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Examining the relation between behavioral risk and reading achievement within a multi-tiered system of supports for middle school students.

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EXAMINING THE RELATION BETWEEN BEHAVIORAL RISK AND READING ACHIEVEMENT WITHIN A MULTI-TIERED SYSTEM OF SUPPORTS FOR MIDDLE SCHOOL STUDENTS

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DEDICATION

This dissertation is dedicated to my wife and children

Ms. DeEtte Decker

Payton, Lily, Henry, and Hannah

who have walked alongside me in this grand adventure.

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ABSTRACT

EXAMINING THE RELATION BETWEEN BEHAVIORAL RISK AND READING ACHIEVEMENT WITHIN A MULTI-TIERED SYSTEM OF SUPPORTS FOR MIDDLE SCHOOL STUDENTS

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May 10, 2024

Academic and behavioral screeners offer a valuable tool to assist schools in supporting students with effective, evidence-based interventions as a part of a multi-tiered system of supports (MTSS). Data from systematic screenings three times a year allow school personnel to respond at the first sign of concern, quickly meet student needs, and determine if some student groups are at greater risk for below grade level academic achievement or behavioral problems than others. This study used archival data to investigate the relation between risk level on the *Student Risk Screening Scale—Internalizing and Externalizing* (SRSS-IE) and the reading *Measure of Academic Progress* (MAP) and to consider moderating effects of sex and beginning of year fall achievement scores. Data included 500 students in a public middle school in suburban Kentucky. Hierarchical multiple linear regression was used for hypothesis testing and results showed fall reading scores account for 72-73% of the variance in spring reading scores, but behavioral risk and sex accounted for 0.0% of variance in spring reading scores. Possible applications in schools, limitations, and future directions are discussed.

Keywords: SRSS-IE, screeners, behavior, reading, multi-tiered system of supports, MTSS, Measure of Academic Progress (MAP)

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Considered broadly, reading outcomes for K-12 students cause concern. Recent data from the National Assessment of Educational Progress (NAEP, 2022) in the United States indicate a decline in 2022 reading scores for fourth and eighth grade students compared to 2019, with 37% of fourth graders and 30% of eighth graders performing below NAEP Basic in reading. Historic nationwide data from the National Center for Education Statistics (NCES) is also concerning, with a 7-point decline for 13-year-olds in reading compared to a decade ago and nearly the same average score in 2023 (256) as in 1971 (255; NAEP, 2023). In response to reading achievement trends, researchers and practitioners have continued to conduct and analyze interventions and instructional approaches for increasing student reading achievement.

Determining if an intervention or instructional strategy is evidence-based is an important area of research. Fien et al. (2021) posited that the field of education has entered an "evidence-based revolution" where enough evidence exists for how to teach students to read, and now schools must work toward scaling up instruction and intervention within a multi-tiered system of supports (MTSS; Fien et al., 2021; McIntosh & Goodman, 2016). Furthermore, the process for determining if a practice is evidence-based has evolved over time. In 2008, the Institute of Education Sciences (IES) and What Works Clearinghouse (WWC) published evidence standards for group design research (i.e., study design, sample attrition, outcome and eligibility reporting, magnitude and statistical significance of study reported estimates of the effectiveness of interventions;

Institute of Education Sciences, 2008; Valentine & Cooper, 2008). Over time IES and WWC have updated and published revised versions of the evidence standards, with the most recent revision occurring in 2022 (Institute of Education Sciences, 2022). The Council for Exceptional Children (CEC) also established quality indicators for categorizing the evidence base of practices in the field of special education specifically (Cook et al., 2014). Indicators considered the number and effects of group comparison and single-subject studies and their methodological quality. In 2005, CEC published a special issue which laid out quality indicators for group design research (Gersten, 2005), single case design (Horner et al., 2005), and qualitative research (Brantlinger et al., 2005). In 2010, WWC proposed standards focused on single-case design (SCD) research and those standards became a regular component of their standards in 2020 (WWC, 2010; WWC, 2020). The Institute of Education Sciences (IES) added *Standards for Excellence in Education Research* (SEER). Recently, Toste and colleagues (2023) proposed an expanded set of quality indicators for group design research including the conceptualization and rationale for a study, participants and sampling, implementation and context, outcome measures, and research design and data analysis. Toste and colleagues also proposed new quality indicators specific to open science practices including preregistration, open results, open materials, and data sharing. Ledford and colleagues (2023) updated recommendations for conducting SCD research and examined the process for identifying evidence-based practices (EBP). Guidance from CEC and WWC, including standards for research such as quality indicators, informs which practices should compose each tier of a school's MTSS. Models of prevention must include evidence-based practices at each tier and for each area of need (i.e., academic,

behavior, social/emotional).

Integrated, comprehensive models of prevention are beginning to take hold in public schools. Multi-tiered models of prevention are typically composed of three tiers, often depicted as a two-dimensional triangle. Tier 1 refers to core instruction for all students, where approximately 80% or more are successful. Tier 2 interventions or supports are provided to approximately 15% of students whose needs are not fully addressed by core instructional practices, and intensive individualized Tier 3 interventions are provided to approximately 5% of students with additional needs (Kettler et al., 2014). Integrated, comprehensive models of prevention lift the two-dimensional model off the page into a three-dimensional shape, where each face of the triangular prism represents one component of interventions (i.e., academic needs, behavioral needs, and social and emotional needs). The goal of MTSS is for educators to respond to the data-determined needs of students with evidence-based interventions to prevent additional delays in academic or behavioral performance.

Models of prevention are particularly important for students with or at risk for emotional and behavioral disorders (EBD). It has been estimated that up to 20% of K-12 students demonstrate externalizing or internalizing behaviors (e.g., aggression, anxiety) that could be classified as mild-to-severe EBD, a much greater number than the less than 1% of students receiving services under the category of emotional disturbance as defined by the Individuals With Disabilities Education Improvement Act (IDEA, 2004; Forness et al., 2012). Outcomes for students with EBD continue to be among the worst when compared with both typically developing children and children eligible for services in other categories of disability (Mitchell et al., 2019; Nelson et al., 2004; Scruggs &

Mastropieri, 1986). Graduation rate, academic achievement, the likelihood of attending postsecondary school, and the likelihood of becoming involved in the criminal justice system are all outcomes impacted by EBD (Kauffman & Landrum, 2017; Kauffman & Landrum, 2009).

Policy and Reforms for Access to Reading Instruction

Over time, laws, reforms, and theories of learning have influenced reading instruction in the United States (Tracey & Morrow, 2017). Whether consciously or unconsciously, theories, lenses, and philosophies such as behaviorism, constructivism, developmental theories, social learning lenses, and cognitive-processing lenses influence teachers and their reading instruction (Tracey & Morrow, 2017). Emphasis on reading instruction did not characterize the early years of serving students with EBD (Knitzer, 1990). Before students with or at risk for EBD could receive effective reading instruction, they had to have access to an appropriate education. Lack of access to an appropriate education led Marian Wright Edelman to open the Children's Defense Fund's *Unclaimed Children: The Failure of Public Responsibility to Children and Adolescents in Need of Mental Health Service* with this statement, "Not only are seriously emotionally disturbed children and adolescents a largely ignored group, but already inadequate state and federal responses to their needs are diminishing in the face of budget constraints" (Knitzer, 1982, p. vii). Many large-scale policy reforms influenced reading instruction by increasing access to education.

Elementary and Secondary Education Act of 1965

President Lyndon B. Johnson passed the first and most extensive piece of federal legislation in education, the Elementary and Secondary Education Act of 1965 (ESEA),

as a part of his “War on Poverty” (Borman, 2000; Yell, 2019). President Johnson stated at the law's signing, "education is the only valid passport from poverty” (Peters & Woolley, n.d.). Included in this act was Title I, which provided financial assistance to local education agencies that served children from low-income families. In 1994, Title I was reauthorized. According to Borman (2000), the goal of Title I was to eradicate the achievement gap between economically disadvantaged children and those with educational and economic advantages. Unfortunately, during the 1960s and 1970s, there needed to be more evidence that Title I achieved its goal at the local level. However, over time it became more effective, and some feel that without the program, many children would have fallen further behind academically (Borman, 2000).

The Education for All Handicapped Children Act of 1975

Funding often limited access to education for students with EBD, and therefore, effective reading instruction. The Education for All Handicapped Children Act of 1975 (EAHCA; P.L. 94-142) provided funding for states with approved plans to educate students with disabilities. In return, the state was obligated to provide students with a free appropriate public education (FAPE; Yell, 1998). Yell (1998) stated, “The EAHCA mandated that qualified students with disabilities had the right to (a) nondiscriminatory testing, evaluation, and placement procedures; (b) be educated in the least restrictive environment; (c) procedural due process, including parent involvement; (d) a free education; and (e) an appropriate education” (p. 225). Before EAHCA, more than 1.75 million students with disabilities did not receive educational services, and more than 3 million students with disabilities were underserved (Yell, 2019; Yell et al., 2004). The EAHCA explicitly included seriously disturbed children and required an individualized

education program (IEP) that explained the specific educational and related services to be provided in the child's least restrictive environment (Knitzer, 1993). The law also outlined due process protections for children and their parents. The evolution of the implementation of EAHCA for students with EBD was characterized by slow progress, however. For example, five years after the law passed, less than one-third of all potentially eligible students received special education under emotional disturbance (Knitzer, 1993). This law was eventually amended and renamed The Individuals with Disabilities Education Act (IDEA) of 1990.

The Individuals with Disabilities Education Act Amendments of 1997

One of the most influential pieces of legislation to impact reading instruction for students with EBD and the field of special education was the Individuals with Disabilities Education Act, amended in 1997 and restructured into four subchapters, with Part B (assistance for education of all children with disabilities) addressing educational requirements for students aged 3 to 21 (Yell, 2019). Language also shifted with this law, from *seriously emotionally disturbed* to *emotionally disturbed* (Kauffman & Landrum, 2006). Core attributes of IDEA that influenced access for students with EBD include the zero-reject principle, a definition of special education as "specially designed instruction, at no charge to the parents or guardians, to meet the unique needs of a child with a disability" (IDEA, 20 U.S.C. § 1404[a][16]), least restrictive environment (LRE), and procedural safeguards. Zero-reject established the right to a free appropriate public education for all students with educational disabilities. In other words, schools were required to provide access to a free appropriate public education (FAPE) for all students, regardless of disability status or category. Central for students with EBD was LRE, which

established the right to receive an education with typically developing same-aged peers to the maximum extent appropriate (IDEA Regulations, 34 C.F.R. § 300.550[b][2]; Yell, 2019). Procedural safeguards outlined the rights of parents of students with disabilities. Shortly after 1997 amendments were made to IDEA, the Reading Excellence Act of 1998 allocated $240,000,000 for staff development in reading based on research with scientifically rigorous standards (Pearson, 2004).

No Child Left Behind Act of 2001

At the turn of the twenty-first century, No Child Left Behind (NCLB) was the next legislation to influence reading instruction. The reauthorization of the ESEA, NCLB included the *Reading First Initiative*, which required all public schools to close the achievement gap in reading and math and for teachers to use effective scientifically based instructional strategies (Yell, 2019). In order to receive grant funding, states had to establish comprehensive reading programs based in scientific research (No Child Left Behind Act, 2001). NCLB increased student achievement expectations and required adequate yearly progress (AYP) toward 100% of students at proficiency (Greer, 2018). Though NCLB increased federal spending on education, it also increased expectations placed on teachers and was critiqued for its emphasis on AYP and high stakes accountability, which potentially narrowed reading instruction to focus on fragmented skills necessary to pass the test (Dewitz & Graves, 2021). Under NCLB, states were permitted to develop their own standards for AYP and test score proficiency levels, or Percentage of Proficient Students (PPS), which may have also led to inconsistent measures of standards across the United States (Ho, 2008; Maleyko & Gawlik, 2011).

