation efforts were similarly effective for those who had internalizing behavior problems and those who had no behavior problems. However, remediation attempts were much less likely to result in meaningful increases in reading skill development when students had externalizing behavior problems. Our current results are not consistent with these findings, as both internalizing and externalizing behavior problems were similarly likely to precede and follow reading problems. Future researchers may seek to examine why externalizing behavior problems were related to weaker reading remediation efforts, but not more likely to precede the initial identification of reading skills deficits.

Additionally, researchers should address several other limitations associated with the current study. First, while students came from a large school district (data from 7,227 first through third grade students were examined), the number of students in subgroups was relatively small for some of our analysis (e.g., 126 students with reading problems who were later identified with internalizing problems). Thus, future researchers should conduct this study with larger samples. This study was conducted with students from a single school district, which was mostly Caucasian, and no data was provided that allowed researcher to identify students from different ethnic groups, English language learners (ELL), or which students received other services (e.g., special education, other health impairment). Researchers should consider conducting additional studies across school districts and regions of the United States.

Researchers should also consider using data from more diverse school districts and analyzing how gender, ELL, and special education students may impact the study's results.

Because we were interested in early reading and behavior problems, we only analyzed data from grades one, two, and three. Thus, these findings cannot be generalized to students in different grades, including middle and high school students. As the nature and impact of behavior and reading problems may manifest differently for older students (Arlsan et al., 2021; Chall, 1983), researchers should consider replicating this study with students from other age groups (e.g., middle and high school students).

The measures used in this study were an additional limitation. The SRSS:IE is a brief teacher-report measure used to screen students for behavior problems. While the measure has adequate reliability and validity, it was not designed to differentiate types of externalizing (e.g., oppositional/defiant or inattentive/hyperactive) or internalizing (e.g., anxious or depressive) problems. Thus, future researchers may want to conduct similar studies using different instruments and multiple measures of behavior problems. The benchmark scores used to identify students with reading problems were also a limitation, as the benchmark scores are based on students' overall reading composite scores (RCS), which included different measures. However, limitation is attenuated as similar procedures were used to develop these benchmark scores (Good, 2019). Regardless, studies using more consistent measures may allow research to analyze ordinal or interval scores, which may yield different results.

Perhaps the biggest limitation with the current study was its retrospective nature. Researchers did not and could not manipulate prevention and remediation procedures. Thus, true causality cannot be determined from our study. Although we identified a potential bidirectional link between the development of reading and behavior problems, a more experimental design

would lend stronger evidence to any causal mechanism between the two problems. Thus, in future studies, researchers should conduct a more experimental design to draw more meaningful and concrete conclusions about how reading and behavior problems develop in elementary-aged students.

Conclusions

Despite these limitations, the current results showed that the probability of developing a behavior problem more than doubled when students were previously identified with a reading problem. Additionally, when students were identified with an initial behavior problem, their probability of later developing a reading problem more than doubled. As the development of the next problem occurred within the same school year, the current results suggest that effective prevention and early intervention for one problem may prevent the other from occurring. Thus, the current study supports applying prevention and early intervention procedures for both behavior and reading problems for students in first through third grades.

CHAPTER FOUR

A General Discussion: The Impact of Reading and Behavior Problems on Elementary-Aged Students' Academic Success

A General Discussion: The Impact of Reading and Behavior Problems on Elementary-Aged Students' Academic Success

Researchers have long been interested in the relationship between reading problems and behavior problems (Hinshaw, 1992; Morgan et al., 2008; Wehby et al., 2003). Previous researchers have found that reading problems and behavior problems often co-occur at high rates (Hinshaw, 1992). Researchers have also found some evidence that having one problem (e.g., reading or behavior) could influence the development of the other problem later in a student's academic career (Morgan et al., 2008). However, few researchers have examined the relationship between reading and behavior problems within the context of Multi-tier Systems of Support (MTSS) and Response-to-Intervention (RTI), which include the provision of services designed to prevent and remedy academic and behavior problems.

Purpose and Findings

Thus, the purpose of this dissertation was to examine the relationship between reading problems and behavior problems in elementary-aged children within the context of school-based reading and behavior remediation services. Specifically, we sought to enhance our understanding of how behavior problems can impact reading remediation efforts and students' ability to develop their reading skills over time. We also sought to enhance our understanding of how the initial development of one problem (e.g., reading or behavior) affects the probability of developing the other problem over the course of a single school year.