Every Student Succeeds Act (ESSA) 2015

In 2015, President Obama reauthorized the ESEA, changing the name from NCLB to the Every Student Succeeds Act (ESSA; Yell, 2019). Five years prior, the U.S. Department of Education issued *The Blueprint for Reform: The Reauthorization of the Elementary and Secondary Education Act* (United States Department of Education, 2010). The goals of the Blueprint included: (1) college and career-ready students; (2) great teachers and leaders in every school; (3) equity and opportunity for all students; (4) raise the bar and reward excellence accomplished through the Race to the Top initiative, public school choice, and increased access to options during high school; and (5) promote innovation and continuous improvement. Though the goals outlined by President Obama were broad, shifts in policies in public education continued to evolve away from the previous policies under President George W. Bush. For example, ESSA no longer required 100% proficiency in reading, though it still required the administration of an annual reading assessment for students in grades three through eight (Darling-Hammond et al., 2016).

Research on Reading and EBD

For a student to be found eligible for special education services under the IDEA category of emotional disturbance (ED), or in the Commonwealth of Kentucky, the category of EBD, the criteria require the consideration of academic deficits related to social-emotional problems (Kentucky Department of Education, 2023). In other words, eligibility criteria suggest a relation between behavior and academic achievement. Researchers have often studied the relation between reading achievement and behavioral needs (Lane, Oakes, & Menzies, 2021; Malecki & Elliott, 2002; Morgan et al., 2008;

Reid et al., 2004; Trout et al., 2003). Nelson (2011) described four hypothetical models of the relation between reading achievement and behavior, including (1) academic deficits lead to behavioral problems, (2) behavioral problems lead to academic deficits, (3) a transactional model, and (4) comorbid variables like ADHD and cognition moderate the relation. According to Trout et al. (2003), students with EBD have high rates of underachievement in reading, with the percentage of students ranging from 31% to 81% and the magnitude of reading deficits ranging from 0.53 grade levels to more than two grade levels behind same-aged peers without disabilities. Additional longitudinal research on the reading deficits of students with EBD found the percentage of students reading below grade level ranged from 54-85%, depending on the student's age (Greenbaum et al., 1996). Anderson et al. (2001) concluded students with learning disabilities demonstrated significant gains in average reading scores from the beginning to the end of elementary school, while students with EBD showed little change. The literature on reading instruction, particularly for students with EBD, is vast and complex. Theories, policies, and research come together to create many great ideas for how to best support the academic needs of students with extensive behavioral deficits. One strategy with extensive strong, positive evidence is Direct Instruction (DI; Forness et al., 1997). Given the considerable research available, it would seem that the most promising path forward may involve a combination of early identification of student needs and the effective implementation of evidence-based practices, such as Direct Instruction. Early identification of academic and behavioral needs and delivery of evidence-based interventions could occur within a model of prevention, such as MTSS.

Beginning in the 1990s, researchers started considering evidence-based

instructional practices to increase achievement for students with EBD (Lane, 2011). With the emphasis on the least restrictive environment and inclusion, many students with EBD started receiving reading instruction within the general education classroom from educators in need of training in effective behavior management strategies (Lane, 2011). A review of the literature on reading instruction and literacy for students with EBD uncovers numerous systematic reviews conducted throughout the last fifty years (Garwood, 2017; Griffith, 2008; McKenna et al., 2019; Rivera et al., 2006; Vaughn et al., 2002). In their systematic review for the period of 1975-2000, Vaughn et al. (2002) identified 16 observational studies conducted during reading with students with learning disabilities (LD) and EBD, with one study primarily focused on students with EBD. In that study, students with EBD in self-contained classrooms spent about 52% of their reading time doing worksheets or workbooks (Olinger, 1987). Overall, the observational studies collected for the review did not contain evidence of effective reading instruction. Rivera et al. (2006) also reviewed the literature on reading instruction interventions for students with EBD and found 11 studies that met criteria. Their review found evidence to support the use of Direct Instruction, peer tutoring, and behaviorally-based procedures such as time delay prompting, trial and error, and differential reinforcement. McKenna et al. (2019) reviewed single-case design studies on reading interventions for students with EBD and located 17 eligible studies that met WWC design standards with or without reservations. They concluded interventions were moderately effective at improving reading performance. Garwood (2017) reviewed 63 articles targeting the reading and/or writing skills of middle and high school students with EBD from 1980 through 2016. Garwood concluded teachers should consider the use of a comprehensive intervention

approach that combines self-regulation strategies, functional behavior assessment procedures, positive reinforcement, and literacy interventions to address the literacy needs of students with EBD. Finally, Griffith et al. (2008) reviewed literacy interventions for adolescents with EBD between 1965 and 2005. They located 17 eligible studies, concluding all interventions studied increased student performance by at least one standard deviation (i.e., all effect sizes were greater than 1.00), but interventions that used practice (ES = 3.00) and direct instruction (ES = 2.90) had the highest effect sizes.

Beyond systematic reviews, researchers have called for the use of effective reading interventions for students with EBD. Mooney (2008) advocated for a proactive, results-driven system of reading interventions for students with EBD that is scientifically based and delivered with fidelity and sufficient dosage. Wehby et al. (2003) called for comprehensive reading instruction. Many researchers have considered the effects of phonological awareness interventions in addition to regular classroom reading instruction (Benner et al., 2010; Lane, 1999; Lane et al., 2001; Nelson et al., 2004; Nelson et al., 2005). In their meta-analysis of studies of reading instruction for students with EBD, Benner et al. (2010) concluded there are too few high-quality studies (n = 6 group studies and n = 18 single-case studies) given the prevalence of reading deficits in students with EBD and called for additional research on literacy for students with EBD. Additionally, in a review of 26 studies, Benner et al. (2002) found, on average, 71% of children with EBD experienced clinically significant language deficits, which was consistent with previous reviews that found high comorbidity rates between antisocial behaviors and language deficits (Baker & Cantwell, 1985; Donahue et al., 1994; Gallagher, 1999). Although the process for referral to special education and access to reading interventions

have changed for students with comorbid reading and behavior challenges over the last 200 years, more work remains, especially in applying and scaling up evidence-based academic interventions for struggling readers (Kettler et al, 2014).

Universal Screeners

Universal academic and behavior screeners are designed to detect students in need of integrated interventions for behavior, including students with EBD, and reading (Kettler et al., 2014; Kettler et al., 2017). Effective, integrated, and systematic use of academic and behavior screeners by local schools requires time, resources, and planning. Screeners differ from formalized assessments or diagnostic testing as they seek to identify potential needs, not confirm the existence of a disability or disorder. As opposed to waiting for students to fail before intervening, universal screening is proactive, preventative, and includes all students (Albers et al., 2007; Dineen et al., 2022; Donohue, 2015; Elliott et al., 2006; Lane, Oakes, & Menzies, 2010). The selection and use of universal screeners should consider their appropriateness, technical adequacy, and usability, as well as psychometric properties (Glover & Albers, 2007; Houri & Miller, 2020). Screening data for K-12 students should be collected frequently enough to make data-informed decisions, typically three times per year in the fall, winter, and spring (Ikeda et al., 2008; Parisi et al., 2014).

Screening results should guide systems-level instructional planning across all tiers of instruction and avoid pitfalls such as collecting but not using screening data systematically and inconsistent use of data-based decisions (Parisi, et al., 2014). Ideally, schools would use screening results to intervene and determine appropriate student supports within a comprehensive MTSS, especially for students with higher than typical

externalizing and internalizing behavior patterns and reading difficulties (Francis et al., 1996; Nelson, 2004; Parisi, et al., 2014). IDEA requires the use of technically sound instruments that may assess the relative contribution of cognitive and behavioral factors when conducting evaluations (IDEA, 2004; Kettler et al., 2017). Even more importantly, upon completing behavior screenings, schools should give attention and focus to students determined at risk for academic and behavioral challenges due to the potential adverse outcomes of waiting to intervene (Lane et al., 2019b).

The use of academic screeners is more prevalent than the use of behavior screeners, despite the well-established bidirectional relationship between academic performance and behavior functioning (Kilgus et al., 2017; Kilgus et al., 2019; Bruhn et al., 2014). Risk level is often placed on a continuum (low, moderate, high; Albers et al., 2007). Dineen et al. (2022) surveyed 1,330 school districts and found the primary way students were identified as having social, emotional, and behavioral needs was through internal referral to a school support team (54.7%), with only 69 districts (5.54%) reporting the use of universal screening and only 40% of secondary schools reported the use of a universal social-emotional program. In a sample of 849 elementary and middle schools, Dowdy et al. (2011) found universal behavior and academic screening identified a higher number of students than teacher nomination, and those identified by universal screening had lower reading grades, which suggests screeners can help identify more students who would benefit from evidence-based interventions.

Previous research on the predictive validity of behavior screeners for academic performance has often confirmed a bidirectional relationship, where academic performance was explained by behavioral risk level. For example, predictive validity

studies determined the *Social, Academic, and Emotional Behavior Risk Screener* (SAEBRS; Kilgus et al., 2014) best predicted academic performance in reading and math for two study samples of elementary school students (Kilgus et al., 2017; Kilgus et al., 2019). Juechter et al. (2012) extended research on the predictive validity of another behavior screener, the *Behavioral and Emotional Screening System* (BESS; Kamphaus & Reynolds, 2007), for a group of elementary students. They found teacher ratings of behavioral risk were predictive of academic achievement, where higher behavioral risk predicted lower reading scores.

Importance of Universal Screening

The implementation of school-wide universal screening procedures across academic, behavioral, and social domains provides educators the data they need to identify students at risk for academic and internalizing and externalizing behavior problems, which is essential given well-established adverse outcomes for students with EBD. Many students with EBD have comorbid reading deficits that carry long-term adverse impacts (Kauffman, 1997; Maughan et al., 1996; Nelson et al., 2004; Vaughn et al., 2002; Webby, 2003). Benner et al. (2002) noted low reading achievement and language deficits are a risk factor for many adverse long-term outcomes such as conduct and social problems, high dropout rates, unemployment, lower academic achievement, increased grade retention, demoralization, psychiatric problems, and greater rates of reading disabilities. The impact of low reading achievement over time on students with EBD cannot be overstated (Nelson et al., 2004).

Other sources of referral for behavioral support, such as teacher referral and number of office disciplinary referrals (ODRs), could lead to underreporting and

subjective reporting of behavioral needs, delayed referral for identification, and a lack of consistency and teacher understanding because of teacher subjectivity and perceptions of need (Del'Homme et al., 1996; Dowdy et al., 2011; Eklund, et al., 2009; Kalberg et al., 2010; Lloyd et al., 1991). Kettler et al. (2012) compared the predictive validity of a less time-intensive universal screener (*Performance Screening Guides*; PSGs; Elliott & Gresham, 2007) with comprehensive behavior ratings (*Social Skills Improvement System*; SSiS; Gresham & Elliott, 2008). They found screeners work well for determining which students need early, inexpensive, non-restrictive interventions.

Some researchers have considered whether students with EBD are more resistant to generally effective academic interventions compared to other disability groups (Al Otaiba & Fuchs, 2002; Mooney, 2008). Reid et al. (2004) conducted a meta-analysis on the academic performance of students with EBD compared to same-age, nondisabled peers or norm groups. They found 101 total effect sizes within 25 studies. Out of the 101 effect sizes, 90 were negative, meaning students with EBD performed lower than non-disabled peers in 89% of comparisons. Similarly, an analysis of data by Trout et al. (2003) found 91% of eligible studies reported the academic status of students with EBD as deficient or below same-aged peers. Educators must consider how to best remediate the academic and behavioral deficits of students with EBD, especially whether students need integrated evidence-based interventions.

Reading Screeners

January and Klingbeil (2020) conducted a systematic review and meta-analysis of curriculum-based measures (CBM), or short standardized measures of progress in the curriculum, used for universal screening in grades K-2. Most of the studies they reviewed

used the *Dynamic Indicators of Basic Early Literacy Skills* (DIBELS; University of Oregon, 2018-2019). Other reading CBMs included easyCBM (Alonzo et al., 2006), Formative Assessment System for Teachers (FAST; Christ et al., 2014), and AIMSweb (NCS Pearson, Inc., 2017). Edwards et al. (2022) explained the importance of using screeners with established reliability, noting the correlation between a screener and an outcome needs to be greater than .9. Additional reading screeners include: *Shaywitz Dyslexia Screen* (SDS; Shaywitz, 2021); *Acadience Reading Survey* (Acadience Learning, Inc., 2018); *Get Ready to Read!* (GRTR; National Center for Learning Disabilities, 2023); the *Application for Readiness in Schools and Learning Evaluation* (AppRISE; Haskins Global Literacy Hub, n.d.); the *Brief Academic Competence Evaluation Scales System* (BACESS; Elliott et al., 2007); and the *Measure of Academic Progress* (MAP; NWEA, 2019). While many universal reading screening options are available, the academic screener currently used by many Kentucky school districts is the MAP (see subsequent section for detailed description).