The first study, described in Chapter Two, was designed to investigate how concurrent reading and behavior problems impact reading remediation efforts and students' ability to develop their reading skills across a school year. Results from the first study indicated that when students had a concurrent reading problem and externalizing behavior problem, they started and

ended the school year with significantly lower reading composite scores than peers without externalizing behavior problems. Students with concurrent reading and externalizing behavior problems also made significantly less growth in their reading skill development over the course of a school year than peers without externalizing behavior problems. No significant differences in reading scores or reading skill development were found between students with concurrent reading and internalizing behavior problems and those with reading problems and no behavior problems. This suggests that the presence of an externalizing behavior problem, but not an internalizing behavior problem, may have a significant, negative impact on reading remediation efforts. This finding could influence how educators and researchers approach efforts to remedy problems with reading and behavior and could influence the development of more effective interventions for students with concurrent reading and externalizing behavior problems.

The second study, described in Chapter Three, was designed to investigate how the initial development of one problem (e.g., reading or behavior) impacts the later development of the other problem, as well as which problem is identified first most often in elementary school students. Results from the second study indicated that when a student starts the year with a reading problem, they are significantly more likely to develop a behavior problem later in the school year than peers without a reading problem. Additionally, when a student starts the school year with a behavior problem, they are significantly more likely to develop a reading problem later in the school year than peers without behavior problems. This suggests that the presence of either problem (e.g., reading or behavior) early in the school year may increase a student's likelihood of developing the other problem later in the school year. Thus, the presence of either problem could potentially be used to predict the development of the other problem, which could influence how educators and researchers address prevention and remediation strategies.

Results from the second study also indicated that when students develop reading and behavior problems during the school year, reading problems and behavior problems are likely to occur first at similar rates. When a reading problem developed first, there was no significant difference in how often internalizing and externalizing behavior problems developed next. Similarly, when behavior problems developed first, there were no significant differences in which type of behavior problem (e.g., internalizing or externalizing) preceded the development of a reading problem. This suggests that neither problem leads to the development of the other problem with a significantly greater frequency.

Implications, Limitations, and Future Research

Taken together, the results of Study One and Study Two support previous research indicating that reading problems and behavior problems are interconnected (Hinshaw, 1992; Morgan et al., 2008; Wehby et al., 2003). The findings appear to support the hypothesis that a reading problem could potentially lead to the development of either broad type of behavior problem (e.g., internalizing or externalizing) later in a student's academic career. Similarly, the findings appear to support the hypothesis that either broad type of behavior problem could potentially lead to the later development of a reading problem (Hinshaw, 1992; Morgan et al., 2008). Neither problem was more likely to be identified first in students' records.

The findings also indicate that when students initially present with a reading problem or behavior problem, they are significantly more likely to develop the other condition throughout the school year than their peers without an initial reading or behavior problem. This finding supports previous research suggesting that a strong, potentially bidirectional, causal link may exist between reading problems and behavior problems, with both problems appearing to have a significant impact on the development of the other problem (Hinshaw, 1992). However, when

focusing solely on reading remediation efforts, our novel findings indicate that externalizing behavior problems have a more significant, negative impact on remediation efforts than internalizing behavior problems.

Together, these studies suggest that while having a behavior problem increases the probability of developing a reading problem, both internalizing and externalizing problems are similarly associated with the development or a reading problem. However, having an externalizing problem appears to lead to greater difficulty in remedying reading problems than having an internalizing problem. Therefore, when considering best practices surrounding reading remediation efforts, educators may benefit from focusing more effort on remedying concurrent externalizing problems compared to remedying concurrent internalizing problems.

The results of this dissertation are novel and provide greater insight into the relationship between reading problems and behavior problems. Specifically, the findings suggest that externalizing problems may have a more negative impact on reading remediation than internalizing problems, and that the initial development of either problem (e.g., reading or behavior) increases the likelihood that the other problem will develop later. In combination, these findings may help inform the development of more effective interventions and remediation strategies within MTSS and RTI frameworks. However, there are several limitations in this study that should be addressed in future research.