Behavior Screeners

Behavior screeners can identify students in need of intervention or referral for additional behavior support within or outside the school setting to prevent adverse behavioral outcomes (Severson et al., 2007). Many options exist for behavior screening, including: (1) *Systematic Screening for Behavior Disorders* (SSBD; Walker & Severson, 1992; Walker et al., 2004; Walker, Severson, & Feil, 2014); (2) *Student Risk Screening Scale* (SRSS; Drummond, 1994); (3) *Student Risk Screening Scale—Internalizing Externalizing* (SRSS-IE; Lane & Menzies, 2009); (4) *Behavior Assessment System for Children 3rd Edition: Behavioral & Emotional Screening System* (BASC-3: BESS;

Kamphaus & Reynolds, 2015); (5) *Strengths and Difficulties Questionnaire* (SDQ; Goodman, 1997); (6) Social Skills Improvement System—Performance Screening Guide (SSiS-PSG; Elliott & Gresham, 2008); (7) *Social, Academic, and Emotional Behavior Risk Screener* (SAEBRS; Kilgus, et al., 2013). The use of behavior screeners in Kentucky is an emerging practice, with some districts utilizing the SRSS-IE (see subsequent section for detailed description).

The SSBD, recently updated in 2014, is now published and sold by Ancora Publishing (2024) in both print and online versions. The full SSBD portfolio costs $243.00, which includes the Administrator's Guide and a CD Technical Manual, 10 Classroom Screening Packets Grades 1-9, and 2 Classroom Screening Packets Prek-K. Additional classroom screening packets can be purchased for $11.00 each. The new edition of the SSBD is a part of SIMS (Screening, Identification, and Monitoring System) and is comprised of two screening stages: Stage 1 (Nominating and Rank Ordering Students) and Stage 2 (Critical Events Index and Combined Frequency Index for Adaptive and Maladaptive Behavior). The SSBD uses a multiple-gating approach based on teachers' judgments of student behavior, externalizing and internalizing (Ancora Publishing, 2024).

The SRSS (Drummond, 1994) is a free one-page screener composed of seven items (steals; lies, cheats; sneaks; negative attitude; low academic achievement; peer rejections; behavior problems, and aggressive behavior) and is used by teachers to identify students at risk for antisocial behavior, typically three times per year (i.e., fall, winter, spring). Lane et al. (2007; 2008) found the SRSS demonstrated internal consistency, test-retest stability, short-term predictive validity, and convergent validity

with the Strengths and Difficulties Questionnaire for middle and high school students (SDQ; Goodman, 1997).

The BASC-3 BESS is published by Pearson Assessments and prices vary. According to the Pearson Assessments website, the BASC-3 BESS Q-global Starter Kit includes the BASC-3 BESS manual and ten Q-global BESS screeners for $95.60 (Pearson Assessments, 2024). Teachers and parents can complete the BASC-3 BESS in 5-10 minutes, either online or on paper, for individuals ages 3 years 0 months to 18 years and 11 months, or students ages 8 years 0 months through 18 years 0 months can complete a self-reported version. Results are reported via T scores with corresponding percentiles for the general population.

The SDQ (Goodman, 1997) is a brief behavior screener composed of 25 items for individuals ages 2-17. Items are divided into five scales, with five items per scale: (1) emotional symptoms; (2) conduct problems; (3) hyperactivity/inattention; (4) prosocial behavior. The first twenty items are added together to generate a total difficulties score.

The SSiS-PSG (Elliott & Gresham, 2008) is also published by Pearson Assessments (2024) and can be purchased for $70.40 for a set of ten at the secondary level. The SSiS-PSG is designed to be used by teachers together with the SSIS Classwide Intervention Program and is composed of four areas: (1) prosocial behaviors; (2) motivation to learn; (3) reading skills; and (4) math skills.

The SAEBRS, sold by Illuminate Education (2024), is for use by teachers in K-12 settings online. SAEBRS is composed of 19 total items within three subscales: (1) social behavior; (2) academic behavior; and (3) emotional behavior. Unlike other universal behavior screeners, SAEBRS considers the presence of well-being and competencies

such as social-emotional skills and the absence of problem behaviors and symptomatology. It also includes a student self-assessment for grades 2-12.

Measure of Academic Progress (MAP)

MAP® Growth™ is a universal screener for grades K-12, developed by the Northwest Evaluation Association (NWEA), often used to monitor student growth and mastery of skills and progress toward state proficiency standards, typically three times a year (in the fall, winter, and spring). Research on the MAP has occurred with varied results (Ball & O'Connor, 2016; Cordray et al., 2012; Klingbeil et al., 2015; Merino & Ohmstede-Beckman, 2010; Thomas & January, 2021). Thomas and January (2021) considered whether scores on the reading MAP predicted proficiency on the state reading assessment and found the MAP provided insufficient classification accuracy, having not identified many students who later failed the state assessment. Ball and O'Connor (2016) also considered the predictive validity of the MAP and determined that spring MAP RIT scores for second grade students predicted performance on the state-wide achievement test in the fall of third grade. The National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, through a contract with Learning Point Associates, an affiliate of the American Institutes for Research, conducted research on the impact of the MAP program on fourth and fifth grade student reading achievement on the state reading assessment (Cordray et al., 2012). They did not find a statistically significant impact on students' reading achievement. Klingbeil et al. (2015) also studied the predictive validity of the reading MAP when combined with additional reading screeners and found that the use of multiple screening measures predicted future academic performance. Merino and Ohmstede Beckman (2010) analyzed archival data of

a sample of elementary school students and determined MAP reading scores could be predicted by the combination of CBMs for oral reading fluency and comprehension. Rambo-Hernandez et al. (2022) analyzed MAP achievement data for a large database of approximately 220,000 elementary students. They found students grew at differing rates in reading, with a nuanced relationship between academic growth, initial achievement, and discipline.

Student Risk Screening Scale—Internalizing Externalizing (SRSS-IE)

One extensively researched behavior screener with predictive validity for academic outcomes is the *Student Risk Screening Scale – Internalizing and Externalizing* (SRSS-IE; Lane & Menzies, 2009). Research provides evidence suggesting SRSS-IE scores are reliable and valid for use in elementary and secondary schools and suggests moderate- and high-risk group mean scores are predictive of GPA and course failures (Lane et al., 2017; Lane et al., 2018; Lane et al., 2019a; Lane et al., 2019b). Lane and colleagues investigated the reliability and validity of the SRSS-IE for use with middle school students using classical test theory including item-level data, internal consistency estimates, and factor structure (Lane et al., 2017). Their study used Cronbach's alpha to determine internal consistency of items on the measure and obtained scores above established alpha criterion of .80 (Nunnally & Bernstein, 1994). For the SRSS-E7, the externalizing subscale, they obtained an alpha coefficient of .84 and for the SRSS-I7 they obtained an alpha coefficient of .80. Previous researchers have considered the co-occurrence of behavioral and reading deficits and the predictive validity of the SRSS-IE on academic achievement (Lane et al., 2019a; Lane et al., 2019b; Morgan et al., 2008; Trout et al., 2003). For example, research suggests secondary-aged students at low risk on

the SRSS-IE have higher GPAs than students at moderate- or high-risk (Lane et al., 2008; Lane et al., 2013; Lane et al., 2019b).

The SRSS-IE is a revision and expansion of the SRSS. Initial research on the SRSS-IE was conducted by Lane and colleagues in 2012 and 2013. An initial exploratory on the SRSS-IE study was conducted in 2012 with kindergarten through sixth grade students (Lane et al., 2012c). For this study, researchers used classical test theory (CTT; Cronbach & Shavelson, 2004) and exploratory factor analyses for new items on the measure. New items included: (8) emotionally flat, (9) shy; withdrawn, (10) sad; depressed, (11) anxious, (12) obsessive-compulsive behavior, (13) lonely, (14) self-inflicts pain. Researchers removed two of the items, obsessive-compulsive behavior and self-inflicts pain, resulting in a slightly higher alpha-coefficient for internalizing subscales (SRSS-I7 = .71; SRSS-I5 = .72). An additional study mirroring the initial validation study was conducted in 2012 in both rural and urban settings (Lane et al., 2012b). Again, researchers found that items for obsessive-compulsive behavior and self-inflicts pain were not supported by empirical and theoretical criteria. In 2013, the same team of researchers expanded their inquiry into middle school aged students using the same data analytic plan as before with elementary aged students. This study found similar results supporting the elimination of two items, obsessive-compulsive behavior and self-inflicts pain. In 2017, Lane and colleagues conducted an exploratory validation study with middle and high school students, resulting in the SRSS-IE12, a combination of the original SRSS-E7 tool developed by Drummond and the SRSS-I6 (Lane et al., 2017).

A different team of researchers also considered the psychometric properties of the SRSS-IE using a nominal response model (Moulton et al., 2019). They considered the

four response options of the SRSS-IE, including the extent to which response options discriminated among students with varying degrees of externalizing and internalizing behavior and whether any response options should be revised or deleted. Their study sample was comprised of middle school students. Moulton and colleagues concluded that SRSS-IE category response options may benefit from possible deletion or combination of category options (e.g., two response options for does and does not manifest the behavior). They also determined the 12 items showed overlapping category response curves (CRCs), which they connected to the increased likelihood of raters endorsing adjacent category response options. Moulton and Young (2020) found evidence suggesting five items on the SRSS-IE function differently for middle school-aged males and females, which may indicate the influence of gender stereotypes, and concluded that current cut scores on the instrument may lead to over-classifying males as at higher risk thank females.

Gregory et al. (2021), for a sample of n = 1,201 elementary students, found externalizing scores (SRSS-E7) predicted year-end office disciplinary referrals (ODRs). Gregory et al. (2021) replicated previous research by Lane et al. (2018) on the predictive validity of SRSS-IE scores for elementary school students. Results of their study found statistically significant correlations between total year-end office disciplinary referrals (ODRs) and SRSS-IE externalizing and internalizing subscale scores. They also found statistically significant group differences in total ODRs using a series of random-effects negative binomial (NB) regressions and calculated effect sizes using Hedges's g. For the externalizing subscale, post hoc comparisons showed students in the low-risk category received significantly fewer year-end ODRs than students in the moderate-risk and high-risk groups and students in the moderate-risk group had significantly fewer year-end

ODRs than students in the high-risk group. Non-significant results were found for internalizing subscale scores.

Statement of the Problem

Many K-12 public schools are embracing tiered models of prevention and early intervention, some of which integrate academic, behavioral, and social and emotional needs (Baker et al., 2010; MTSS-R, Fien et al., 2021; Greenwood et al., 2008; Kilgus et al., 2019; Ci3T, Lane et al., 2014; I-MTSS, McIntosh & Goodman, 2016). Other models of prevention and intervention focus on one component of student need (Kamphaus et al., 2014; von der Embse et al., 2016). For example, Fien et al. (2021) proposed MTSS-R, a comprehensive, schoolwide approach to reading instruction based on the Science of Reading (SOR) but noted limited existing research on this new model. Horner and Sugai (2015) propose a school-wide Positive Behavioral Interventions and Supports (PBIS) framework to address behavioral needs at increasing levels of intensity. Berkeley et al. (2020) conducted a systematic review of all 50 state education agency websites on Response to Intervention (RTI) and discovered while progress has occurred in the adoption of systematic supports, especially MTSS models, many states still focused solely on academics.

Ideally, the effective systematic use of universal academic and behavior screeners would lead to the implementation of interventions within a comprehensive multi-tiered system of supports (MTSS) framework, especially for students with higher than typical externalizing and internalizing behavior patterns (Nelson, 2004). Upon completing academic and behavior screenings, schools should give attention and focus to students determined at risk for challenges in order to prevent potential adverse outcomes (Lane et

al., 2019b). Additionally, educators looking to provide early interventions prior to failure may benefit from knowledge of what additional student factors (e.g., student demographics, eligibility statuses) may or may not impact academic achievement and behavioral risk.

The Kentucky Department of Education (KDE) has provided resources and support for the implementation of MTSS within school districts, expanding their previous use of RTI to a more comprehensive approach that includes academic, social-emotional, and behavioral competencies. The name of this model is Kentucky Multi-Tiered System of Supports (KyMTSS). A website with tools and resources outlines KyMTSS and how it aligns with the work of KDE and its Strategic Plan (Kentucky Department of Education, 2023b). The KyMTSS website also provides a crosswalk document that clarifies how RTI, PBIS, and Interconnected Systems Framework (ISF) integrate to form KyMTSS (Kentucky Department of Education, 2023a).

Additional research is needed on moderating variables such as sex, disability status, and English language learner status. When teacher nomination is utilized over a universal screener, student sex (i.e., male, female, non-binary, etc.) may influence who receives interventions for behavior (Margherio, 2019; Novak et al., 2020). Using a universal screener within an integrated model of prevention could help reduce bias that may otherwise occur from a system that relies on teacher nomination for intervention and support (Kauffman et al., 2010; Young et al., 2010). In one study of the construct validity of the SRSS, the SRSS functioned similarly across males and females when assessing externalizing behavior in elementary school students (Drummond, 1994; Fredrick et al., 2019). In their report to congressional reporters, Nowicki (2018) noted disparities in

school discipline for Black students, males, and students with disabilities. More specifically, students with disabilities accounted for nearly 25 percent of students referred to law enforcement, arrested for a school-related incident, or suspended from school. However, they represent only 12 percent of all public-school students. Interactions between these moderating variables (i.e., sex, disability status) were also reported by Nowicki, with males with disabilities receiving a disproportionately higher number of school suspensions. Overall, Nowicki noted males were overrepresented in students disciplined, accounting for at least two-thirds of students disciplined but representing just over half of the population of all public-school students.

In Kentucky, leaders in the Department of Education have provided a set of resources for schools toward the goal of implementing KyMTSS, which aligns with the state's strategic plan. KyMTSS is comprised of six components, including (1) equitable access and opportunity; (2) tiered delivery system with a continuum of supports; (3) collaborative problem-solving teams; (4) data-based decision-making with comprehensive screening and assessment; (5) evidence-based instruction, intervention, and supports; and (6) family, school, and community partnerships (Kentucky Department of Education, 2023). To that end, many schools in Kentucky utilize the NWEA's MAP to screen for academics in the fall, winter, and spring, and a behavior screener currently used in Kentucky is the SRSS-IE (Lane & Menzies, 2009). Educators can screen students in 15 min using the SRSS-IE to determine their low-, moderate-, or high-risk status on internalizing and externalizing subscales. Previous researchers have considered the co-occurrence of behavioral and reading deficits and the predictive validity of measures such as the SRSS-IE on academic achievement (Lane et al., 2019a; Lane et al., 2019b; Morgan

et al., 2008; Trout et al., 2003). Lane and colleagues found secondary-aged students at low risk on the SRSS-IE have higher GPAs than students at moderate- or high-risk (Lane et al., 2008; Lane et al., 2013; Lane et al., 2019b).

The integrated use of universal screeners for academics and behavior is an emerging practice in need of additional research. Results of academic and behavior screeners must lead to appropriate evidence-based interventions for students determined at risk academically or behaviorally to prevent future adverse outcomes. Current research has considered the psychometric properties of the SRSS-IE and its predictive validity for ODRs, course failures, and GPA, however, additional research is needed to determine the moderating effects of variables such as gender and beginning reading achievement level.

Purpose

The purpose of this study was to analyze archival data for middle school students from one Kentucky school on district-wide screeners for reading and behavior. In addition to descriptive analyses, this study investigated if MAP reading scores were predicted by externalizing or internalizing behavioral risk on the SRSS-IE, and what were the effects of moderating variables such as sex, disability status, or EL status. Specific research questions (RQ) were:

RQ1: What are the general characteristics of the study sample in terms of demographics, MAP reading, and SRSS-IE data at each time point and compared over time?

1a: What changes occurred in average student reading performance on the MAP within a given academic year?

1b: What percentage of students were in each category of risk for externalizing and internalizing behaviors at each time point?

1c: What is the average reading score for students in low-, moderate-, and high-risk categories of internalizing and externalizing behavior in fall and in spring?

RQ2: How much variance in spring MAP reading scores is explained by externalizing or internalizing behavioral risk, accounting for student sex and fall MAP reading scores?

2a: Does sex or beginning of year achievement status moderate the relation between internalizing or externalizing risk and reading achievement?

CHAPTER 2: METHOD

An analysis of district academic and behavior screeners, as well as moderating variables, may show trends and patterns worthy of researcher and school stakeholders' attention. This study utilized archival data from a school-wide academic achievement and behavior screener at two different time points (e.g., fall, spring) during the 2021-2022 school year for the same population of middle school students.

Participants and Setting

Data were based on a sample of 500 students in grades 6-8, ages 11 to 15, at one middle school in a suburban school district in the Commonwealth of Kentucky for the school years 2021-2022 and 2022-2023. Annual approximate enrollment at the school was *n* = 545 for the 2021-2022 school year and *n* = 552 for the 2022-2023 school year. Table 1 provides details on study sample.

Table 1

Student Characteristics

Variable	2021-2022 *n* = 241	2022-2023 *n* = 259
Sex % (*n*)		
Male	48.5 (117)	47.9 (124)
Female	51.5 (124)	52.1 (135)
Grade % (*n*)		
Sixth	38.2 (92)	44.4 (115)
Seventh	37.8 (91)	27.4 (71)
Eighth	24.1 (58)	28.2 (73)
Age % (*n*)		
10	1.6 (4)	1.5 (4)
11	34.0 (82)	39.0 (101)
12	35.7 (86)	30.5 (79)

13	25.7 (62)	27.0 (70)
14	2.5 (6)	1.9 (5)
15	0.4 (1)	0 (0)
M (*SD*)	11.9 (0.9)	11.9 (0.9)
Ethnicity % (*n*)		
Hispanic	12.4 (30)	15.4 (40)
Not Hispanic	87.6 (211)	84.6 (219)
Race % (*n*)		
Hispanic	12.4 (30)	15.4 (40)
White	75.9 (183)	72.2 (187)
Black	4.6 (11)	6.6 (17)
Asian/Pacific Islander	0.4 (1)	0.8 (2)
Mixed Races	6.6 (16)	5.0 (13)
Special education % (*n*)		
Eligible/receiving services	7.5 (18)	9.7 (25)
Not eligible/no services	90.9 (219)	90.3 (234)
Not reported	1.7 (4)	0 (0)
English language learner % (*n*)		
Eligible/receiving services	1.2 (3)	11.2 (29)
Not eligible/no services	98.8 (238)	88.8 (230)
Economically disadvantaged[a]%	52.8	45.5

Note. Data are reported for ethnicity (i.e., Hispanic) and race for students. All data came from student records provided by the school.

[a]State school report card data 2021-2022 and 2022-2023 (State Department of Education 2022; 2023).

School and District Characteristics

The school was in a suburban location of a Southern state, in a school district with approximately 6,665 students for the 2021-2022 school year and 6,775 students for the 2022-2023 school year enrolled in grades preschool through twelve. School report card data showed between 52.8% (2021-2022) and 45.5% (2022-2023) of students were considered economically disadvantaged (State Department of Education, 2022; 2023). The school district's student race and ethnicity demographics noted 62% of students were White, 24.3% Hispanic or Latino, 6.4% African American, and 7.3% other for the 2021-

2022 school year. For the school year 2021-2022, the percent of students earning a proficient or distinguished rating on annual state testing in reading for the district at the middle school level was 39%, with a difference between males (33%), females (45%), students with disabilities (12%), and students with English learner monitored (8%; State Department of Education, 2022). The school returned to a typical daily schedule for the 2021-2022 school year after approximately 18 months of the COVID-19 pandemic, which had led to alternative schedules, extensive health precautions, and other preventative measures. The 2021-2022 school year was the first year where educators and students attempted to return to pre-COVID norms for instruction and routines.

Procedures

During the summer of 2023, district leaders for a local school district were approached about extending previous research on the use of behavior and academic screeners in their district. A description of the possible extension was provided to the assistant superintendent via email, and a follow-up conversation occurred over the phone. Upon receiving approval from the university Institutional Review Board (IRB) and school district assistant superintendent, coded data were obtained through a records request from school district personnel.

University and District Approvals

Approval for the study was obtained through the university's Institutional Review Board prior to beginning. An amendment to the originally approved study was made to extend the study an additional year, include additional researchers, and add research questions. District approval was obtained for the original and extended analysis through the Assistant Superintendent prior to beginning the study.

Data Entry and Reliability

Coded data were obtained through a records request from school district personnel at which time each participant was given a unique researcher-assigned identification number. School district staff, which at the time included the primary investigator, provided access to one Google Sheet of data for the SRSS-IE for fall and a second Google Sheet for spring, with individual teacher Google Sheets combined prior to transfer into a researcher created database. Coded data were taken from the Google Sheets version and converted to a MS-Excel database. All data were checked for outliers and data out of range. Graduate research assistants checked for reliability of data (99.46% accuracy for 2021-2022; 99.60% accuracy for 2022-2023). Demographic and MAP data provided by the school district were also transferred to researcher created databases. Each database was cleaned and prepared for SPSS import using a checklist (i.e., formatting cells, checking variable names). Databases were merged in SPSS by researcher-assigned ID number.

Measures

Demographics

Demographic data came from school records. Student demographic variables included sex, age, race/ethnicity, special education eligibility status, English language learner (ELL) eligibility status, and grade. Demographic data for sex, age, and race/ethnicity were self-reported by parents/guardians during the enrollment process. The school reported eligibility for special education services and ELL services. No demographic data were provided for teachers who administered screeners.

SRSS-IE

The SRSS-IE (Lane & Menzies, 2009), a universal behavior screener, is designed to detect internalizing and externalizing behavior patterns for elementary, middle, and high school students. SRSS-IE scores have shown good evidence of reliability and validity for use in elementary and secondary schools and suggest moderate- and high-risk group mean scores are predictive of GPA and course failures (Lane et al., 2017; Lane et al., 2018; Lane et al., 2019a; Lane et al., 2019b). The SRSS-IE consists of seven externalizing items (SRSS-E7; the original SRSS items by Drummond, 1994): (1) steal; (2) lie, cheat, sneak; (3) behavior problems; (4) peer rejection; (5) low academic achievement; (6) negative attitude; (7) aggressive behavior; and for middle and high schools, six internalizing items (SRSS-I6): (4) peer rejection; (8) emotionally flat; (9) shy, withdrawn; (10) sad, depressed; (11) anxious; (12) lonely; with peer rejection uniquely loading onto both externalizing and internalizing constructs at the middle and high school level (Lane et al., 2016). Teachers rate each student in their class using a 4-Point Likert-type scale (*never* = 0, *occasionally* = 1, *sometimes* = 2, *frequently* = 3). Higher scores indicate higher risk, with subscale scores placing students into one of three risk categories: low, moderate, and high for externalizing (SRSS-E7) and internalizing (SRSS-I6). Scores have a range for each subscale, 0 to 21 on the externalizing subscale and 0 to 18 on the internalizing subscale. Risk level cut scores for the externalizing subscale are: 0-3 low risk, 4-8 moderate risk, 9-21 high risk. Risk level cut scores for the internalizing subscale are: 0-3 low risk, 4-6 moderate risk, 7-18 high risk (Lane et al., 2019b).

MAP

MAP® Growth™ is a universal screener for grades K-12, developed by the Northwest Evaluation Association (NWEA), often used to monitor student growth and mastery of skills and progress toward state proficiency standards, typically three times a year (fall, winter, and spring). Classroom teachers typically administer the MAP and takes between 30 to 90 minutes (Kingbeil et al., 2015). The NWEA (2005; 2016) has conducted internal research to align MAP RIT scale scores to proficiency levels on standardized state assessments for all 50 states and the District of Columbia. The MAP Growth assessment measures achievement and growth in reading, with scores reported on a continuous interval scale called the Rasch (RIT) unit scale score, with a mean of 200, a standard deviation of 10, and possible scores ranging from 100 to 350 (NWEA, 2020). RIT scores measure levels in academic difficulty and extend equally across grade levels. The MAP is a computer adaptive assessment based on a one-parameter Item Response Theory Model and places students on a continuum of learning. The MAP reading assessment has consistently high marginal reliability estimates (above .95) and good validity evidence (Cordray et al., 2012; He & Meyer, 2021; NWEA, 2019; Rambo-Hernandez et al., 2022). The NWEA (2020) also conducted internal research on the MAP to determine grade level school growth norms for MAP RIT score for grades K-12. Expected growth for students in primary grades (K-2) ranges from 13.22-16.45, for students in intermediate grades (3-5) ranges from 6.50-10.50, and for students in middle school (grades 6-8) ranges from 3.65-5.19.