Generalizability

External validity is limited in both Study One and Study Two. Both studies were conducted with a dataset of students hailing from a single school district in the western United States, and all students included in the study were in first through third grades when data was collected. Thus, similar studies should be conducted with a broader and more representative

sample of students, especially those from different school districts and regions of the United States. Researchers should also consider replicating this study with students from different age groups, including students in middle school and high school. Given that internalizing and externalizing problems present differently in older students, replicating this study in more advanced grades may yield different results.

Another limitation with the sample across both studies is that most students involved in analyses were Caucasian, and students of different ethnicities were defined only as minority students. Additionally, English language learners (ELL) and students receiving special education services were not uniquely considered in the study. In the present study, there were also no analyses conducted to determine differences in reading and behavior problems across genders. Thus, future researchers should consider conducting similar studies which take into account student gender and ethnicity (e.g., African American, Asian, Hispanic/Latino). Researchers should also include ELL and students receiving special education services in their analyses to determine if differences in learning needs play an important role in the development and remediation of reading and behavior problems.

Applied Research

One limitation to our study involved the measures used to determine if students had reading and behavior problems. The Acadience Reading test is a well-researched measure of basic early literacy skills for students in kindergarten through sixth grade. However, the early literacy skills measured vary by each grade, which makes it difficult to draw direct comparisons between students' reading skills across grades. Although the measured reading skills for each grade are combined into a reading composite score (RCS) that estimates students' overall reading proficiency, the RCS does not allow researchers to make direct comparisons between

students discrete reading skills (e.g., letter naming fluency, oral reading fluency, reading retell, etc.). Thus, future researchers should consider using a more consistent measure of reading proficiency that measures the same reading skills across several grades, which would allow for more direct comparisons.

Additionally, the Student Risk Screening Scale: Externalizing and Internalizing (SRSS:IE) was used to identify students as having either type of behavior problem. Although this scale has adequate validity and reliability, it is a brief screening measure completed by teachers, with only five internalizing behavior items and seven externalizing behavior items. Because the measure is so brief, it is possible that teachers' ratings of students' behavior were not as thorough or accurate as they could have been if a more robust behavior measure was used. Additionally, the scale did not break down internalizing and externalizing behaviors into more specific categories (e.g., anxiety and depression, hyperactivity and aggression), which could be useful in allowing researchers to develop a more thorough understanding of the link between behavior problems and reading problems. Thus, in future research studies, researchers should use a more robust behavior rating scale to measure behavior problems.

Another major limitation regarding Study One is that we investigated the impact of behavior problems on reading remediation, but we did not investigate the inverse relationship. Given the results of Study Two, indicating that having a reading problem can lead to the later development of a behavior problem, it would be beneficial for researchers to investigate the effects of reading problems on behavior problem remediation. Because it was found in Study Two that reading problems are equally as likely to lead to externalizing and internalizing behavior problems, it would be meaningful for future researchers to investigate the impact of reading problems on the development and remediation of both types of behavior problems, rather

than just externalizing problems. Thus, in future studies, researchers should replicate this study by focusing on reading problems as an independent variable and behavior remediation as a dependent variable.

Finally, one limitation to this study is that it focused entirely on the link between behavior problems and reading problems, despite a wealth of research suggesting that behavior problems can impact skill development across many subjects (Algozzine et al., 2011; Bradshaw et al. 2008; Murray & Farrington, 2010). Because behavior problems are generally impactful in school environments, it would be beneficial to replicate this study by investigating the impact of behavior problems on skill remediation across different subjects, including math, writing, and language arts, to determine if similar results are found across subjects. Thus, in future studies, researchers may consider conducting studies investigating several measures of academic proficiency and different types of academic skill development, rather than focusing solely on reading skills.

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APPENDICES

Appendix A: Tables

Table 1. *Study One: Results of a Mixed Effects ANOVA Determining Differences in Reading Composite Scores Across Groups in Fall and Spring*

Predictor	Source of Variation	df	Mean Square	f-test	p-value	η^2
Intercept	Reading Group	3	64,234.557	19.830	< 0.001*	0.032
	Error	1803	3,239.201			
Reading Group	Contrast	3	213,939.251	32.273	< 0.001*	0.051
	Error	1803	6,628.996			
Time	Contrast	1		1832.378	< 0.001	0.504
	Error	1803				

* denotes significant p-values of <0.05.
Bonferroni adjustments were used to correct for multiple comparisons.