The NWEA reported normative data for 2020 and noted drops in average reading achievement were consistent with NAEP data for fourth and eighth grades. According to

their report, fourth grade students score an average of 196.67 in the fall and an average of 204.83 in the spring. Similarly, eighth grade students score an average of 218.01 in the fall and 221.66 in the spring. Growth norms for fourth grade students indicate students are expected to increase, on average, by 8.16 points from fall to spring (*SD* = 7.53). Eighth grade students are expected to increase, on average, by 3.65 points from fall to spring (*SD* = 7.46; NWEA, 2020).

Design and Analytic Plan

The study utilized data from a school academic achievement screener (MAP test for reading) and school behavior screener (SRSS-IE) at different time points for the same population of students using a one group pre- post- design. Data were analyzed following the data analytic plan below.

Data Screening

Student characteristic, SRSS-IE, and reading MAP RIT data were checked for quality, including missing values, outliers, and data distribution. Student characteristic, SRSS-IE, and reading MAP RIT data were cleaned, recoded, and transformed, including handling missing values and outliers if necessary. SRSS-IE data were not expected to demonstrate a normal distribution, as most students screen at a low-risk, which is the desired outcome (Lane et al., 2012). Reading MAP RIT variables were graphed on a histogram and a visual analysis used to determine if they were normally distributed (Figures 1-4). I used SPSS software, which gave values of zero for a normal distribution (Field, 2018). Reading MAP RIT data were also analyzed for skewness and kurtosis using the Shapiro-Wilk test, to determine if the test resulted in non-significant findings ($p > 0.05$), which would indicate the distribution of the sample was not significantly

different from a normal distribution or if the test was significant ($p < 0.05$) and the distribution was significantly different from a normal distribution (Table 2). According to the Shapiro-Wilk test, reading MAP RIT data were not normally distributed, with negative values for skewness for the school year 2021-2022 (fall 2021 = -.686; spring 2022 = -.684), and also negative for the school year 2022-2023 (fall 2022 = -.576; spring 2023 = -.565), which indicated a pile-up of scores on the right of the distribution. I converted the values to a test of whether they were significantly different from 0 using *z*-scores, which is a score that represents the distance of a score from the mean of its distribution standardized by dividing by an estimate of how much the scores varied (the standard deviation; *SD*) using the following formulas:

$$^{z}\text{skewness} = \frac{S-0}{SE_{skewness}}$$

$$^{z}\text{kurtosis} = \frac{K-0}{SE_{kurtosis}}$$

For fall 2021, the *z*-score for skewness was -4.37 and for spring 2022, the *z*-score for skewness was -4.36. For fall 2022, the *z*-score for skewness was -3.71, and for spring 2023 it was -3.69. Kurtosis was calculated similarly, with *z*-scores of 0.34 for fall 2021, 1.16 for spring 2022, 0.78 for fall 2022, and 0.55 for spring 2023. Assuming the middle 95% of *z*-scores fall between -1.96 and 1.96, and scores outside of this range are statistically significant ($p < 0.05$), all converted skewness scores resulted in statistically significant z-scores for all timepoints, whereas converted kurtosis scores were not statistically significant. Skewness and kurtosis were interpreted with caution due to the large sample size (Field, 2018). Since results of the Shapiro-Wilk test indicated the reading MAP RIT data were not normal, I continued my analysis of normality through a visual analysis of scatterplots to consider the relation between variables and to check for

linearity and normality (Appendices 1-4). Descriptive statistics were calculated for all variables in the analysis, including means, standard deviations, and correlations (Tables 2-4). Correlations between student characteristics, reading MAP RIT, and SRSS-IE variables were calculated using both SRSS-IE raw scores on a continuous scale and SRSS-IE scores transformed risk level categories (0 = low risk; 1 = moderate risk; 2 = high risk; see Tables 4-5).

Distributional properties of the variables were examined to ensure they met the assumptions of regression analysis. For student reading achievement data (MAP RIT scores for both years; 2021-2022 and 2022-2023), assumptions met prior to analysis included normal distribution, linear relation between variables, and an analysis and accounting for outliers. A visual analysis of scatterplots and Q-Q plots met the assumption that the pattern of the relation was linear between variables. The assumption of normality and lack of outliers were met through an analysis histograms of reading MAP RIT data where scores were spread across the distribution (Figures 1-4).

Objective

The research objective was to analyze data to determine frequencies and variation of academic and behavior screeners for one sample of middle school students in Kentucky as well as to consider the relation between student demographics, academic scores on the MAP reading, and behavior risk scores on the SRSS-IE.

Question 1. What are the general characteristics of the study sample in terms of demographics, MAP reading, and SRSS-IE data at each time point and compared over time?

1a: What changes occurred in average student reading performance on the MAP

within a given academic year?

1b: What percentage of students were in each category of risk for externalizing and internalizing behaviors at each time point?

1c: What is the average reading score for students in low-, moderate-, and high-risk categories of internalizing and externalizing behavior in fall and in spring?

Hypotheses 1a. Student scores will increase from fall to spring and match expected reading growth averages (NWEA, 2020).

Hypotheses 1b. Less than 20% of student scores on the SRSS-IE subscales will fall in the moderate or high risk ranges at each timepoint (Lane et al., 2013; Lane et al., 2017; Lane et al., 2019a; Lane et al., 2019b).

Hypotheses 1c. The vast majority of student scores (> 75%) on the SRSS-IE subscales will occur in the low-risk category at all time points (Lane et al., 2013; Lane et al., 2017; Lane et al., 2019a; Lane et al., 2019b).

Hypothesis 1d. Students with low risk levels of internalizing and externalizing behavior will demonstrate higher reading performance than students with moderate or high behavior risk (Lane et al., 2013; Lane et al., 2017; Lane et al., 2019a; Lane et al., 2019b).

Data analytic plan. Descriptive statistics were used to analyze means and standard deviations for each group (e.g., low, moderate, high risk on both subscales of the SRSS-IE, RIT scores on the MAP, sex, eligibility for special education status, eligibility for ELL services status; Tables 2-4) to understand characteristics of the study sample. Data for MAP RIT scores and SRSS-IE subscales were graphed to show mean scores at each timepoint (e.g., fall, spring; see Figures 1-6).

Question 2. Does externalizing or internalizing behavioral risk explain variance in spring MAP reading scores above and beyond sex and fall MAP reading scores?

2a: Does sex or beginning of year achievement status moderate the relation between internalizing or externalizing risk and reading achievement?

Hypothesis 2.1. A small negative relation accounting for 10% of variance exists between moderate and high externalizing and internalizing behavioral risk and spring MAP reading scores (Gregory et al., 2021; Lane et al., 2019a; Lane et al., 2019b; Lane et al, 2021).

Hypothesis 2a.1. A small negative relation exists for males between moderate and high externalizing and internalizing behavioral risk and spring MAP reading scores (Kauffman et al., 2010; Moulton & Young, 2020; Nowicki, 2018; Young et al., 2010).

Data analytic plan. Data were analyzed using hierarchical multiple regression. A hierarchical multiple regression model of analysis was appropriate, as one purpose of the study was to predict reading outcomes for middle school students in relation to risk level on a universal behavior screener and to consider the amount of variance accounted for by sex and fall achievement scores on the MAP. The hierarchical order of entry of variables was developed upon review of literature suggesting sex status was related to identification for externalizing behavioral risk and variables that did not account for a significant portion of variance were deleted from the equation and the equation was recalculated (Osborne, 2000). Hierarchical regression was more appropriate than an analysis of variance (ANOVA) for the aims of this study due to its flexibility. The use of hierarchical multiple regression prevented the need for behavioral risk level cut-points (i.e., low-, moderate-, and high-risk) and allowed for the full use of continuous data for

SRSS-IE subscale scores. The use of hierarchical multiple regression allowed for the retention of the true nature of continuous variables, resulting in fewer Type I and Type II errors when detecting moderator effects, which were more likely to occur with the use of cut points (Frazier et al., 2004). Significance for this study was determined a priori as any *p*-value less than 0.01, which indicated a less than 1% chance results were by chance (Ary et al., 2010; Field, 2018; Fraenkel et al., 2019). Since the sample size included the entire school, the level of significance was set at a more stringent level of less than 0.01.

The independent variable was SRSS-IE scores. Previous research on the SRSS-IE has transformed raw data from a continuous variable to an ordinal variable to indicate risk categories of low, moderate, and high. For this purpose of this study, analysis began with continuous scores and extended to also analyze transformed risk level scores on the SRSS-IE for the second research question using multiple regression. To measure internal consistency on the items on the SRSS-IE, I calculated Cronbach's coefficient alpha for the externalizing and internalizing subscales. For 2021-2022 externalizing data, Cronbach's alpha was .809 and for 2022-2023 was .848. For the internalizing subscale for the year 2021-2022, Cronbach's alpha was .797, and for 2022-2023 it was .886.

The dependent variable, on a continuous scale, was MAP RIT score. Moderating variables, all categorical, included: (1) sex (0 = male; 1 = female) and (2) fall MAP RIT score. Sample size was adequate for this type of analyses, with at least 20 times more cases than independent variables (i.e., two independent variables required at least 40 cases; Ho, 2013). Assumptions for this model included linearity, independence, homoscedasticity, and normally distributed errors (Cohen & Cohen, 1983; Ho, 2013; Pedhazur, 1997).

The assumption of normality was met through a visual analysis of histograms and scatterplots, see above in the section on Data Screening (Figures 1-4). Linearity and homoscedasticity were analyzed together, as both assumptions related to the errors in the model and could be analyzed using a scatterplot. Linearity required a visual analysis of the relation between dependent and independent variables on a scatterplot. Homoscedasticity required equal variances between pairs of variables and was also determined using a visual analysis of scatterplots.

Additionally, using SPSS, Levene's test (Levene, 1960) was conducted to test if the null hypothesis that the variance in different groups were equal. For the Levene's test, significance is at $p \leq 0.05$, which would lead to rejection of the null hypothesis and a determination that the variances are significantly different, therefore violating the assumption of heteroscedasticity. The opposite is also true, non-significant findings (i.e. $p > 0.05$) could indicate the variances are roughly equal and the assumption is tenable. All Levene's test results were not significant, therefore homoscedasticity was assumed for the dependent variable of MAP RIT score for the corresponding timepoint of SRSS-IE subscale scores (Table 3).

The assumption of independence was calculated using the Durbin-Watson statistic d to determine if critical values were between 1.5 and 2.5 (i.e., $1.5 < d < 2.5$; Durbin and Watson 1951). Using the Durbin-Watson test, I looked for serial correlations between errors, or whether adjacent residuals were correlated. This test was affected by the order of cases and required a meaningful order. Results of the test statistic can range from 0 to 4, where a 2 indicates the residuals are uncorrelated, a value of greater than 2 indicates a negative correlation between adjacent residuals, and a value below 2 indicates a positive

correlation.

Cross-validation was performed by splitting the sample in two based on year. A prediction equation was created for the first sample to predict scores for the second sample. A cross-validity coefficient was obtained, correlating the observed scores on the dependent variable ($r_{yy'}$), and shrinkage was calculated as the difference between the original R-squared and the r_{yy2} (Osborne, 2000). Scores for the sample, including confidence intervals, were obtained using the formula $Y' \pm (\alpha/2, df) (S_{y'})$.

Additionally, in this model I considered if predictors were uncorrelated with external variables, whether my predictor variables were categorical or continuous, whether my model had more than one predictor and if yes, was there multicollinearity, and whether predictors had variation in value or there was non-zero variance. Meeting these assumptions was essential in order to calculate confidence intervals, or to generalize the model to the population. Effect sizes were calculated, with a large effect size benchmark of greater than 0.5 considered large, 0.5 to 0.3 considered moderate, 0.3 to 0.1 considered small, and less than 0.1 was insubstantial (Cohen, 1988).

CHAPTER 3: RESULTS

General Characteristics of the Study Sample

For the first research question, I analyzed the general characteristics of the study sample for both school years (2021-2022; 2022-2023) in terms of demographics, eligibility statuses, MAP RIT reading scores, and SRSS-IE data at each time point (fall 2021; spring 2022; fall 2022; spring 2023) and compared over time.

Demographics

Data included a sample of 500 middle school students (n = 241 for 2021-2022; n = 259 for 2022-2023). Table 1 shows nearly half of each year's sample was female (51.5% for 2021-2022; 52.1% for 2022-2023). As shown, sixth graders were the largest sub-group represented in the data and included 38.2% in 2021-2022 and 44.4% in 2022-2023. The largest portion of the student sample by race was White (75.9% in 2021-2022 and 72.2% in 2022-2023), followed by Hispanic (12.4% in 2021-2022 and 15.4% in 2022-2023), Black (4.6% in 2021-2022 and 6.6% in 2022-2023), and a very small percentage in the categories for mixed races and Asian/Pacific Islander. Eligibility for special education services ranged from 7.5% in 2021-2022 to 9.7% in 2022-2023. Very few students in the 2021-2022 sample were eligible for ELL services (1.2%) with a higher percentage in 2022-2023 (11.2%). Student age ranged from 10-15, with an average age of 11.9 for both years of data, and the majority falling between 11-13 years old (95.4% for 2021-2022; 96.5% for 2022-2023 school year; Table 1).

MAP Reading

For the first part of the first hypothesis of student scores increasing from fall to spring and matching expected reading growth averages, I analyzed each school year independently for school-wide averages and grade level averages (NWEA, 2020). From fall 2021 to spring 2022, student MAP RIT scores (n = 241) increased from 211.54 (SD = 17.25) to 217.87 (SD = 15.33; see Table 2). Similarly, from fall 2022 to spring 2023, student MAP RIT scores (n = 259) increased from 210.19 (SD = 16.58) to 216.11 (SD = 14.75; Table 2).

Sixth grade. Sixth grade students had an average MAP RIT of 213.84 in the fall of 2021 and increased to 221.46 in the spring of 2022, for a total growth of 7.62. Sixth grade students had an average MAP RIT of 206.58 in the fall of 2022 and increased to 212.43 in the spring of 2023, for a total growth of 5.85 (Figure 5). According to Thum and Kuhfeld (2020), the mean reading score for sixth grade students for fall is 210.17 (student SD = 16.46) and the mean reading score for spring is 215.36 (student SD = 16.03), for an expected growth of 5.19. Growth for the sixth grade for 2021-2022 exceeded the national norms by 2.43. Growth for the sixth grade for 2022-2023 exceeded the national norms by 0.66 (Thum & Kuhfeld, 2020; NWEA, 2020; Figure 5).

Seventh grade. Seventh grade students had an average MAP RIT of 216.32 for fall 2021 and 220.90 for spring 2022, for an increase of 4.58. For fall 2022, seventh grade students had an average MAP RIT of 213.41 and increased to 218.87 for spring 2023, an increase of 5.46 (Figure 5). According to Thum and Kuhfeld (2020), the mean reading score for seventh grade students for fall is 214.20 (student SD = 16.51) and the mean reading score for spring is 218.36 (student SD = 16.38), for an expected growth of 4.16.

Students in the study sample exceeded national growth norms for both school years (Thum & Kuhfeld, 2020; NWEA, 2020; Figure 5).

Eighth grade. For fall 2021, eighth grade students had an average MAP RIT of 200.38, increasing to 207.43 for spring 2022, total growth of 7.05. Scores for the 2022-2023 school year were higher, with an average of 213.22 for fall 2022 and 219.20 for spring 2023, with a total growth of 5.98. The mean reading score for eighth grade students for fall is 218.01 (student *SD* = 17.04) and the mean reading score for spring is 221.66 (student *SD* = 16.87), for an expected growth of 3.65 (Thum & Kuhfeld, 2020, p. 5). Students in the study sample exceeded national growth norms for both school years (Thum & Kuhfeld, 2020; NWEA, 2020; Figure 5).

Grade level equivalencies. The percentage of all students scoring at the 50th percentile for the ninth grade or above, meaning above the expectation for middle school, ranged from 35.1 to 43.6 across timepoints and years, with more students outperforming the highest grade in their school in spring of 2022 than the spring of 2023 by 6.9% (Figure 7). Since the sample population was composed of entirely middle school students in grades six through eight, I considered the percentage of students scoring at the 50th percentile for grades six and above. The percentage of students scoring at 50th percentile for grade six or above shifted down from 2021-2022 to 2022-2023, with 61% in fall 2021 and 64.3% in spring 2022, to 53.3% in fall of 2022 and 57.2% in spring of 2023 (Figure 7). Conversely, each grade level's reading MAP RIT scores were analyzed to consider trends over time for the percentage of students scoring at a grade level equivalency at least one grade level below or more. For sixth grade students, the percentage of students scoring one grade level or more below increased from 35.9% in the fall of 2021 to 51.3%

in the fall of 2022, and from 25.1% in the spring of 2022 to 52.3% in the spring of 2023. For seventh grade students, the percentage of students scoring one grade level or more below increased from 34.1% in fall of 2021 to 42.1% in fall of 2022, and from 34.9% in spring of 2022 to 45.1% in spring of 2023. Finally, eighth-grade students showed the reverse trend, with 91.5% of students scoring at least one grade level below in fall of 2021, decreasing to 58.9% in fall 2022, and 77.6% scoring at least one grade level below in spring of 2022, decreasing to 48.5% in spring of 2023.

SRSS-IE Risk Status Over Time

Hypotheses 1b and 1c predicted less than 20% of students would score at moderate or high risk at each timepoint on the SRSS-IE and the vast majority of student scores (> 75%) on the SRSS-IE subscales would occur in the low-risk category at all time points (Figures 11-12). Descriptive statistics were calculated for the percentage of students in each category of risk on the SRSS-IE across time points, fall and spring, and school years for externalizing and internalizing behaviors. I analyzed the percentage of students at risk for behavioral problems by subscale (i.e. externalizing, internalizing).

Externalizing. The hypothesis was accepted for the timepoint of fall 2021, 16.6% of students scored at moderate or high risk on the SRSS-IE externalizing subscale. For the remaining three timepoints, the hypothesis for externalizing risk was rejected, with 23.2% of students for spring 2022, 25.9% of students for fall 2022, and 31.6% for spring 2023 scoring at moderate or high risk. Data were split for the second portion of the hypothesis, with two timepoints above 75% (83.4% for fall 2021 and 76.8% for spring 2022) and two timepoints below (74.1% for fall 2022 and 68.3% for spring 2023) for externalizing risk.

Internalizing. On the internalizing subscale, one portion of the hypothesis was accepted. The percentage of students scoring in the low-risk category on the SRSS-IE was greater than 75% for all four timepoints (86.3% for fall 2022, 81.3% for spring 2022, 77.2% for fall 2022, and 75.3% for spring 2023). The hypothesis predicting less than 20% of students would score at moderate or high risk was rejected for two of the timepoints, where fall 2023 (22.7%) and spring 2023 (24.7%) both exceeded the criteria. See Figure 12.

Reading Scores by SRSS-IE Risk Level Over Time

The last analysis for research question one analyzed student reading scores by SRSS-IE risk level over time. I predicted students with low risk levels of internalizing and externalizing behavior risk would demonstrate higher reading performance than students with moderate or high behavior risk. To determine if my prediction was true, average reading score was determined for students in low-, moderate-, and high-risk categories of internalizing and externalizing behavior in fall and in spring for the 2021-2022 and 2022-2023 school years (Figure 6).

Fall 2021. Mean MAP RIT scores for students in the low-risk category for externalizing behaviors for fall 2021 (M = 211.65) scored 1.73 higher than those in the moderate risk category (M = 209.92) but scored lower than those in the high-risk category (M = 212.86) by 1.21. On the internalizing subscale, the MAP RIT score for those in the low-risk category (M = 211.25) was lower than those in the moderate (M = 211.83) and high risk (M = 215.2) categories for fall 2021 (Figure 6).

Spring 2022. For the timepoint spring 2022, students in the low-risk category on the SRSS-IE (M = 218.04) for externalizing behaviors scored lower than those in the

moderate risk category (M = 218.71) and greater than those in the high-risk category (M = 214.95). On the internalizing subscale, students in the low-risk category (M = 217.81) scored higher than those in the moderate risk category (m = 214.21), but lower than those in high-risk category (M = 221.04; Figure 6).

Fall 2022. For the second year of data on the SRSS-IE externalizing subscale, students in the low-risk category (M = 212.7) scored higher than those in the moderate (M = 205.63) and the high-risk categories (M = 200.72). On the internalizing subscale, students in the low-risk category (M = 210.13) scored higher than those at moderate risk (M = 208.89), but lower by 1.85 than those at high risk (M = 211.98; Figure 6).

Spring 2023. Mean scores on the SRSS-IE for the spring 2023 timepoint on the externalizing subscale decreased as risk level increased (M = 219.54 for low-risk; M = 210.51 for moderate risk; M = 205.47 for high-risk). On the internalizing subscale, students at low-risk had the greatest mean (M = 217.06), with mean scores for moderate risk 6.18 lower (M = 210.88) and 1.29 lower for high-risk (M = 215.77; Figure 6).

Hierarchical Multiple Linear Regression

For the second research question, I used hierarchical multiple linear regression to determine if externalizing or internalizing behavioral risk explained variance in spring MAP reading scores above and beyond sex and fall MAP reading scores. The criteria for assessing model data fit included R-square, change in R-square from one variable block to the next, and overall F-statistic of the final model. The relation of the dependent variable, spring reading MAP RIT, to dependent variables (fall MAP RIT, sex, externalizing behavioral risk, internalizing behavioral risk) was inspected using regression coefficients.

Model one included one block with two independent variables (fall MAP RIT and sex) and the dependent variable was spring MAP RIT. Model two included two blocks, composed of four independent variables (fall MAP RIT, sex, fall internalizing scale score, fall externalizing scale score). Model two block one consisted of fall MAP RIT and sex and model two block two included fall MAP RIT, sex, fall internalizing scale score, fall externalizing scale score.

Correlations between student characteristics, reading screener scores, and behavioral screener scores are presented in Tables 4 and 5, including two different representations of behavioral screener results (i.e., total scores and recoded risk levels). Findings suggest several significant correlations among multiple variables, see Tables 4 and 5. Additionally, I determined if sex and fall achievement scores moderated the relation between internalizing or externalizing risk and end of school year reading achievement. A two-step hierarchical regression model was used to identify predictors of student reading achievement on the MAP reading screener (spring MAP RIT scores; fall 2021 MAP RIT scores; fall 2022 MAP RIT scores). Statistically significant results were found in the first step only. Results are discussed for their possible applications in meeting student needs through an integrated multi-tiered system of supports.

Moderating Variables

In the first model, two variables were entered in one block, fall student reading achievement scores (fall MAP 2021; fall MAP 2022) and student sex (0 = male; 1 = female). For the first year of data (2021-2022), analysis suggested a statistically significant model predicting 73.1% of total variance (F [2, 238] = 323.757, p = < 0.001, R^2 = 0.731). For the second year of data (2022-2023), analysis suggested a statistically

significant model predicting 72.4% of total variance (F [2, 252] = 330.232, p = < 0.001, R^2 = 0.724).

In the second model, I added a second block with fall SRSS-IE scores on the externalizing subscale (fall externalizing 2022; fall externalizing 2023) and internalizing subscale (fall internalizing 2022; fall internalizing 2023). For the 2021–2022 school year, analysis demonstrated non-statistically significant results (F [2, 236] = .052, p = .651, R^2 = 0.732), and explained an additional 0.0% of total variance. Similarly, for the 2022-2023 school year, results of the second model were non-statistically significant (F[2, 250] = .970, p = .380, R^2 = 0.726), and explained an additional 0.2% of total variance. Results are presented in detail in Table 7.