Table 2. *Study One: Descriptive Statistics for All Reading Groups' Reading Proficiency Scores*

Group	Fall M (SD)	Spring M (SD)	Growth M (SD)
RO	106.048 (2.232)	208.766 (4.542)	102.717 (81.773)
RI	97.211 (3.202)	189.920 (6.516)	92.709 (80.327)
RE	85.219 (3.003)	155.520 (6.109)	70.301 (81.899)
REI	78.113(2.549)	149.632(5.186)	71.518 (77.833)

Note. All group showed statistically significant RCS growth between Fall and Spring, with p-values of < 0.05

Table 3. *Study One: Results of an Analysis of Covariance (ANCOVA) Determining Differences in Reading Composite Score Growth Across Groups*

	Source of Variation	df	Mean Square	f-test	p-value	η^2
ANCOVA	Reading Group	3	40,928.268	7.479	< 0.001*	0.012
	Error	1802	5,472.192			
	Total	1807				

* denotes significant p-values of <0.05.
Bonferroni adjustments were used to correct for multiple comparisons.

Table 4. *Study One: Significant p-Value Differences in Reading Composite Score Growth Across Groups*

	REI	RE	RI
RO	0.003*	< 0.001*	1.000
RI	0.308	0.038*	--
RE	1.000	--	

* denotes significant p-values of <0.05.
Bonferroni Adjustments were used to correct for multiple comparisons.

Table 5. *Study One: Numbers and Percentages of Students in Each Group Who Improved, Maintained, and Worsened in their Reading Benchmark Categories*

Group	*n*	*n* Improved (% Improved)	*n* Maintained (% Maintained)	*n* Worsened (% Worsened
RO	644	345 (53.57%)	265 (41.15%)	34 (5.28%)
RI	313	150 (47.92%)	145 (46.33%)	18 (5.75%)
RE	356	100 (28.09%)	233 (65.45%)	23 (6.46%)
REI	494	143 (28.95%)	326 (65.99%)	25 (5.06%)

Table 6. *Study One: Results of Tests of Proportions for RCS Improvement Across Reading Groups.*

	REI		RE		RI	
	Z	*p*	*Z*	*p*	*Z*	*p*
RO	8.77	< 0.001*	-7.76	< 0.001*	1.64	0.101
RI	5.46	< 0.001*	-5.29	< 0.001*	-	-
RE	-0.27	0.787	-	-	-	-

* denotes significant p-values of <0.05.
Bonferroni adjustments were used to correct for multiple comparisons.