For this analysis, standardized regression coefficients (β-values) were used to indicate the individual contributions of each predictor to the model. In other words, *b*-values were used to quantify the relation between student sex, fall reading achievement, and fall behavior screener results with spring reading achievement. Linear regression analysis of the 2021-2022 data showed that spring reading achievement was negatively related to sex (β = -.806) and externalizing behavior score on the SRSS-IE (β = -.149). Conversely, spring reading achievement was positively related to fall reading achievement (β = .758) and fall internalizing score on the SRSS-IE (β = .207). These scores indicate that as the spring MAP RIT score increases by one, externalizing behavior scores on the SRSS-IE decrease by -.149 and internalizing behavior scores on the SRSS-IE increase by .207.

For the 2022-2023 data, spring reading achievement was negatively related to sex (β = -.499) and externalizing behavior score on the SRSS-IE (β = -.203). Conversely,

spring reading achievement was positively related to fall reading achievement (β = .746) and fall internalizing score on the SRSS-IE (β = .036). These scores indicate that as the spring MAP RIT score increases by one, externalizing behavior scores on the SRSS-IE decrease by -.499 and internalizing behavior scores on the SRSS-IE increase by .036. Results of hierarchal multiple regression analysis in this study suggest the most significant predictor of end of year reading achievement in middle school students was beginning of the year reading achievement (2021-2022, β = .758; 2022-2023, β = .746). Data were coded zero for male and one for female and results were not statistically significant for this variable. Since data for sex were coded categorically, a one-unit difference represented switching from male to female. Therefore, the unstandardized coefficient for sex represented the average difference in males and females.

Cross Validation

To perform cross-validation, the study sample was split into two samples based on year (2022; 2023). After running regression analyses and descriptive analyses for both years of data, outputs for each year of data were analyzed and *z* scores for each predictor variable (i.e., sex, fall MAP RIT, fall externalizing score on the SRSS-IE, fall internalizing score on the SRSS-IE) were calculated. A prediction equation was created using the first sample, year one, and I used it to create predicted scores for the second sample, year two. The prediction equation began with an overall $R^2 = .732$, meaning 73.2% of variance in spring MAP RIT scores was explained by sex, fall MAP RIT scores, and fall externalizing and internalizing scores. The prediction equation was: 57.845 + (-.806 * sex) + (.758 * fall MAP RIT 2021) + (-.149 * fall externalizing score 2021) + (.207 * fall internalizing score 2021). The equation used unstandardized coefficients all

variables. I then correlated the predicted scores of year one with the observed scores of year two for the dependent variable of spring MAP RIT 2023 score ($r_{yy'}$) to determine the cross-validity coefficient. Predicted scores correlated $ry\hat{y} = 0.196$ with observed scores. Finally, I found the shrinkage by determining the difference between the original R-squared (.732) and $r_{yy'}^2 = .038$, shrinkage for this sample was .694, which indicated I cannot have confidence in the generalizability of the equation.

Results Using Recoded SRSS-IE Data

Previous research on the SRSS-IE primarily used transformed data, where total scores on the externalizing and internalizing subscales were recoded into levels of risk (i.e., low, moderate, high; Lane et al., 2017; Lane et al., 2018; Lane et al., 2019a; Lane et al., 2019b). In keeping with previous research on the SRSS-IE and to confirm findings from above, I conducted a second two-step hierarchical regression model using dummy coded data for the SRSS-IE externalizing and internalizing subscales (See Table 8). First, scaled scores were recoded into risk levels (i.e., low, moderate, high). Second, recoded risk level scores were dummy coded to scores of zero or one to conduct regression (i.e., low = 0, moderate = 1, high = 0; low = 0, moderate = 0, high = 1). Even with dummy coding of SRSS-IE subscale scores, results remained similar to the regression models where SRSS-IE data remained on a continuous scale. Analysis suggested non-statistically significant results for the 2021-2022 school year (F [4, 234] = .431, $p = .995$, $R^2 = 0.731$), and explained an additional 0.1% of total variance. Similarly, for the 2022-2023 school year, results were non-statistically significant (F [4, 248] = .576, $p = .680$, $R^2 = 0.726$), and explained an additional 0.3% of total variance.

Multiple Regression Hypotheses

Hypotheses for research questions 2.1 and 2a.1 were rejected, as the relation between moderate and high externalizing and internalizing behavioral risk and spring MAP reading scores did not account for 10% of variance and no negative relation existed for males between moderate and high externalizing and internalizing behavioral risk and spring MAP reading scores.

CHAPTER 4: DISCUSSION

To complete this study, I utilized descriptive and inferential statistics to examine the relation between academic and behavior screener results in fall and spring for two years of data at the middle school level. Previous research on the predictive validity of behavior screeners has often occurred at the elementary level (Gregory et al., 2021; Juechter et al., 2012; Kamphause & Reynolds, 2007; Kilgus et al., 2014; Kilgus et al., 2017; Kilgus et al., 2019; Lane et al., 2012a; Lane et al., 2012b; Lane et al., 2019a; Morgan et al., 2008). At the secondary level (i.e., middle and high school), research utilizing results from behavior screeners has focused on predictive validity for academic outcomes such as GPA and course failures (Jones et al., 2020; Lane et al., 2008; Lane et al., 2013; Lane et al., 2017; Lane et al., 2019b; Moulton et al., 2019), but has not been used to examine the relation with academic screener data. This gap in existing literature was addressed by the current study.

The results of this study suggest the need for educators to carefully consider the use of academic and behavior screeners within MTSS at the middle school level (Lewis et al., 2017). While previous research suggested some students may benefit from integrated reading and behavior interventions for elementary aged students, the results of this study of middle school level data suggested very little relation between academic and behavior screener results at the secondary level. The results of the hierarchal multiple regression suggested fall reading MAP RIT scores were the most significant predictor of spring reading MAP RIT scores for both years of data, not behavior screening data. With

less than .1% of variance in spring reading MAP RIT accounted for by fall scores on the SRSS-IE for externalizing and internalizing behavior for both years of data, middle school students with low scores on reading screeners were not predicted by risk status on their behavior screener, in contrast to previous studies at the elementary level.

Reading Screener Achievement and Growth

Though 2022 reading score data from the National Assessment of Educational Progress (NAEP) showed a decline for eighth grade students compared to 2019, descriptive statistics for this sample of students showed a consistent trend of improvement in reading MAP RIT scores, both at the overall school level and within specific grade levels (NAEP, 2023; Figure 5). A noticeable increase in overall school MAP RIT scores occurred from fall 2022 to spring 2022, as well as from fall 2023 to spring 2023. The positive trajectory of average grade level MAP RIT scores suggests growth in reading achievement from fall to spring beyond expected norms from the NWEA which would be anticipated after one year of instruction. All grade levels exceeded growth norms. Expected growth in MAP RIT score for sixth grade students was 5.19 and this sample demonstrated growth of 7.62 for 2021-2022 and 5.85 for 2022-2023. Expected growth in MAP RIT score for seventh grade was 4.16 and the data exceeded that norm with an average growth of 4.58 for 2021-2022 and 5.46 for 2022-2023. Finally, average growth in MAP RIT scores for the eighth grade was 7.05 for 2021-2022 and 5.98 for 2022-2023, which was higher than the norm for growth of 3.65 (Thum & Kuhfeld, 2020).

Researchers and educators should consider if these findings are due to reading instruction that emphasizes critical thinking, comprehension, and reading to learn at the

middle school level, which differs from instruction during elementary years (i.e. typically kindergarten through the fifth grade). For example, the KAS for reading are divided into three categories in grades K-5 including: reading foundations, reading literature, and reading informational text (KAS, 2019). Kindergarten and first grade Kentucky Academic Standards emphasize print concepts, phonological awareness, phonic and word recognition, fluency, and key ideas and details. Starting in second grade, print concepts and phonological awareness standards are no longer present. Beginning in sixth grade, the KAS no longer have the category "reading foundations," as the assumption is that students enter middle school with basic reading and reading fluency abilities that no longer require Tier 1 instruction (KAS, 2019). Students who enter middle school with deficits in basic reading may not receive any additional Tier 1 instruction from their teachers. However, in this study, students still demonstrated growth on the MAP reading screener from fall to spring. On the reading MAP Growth assessment for middle school students, questions came from multiple categories that resulted in one overall RIT score as well as subscores for informational text, literacy text, and vocabulary acquisition and use. NWEA has not yet developed norms for subscores (Thum & Kufeld, 2020). One possible difference that may be a reason for continued growth despite shifts in reading instruction is the variety of questions asked and the difference between questions asked on the MAP Growth 2-5 versus the MAP Growth 6+. Students with skills in one area of literacy may still demonstrate growth despite deficits in basic reading skills.

Another consideration when interpreting the results of reading growth on the MAP is the potential for growth at the middle school level. The NWEA reading MAP RIT score norms for the 50th percentile for middle school students fall within a small band,

ranging from 210-222, as opposed to the larger potential for increasing reading MAP RIT score during grades K-5, which ranges from 137-211 (see Appendix E). Potential growth in reading MAP RIT score for the average middle school student may be so minimal that perhaps we should not expect statistical significance growth when examining reading screener data. The MAP assessment is a nationally norm-referenced academic screener; thus, scores fall along the bell curve and rank students relative to a group, making it possible to compare individuals within the group (Lok et al., 2016). The NWEA norms for the MAP reading assessment have not changed since 2020, which means grade level benchmarks were established using data from before the COVID-19 pandemic (Thum & Kuhfeld, 2020). Reading MAP RIT scores for this study surpassed growth norms from before the COVID-19 pandemic (Thum & Kuhfeld, 2020). These trends serve as an encouragement for educators and stakeholders, as they consider the direction of student achievement over time and Tier 1, or core, instruction in reading for middle school students (Kettler, et al., 2014).

Behavioral Risk Levels

The percentage of students in each category of risk (i.e., low, moderate, high) for the externalizing and internalizing subscales of the SRSS-IE was not aligned to the theoretical MTSS model, which suggests at least 80% of students will fall into the low-risk category for behavior subscales when MTSS is implemented with fidelity (Lane et al., 2009). For this study, between 23-31% of students were at moderate or high risk for externalizing behavior (versus the ideal 20% or less) and 22-24% were at moderate or high risk for internalizing behaviors. When greater than 20% of students are at elevated risk, educators should consider strengthening core behavioral supports through strategies

such as higher-fidelity PBIS and low-intensity teacher-delivered strategies at Tier 1 (Horner & Sugai, 2015; Horner et al., 2010; Kalberg et al., 2010; Lane et al., 2009). When a stronger core of behavioral strategies is used schoolwide, educators are able to more adequately address the needs of all students and are able to provide Tier 2 and Tier 3 interventions to students with or at risk for EBD (Lane et al., 2009). The school in which this study took place utilizes school wide PBIS. Though fidelity of implementation of PBIS data were not collected for this study and therefore unknown, SRSS-IE data suggest the school was close to the theoretical model of 20% or less, especially for internalizing behaviors.

Average reading scores for students in the low, moderate, and high-risk behavior categories varied. Though previous research suggested students in the moderate or high-risk behavior category on the externalizing scale of the SRSS-IE have lower GPAs, reading MAP RIT scores for students in these behavioral risk categories for this sample were not always lower than peers in the low-risk category. In this study, reading achievement and behavioral risk did not have a consistently strong predictive relation (see Figures 6-7). For example, students at low risk for externalizing behaviors on the SRSS-IE scored nearly the same as students at high risk on the fall reading MAP in 2021 (low = 211.65 vs. high = 212.65) but scored more than 12 points lower the following year in fall of 2022 (low = 212.70 vs. high = 200.72). Average reading MAP RIT scores were not always lower for students at higher risk on the SRSS-IE. In fall 2021, students who scored at low risk on the internalizing subscale of the SRSS-IE had an average MAP score of 211.25 versus a MAP score of 215.20 for those at high risk for internalizing behaviors. Additionally, the results of the hierarchical multiple regression suggested fall

externalizing and internalizing scores on the SRSS-IE do not account for variance in future reading achievement in the spring.