Appendix B: Figures

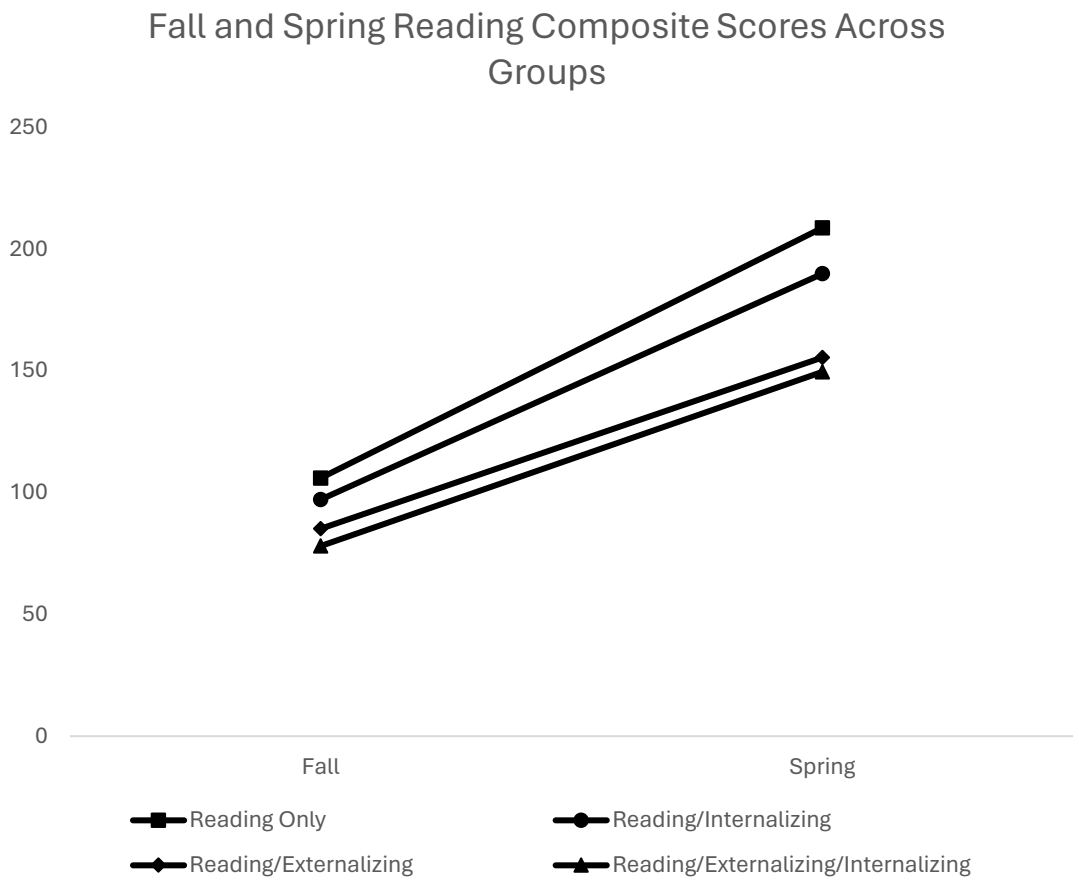


Figure 1. *Study One: Reading Composite Score Growth Between Fall and Spring for Each Reading Group*

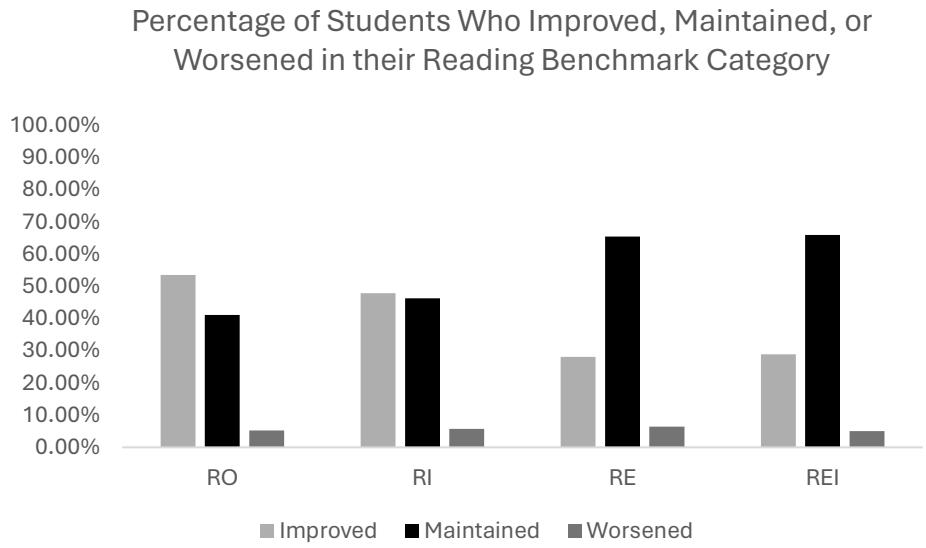


Figure 2. *Study One: Categorical Improvement Across Groups*

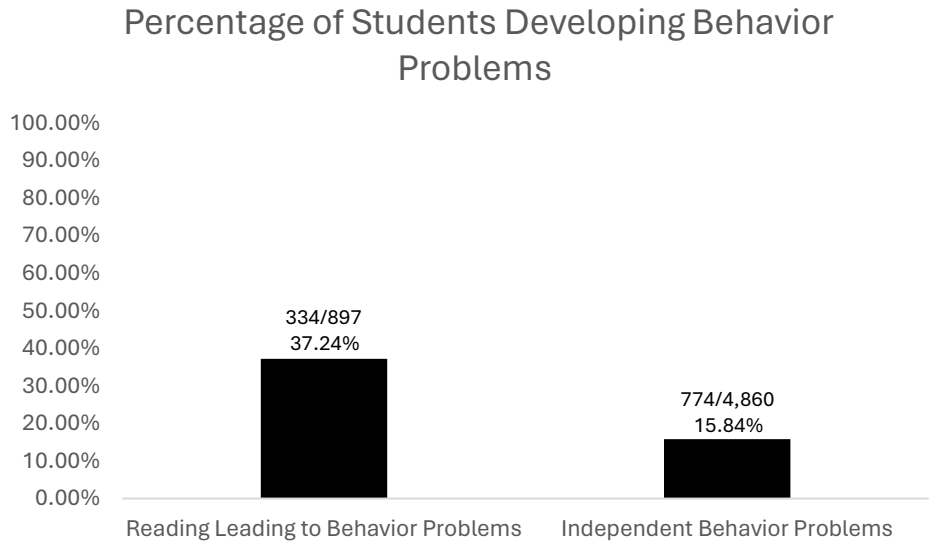


Figure 3. *Study Two: Proportion of Students Developing a Behavior Problem Throughout the School Year.*

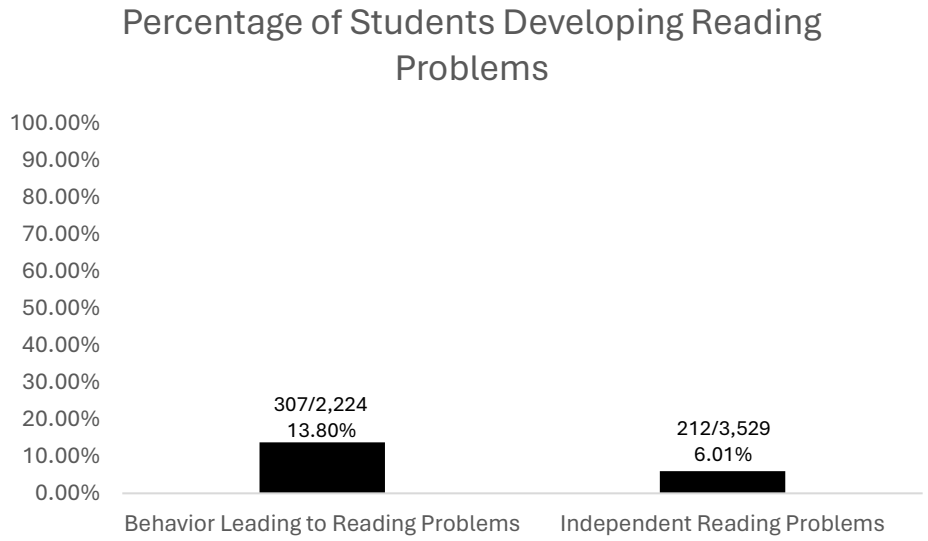


Figure 4. *Study Two: Proportion of Students Developing a Reading Problem Throughout the School Year.*

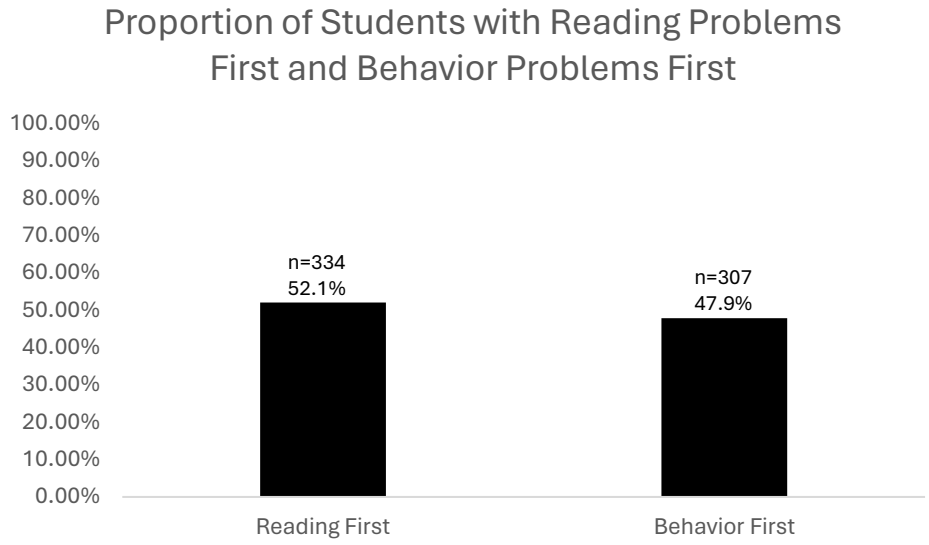


Figure 5. *Study Two: Proportion of Students First Identified with Reading and Behavior Problems*

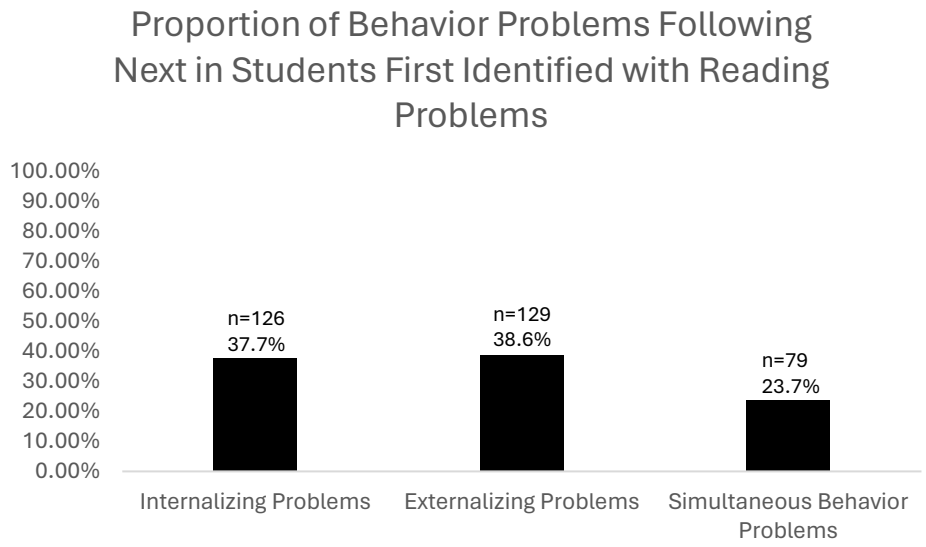


Figure 6. *Study Two: Proportion of Behavior Problems Following the Development of Reading Problems*

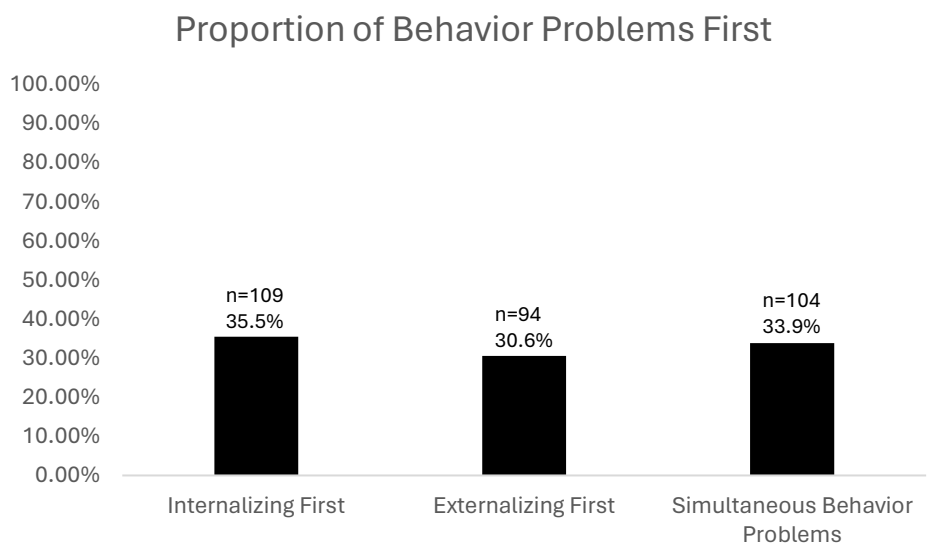


Figure 7. *Study Two: Proportion of Behavior Problems Preceding the Development of Reading Problems*

VITA

Chelsea Nicole Price was born to Michael and Kelly Price in Charleston, West Virginia. She attended West Virginia University in Morgantown, West Virginia, where she graduated in May 2018 with a Bachelor of Science degree in Psychology and a minor in English. In August 2020, Chelsea began the School Psychology doctoral program at the University of Tennessee, Knoxville. Chelsea received her Master of Science degree in Applied Behavior Analysis from the University of Tennessee, Knoxville in December 2022. She will begin her doctoral internship in the summer of 2024 with the Youth Opportunity Center in Muncie, Indiana. Chelsea will complete her doctoral requirements upon the completion of her internship in summer 2025.