Limitations and Future Directions for Research

Results of this study should be interpreted with caution given the following limitations. First, these results may not be generalizable as these data came from one middle school in one geographic locale. Future researchers should replicate this study across additional locales using the same academic and behavior screeners, the reading MAP Growth and the SRSS-IE. Replication of the current study design will help confirm or extend findings and determine if the results for this study sample are similar to additional samples with corresponding characteristics. Additionally, researchers may want to study alternate combinations of reading and behavior screeners at the middle school level, such as the MAP with SAEBRS or SDQ, or the SRSS-IE with DIBELS or AIMSweb, to determine if similar relations are present as were found in the current study. Future researchers should seek to determine if statistically significant findings for the relation between spring reading scores and behavioral screener scores on a variety of reading and behavior screeners are absent. If future research using other combinations of academic and behavior screeners suggests similar results, it could lead educators to shift their practices around planning and implementing integrated interventions.

A second limitation for this study was overall sample size and the sample size for potential moderating variables such as race, ethnicity, and various eligibility statuses. The size of the sample likely did not represent the target population (all middle school students in the U.S.) and may not have captured the full range of variation in the population. Future researchers should seek to expand the sample size so that all potential

moderating variables can be considered in the regression analysis. For this study, I was unable to input moderating variables in the regression analysis for race, ethnicity, eligibility for special education services, and eligibility for English language learner services because not enough of each subpopulation was present (see Table 1). Teacher demographics (SRSS-IE raters) were also not available as those data were not requested from the school. Future researchers should obtain teacher data in order to run analyses based on rater demographics (e.g., does rater gender or race influence overall scores) when a larger sample is obtained. Future research which includes additional moderating variables could help educators identify specific groups of students likely in need of reading and behavior interventions.

A third limitation for the study was incomplete data sets. Future researchers should attempt to acquire full sets of data for all key variables for the entire school. Although the total school population ranged from 545-552, complete data sets were only acquired for a portion of the students enrolled during the 2021-2022 and 2022-2023 school years. Incomplete data may have impacted results. Obtaining a full dataset impacts the degrees of freedom within multiple regression, which could impact results.

Overall, results of this study are not generalizable, and the results of cross validation suggest greater than anticipated differences between year one and year two data, as seen in a visualization of the data in scatterplots (Appendices F-I). A visual analysis of the scatterplot of spring MAP RIT scores and fall externalizing scores showed differences across school years. While both years' scatterplots displayed a concentration of SRSS-IE data ranging from zero to two, a visual analysis of data for the 2021-2022 school year showed fewer points above a score of seven on the SRSS-IE and fewer points

above a score of 240 on the reading MAP (Appendix F; Appendix H). Future researchers should seek to determine if additional samples with similar characteristics result in the same relation between reading achievement and behavior screener scores.

Practical Implications for the Field

The adoption of MTSS within many K-12 schools is likely for the long-term, especially in the area of literacy (Bailey, 2018), and an essential component of MTSS is academic and behavior screening. Educators have limited time and resources at their disposal, however, and while a few academic screeners like DIBELS and behavior screeners such as the SRSS-IE remain free or inexpensive, they do require time to conduct, analyze, and use results. While evidence from multiple sources at the elementary level have shown an integrated approach is best (e.g., unclear whether reading or behavior challenges come first and there are often both), results of this study suggest it may not always be necessary at the middle school level to plan reading interventions for students based on elevated behavioral risk (Chitiyo et al., 2021; Garwood, 2018). Instead, middle school educators may want to prioritize evidence-based reading interventions for students who are more than one grade level behind in reading on an academic screener such as the MAP. That said, individual students should always have risk factors assessed across multiple data sources, so when students are identified as below grade level in reading on a reading screener, their data should be compared side-by-side with behavior screening data, attendance, and more to determine how to best design an integrated intervention that meets their multiple needs, when present (Lane et al., 2020).

Conclusion

This study highlights the predictive relation of fall reading achievement scores on

spring reading achievement scores among middle school students. However, it is crucial to acknowledge that while fall reading achievement served as a strong predictor, the moderating variable of behavior screener score did not add to the prediction of spring reading scores. These findings suggest future researchers should consider for whom the predictor variable of fall reading achievement holds stronger predictive validity, including additional locales and populations of middle school students. The findings also emphasize the importance of providing evidence-based reading instruction and interventions to students, especially middle school students who are not yet reading at grade level.

Though policies and reforms around reading instruction have stretched from the passage of ESEA in 1965 to its reauthorization in 2015 as ESSA, effective reading instruction for adolescents remains a hot topic for educators (Cassidy et al., 2020; Tracey & Morrow, 2017). An emphasis on reading instruction in middle school remains timely because students continue to demonstrate the need for growth in reading (NAEP, 2023). Future studies should delve deeper into identifying and examining additional moderating variables to tailor interventions effectively and ensure equitable educational outcomes for all students. By addressing these complexities, educators and policymakers can adopt stronger Tier 1 instructional practices for use with middle school students based on the Science of Reading (SoR), which has made a resurgence in awareness and use (Cassidy et al., 2020; Cassidy et al., 2021; Grote-Garcia & Ortlieb, 2023; Grote-Garcia & Ortlieb, 2024). Many educators have discontinued the use of reading programs with less evidence of effectiveness and instead embraced the SoR, with new policies, laws, and even bans occurring across numerous states in 2023. Arkansas, Indiana, Louisiana, and Texas all

mandated or proposed banning the use of three cueing systems in elementary classrooms (Dutton, 2023; Schwartz, 2023a, 2023b). Kane et al. (2024) called for a clearer delineation of what constitutes literacy in the adolescent years, such as what Agosto (2022) proposed, to establish a more current framework for use in middle grades and so that educators can understand what is different than when teaching reading to elementary aged students. With the adoption of new policies and laws that embrace the SoR, the future of reading instruction for all students, but especially those with or at risk for emotional behavioral disabilities, will likely progress in a positive direction.

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Table 2

Descriptive Statistics for Reading MAP RIT Scores Over Time

	Fall 2021 *n* = 241	Spring 2022 *n* = 241	Fall 2022 *n* = 259	Spring 2023 *n* = 259
Mean	211.54	217.87	210.19	216.11
SD	17.25	15.33	16.58	14.75
Minimum	159	169	164	169
Maximum	243	248	247	247
Skewness	-.686	-.684	-.567	-.565
Kurtosis	.105	.362	.236	.167
Shapiro-Wilk Statistic	.963	.968	.974	.978
df	241	241	255	255
p	<.001	<.001	<.001	<.001

Note. MAP = Measure of Academic Progress, RIT = Rasch Unit Scale.

Table 3

Levene's Test Results for MAP RIT and SRSS-IE Across Timepoints and Years

	Levene Statistic based on Mean	*df*1	*df*2	*p*
Fall 2021 MAP RIT				
Fall 2021 SRSS-E7	1.35	10	225	.216
Fall 2021 SRSS-I6	1.45	9	228	.166
Spring 2022 MAP RIT				
Spring 2022 SRSS-E7	1.270	13	225	.232
Spring 2022 SRSS-I6	1.264	12	226	.241
Fall 2022 MAP RIT				
Fall 2022 SRSS-E7	2.454	14	243	.003
Fall 2022 SRSS-I6	1.442	11	241	.155
Spring 2023 MAP RIT				
Spring 2023 SRSS-E7	2.440	12	238	.005
Spring 2023 SRSS-I6	1.773	10	240	.066

Note. MAP = Measure of Academic Progress, RIT = Rasch Unit Scale; *df* = degrees of freedom; SRSS-IE = *Student Risk Screening Scale—Internalizing and Externalizing*; E7 = externalizing; I6 = internalizing.

Table 4

Correlations between Student Characteristics, SRSS-IE, and MAP RIT for 2021-2022

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Gender	--														
2. Hispanic	.165*	--													
3. Ethnicity	-.021	.060	--												
4. ELL status	-.041	.298**	.018	--											
5. Special Educ. status	-.102	.082	-.004	.110	--										
6. Fall Reading MAP RIT	-.003	-.252**	-.265**	-.156*	-.471**	--									
7. Spring Reading MAP RIT	-.025	-.215**	-.194**	-.190**	-.458**	.855**	--								
8. Fall E7 Total Score	-.181**	-.034	.133*	.022	-.061	-.032	-.037	--							
9. Fall I6 Total Score	-.044	-.009	-.064	.113	-.066	.017	.033	.460**	--						
10. Spring E7 Total Score	-.213**	-.063	.136*	.033	-.013	-.057	-.044	.763**	.346**	--					
11. Spring I6 Total Score	.100	-.021	-.101	.029	.035	.053	.045	.171**	.485**	.356**	--				
12. Fall E7 Risk Level	-.182**	-.017	.097	.023	-.062	-.002	-.002	.923**	.452**	.680**	.168**	--			
13. Fall I6 Risk Level	-.089	-.023	-.110	.098	-.079	.052	.053	.422**	.891**	.315**	.488**	.408**	--		
14. Spring E7 Risk Level	-.181**	-.072	.143*	.002	-.042	-.044	-.040	.713**	.333**	.935**	.327**	.662**	.294**	--	
15. Spring I6 Risk Level	.044	-.035	-.107	.007	.048	.051	.040	.192**	.418**	.340**	.882**	.202**	.441**	.329**	--

Note. SRSS-IE = *Student Risk Screening Scale—Internalizing and Externalizing*; E7 = externalizing; I6 = internalizing; MAP = Measure of Academic Progress, RIT = Rasch Unit Scale; Risk Level = low, moderate, high; *Significant at $p < .05$; **Significant at $p < .01$.

Table 5

Correlations between Student Characteristics, SRSS-IE, and MAP RIT for 2022-2023

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Gender	--														
2. Race	.067	--													
3. Ethnicity	.022	.098	--												
4. ELL status	.046	.797**	.085	--											
5. Special Educ. Status	-.105	.077	-.056	.091	--										
6. Fall Reading MAP RIT	.210**	-.231**	-.071	-.244**	-.515**	--									
7. Spring Reading MAP RIT	.174**	-.276**	-.097	-.285**	-.453**	.851**	--								
8. Fall E7 Total Score	-.154*	.016	.002	.025	.161**	-.286**	-.298**	--							
9. Fall I6 Total Score	.027	.013	.009	-.014	.041	.066	.035	.392**	--						
10. Spring E7 Total Score	-.154*	.045	.025	.059	.157*	-.331**	-.355**	.863**	.211**	--					
11. Spring I6 Total Score	.045	.034	.037	.003	.071	-.055	-.075	.325**	.794**	.308**	--				
12. Fall E7 Risk Level	-.149*	-.029	.026	-.014	.111	-.254**	-.264**	.948**	.372**	.814**	.319**	--			
13. Fall I6 Risk Level	.015	.025	.026	-.001	.061	.033	.006	.411**	.916**	.250**	.714**	.389**	--		
14. Spring E7 Risk Level	-.113	.061	.041	.086	.143*	-.351**	-.357**	.797**	.174**	.937**	.242**	.792**	.232**	--	
15. Spring I6 Risk Level	.062	.036	.061	.024	.092	-.060	-.075	.324**	.713**	.302**	.906**	.314**	.706**	.240**	--

Note. SRSS-IE = *Student Risk Screening Scale—Internalizing and Externalizing*; E7 = externalizing; I6 = internalizing; MAP = Measure of Academic Progress, RIT = Rasch Unit Scale; Risk Level = low, moderate, high; *Significant at $p < .05$; **Significant at $p < .01$.

Table 6

Risk Level on the Student Risk Screening Scale-Internalizing and Externalizing

	Fall 2021 *n* = 241 (%)	Spring 2022 *n* = 241 (%)	Fall 2022 *n* = 259 (%)	Spring 2023 *n* = 259 (%)
	Externalizing			
Low	201 (83.4)	185 (76.5)	192 (74.1)	177 (68.3)
Moderate	26 (10.8)	35 (14.5)	38 (14.7)	48 (18.5)
High	14 (5.8)	21 (8.7)	29 (11.2)	34 (13.1)
	Internalizing			
Low	208 (86.3)	196 (81.3)	200 (77.2)	195 (75.3)
Moderate	18 (7.5)	19 (7.9)	19 (7.3)	33 (12.7)
High	15 (6.2)	26 (10.8)	40 (15.4)	31 (12.0)

Note. *n* = number of participants.

Table 7

HMR Model Summaries for 2021-2022 and 2022-2023 Using Scaled Scores for the SRSS-IE

						Change Statistics			
Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate	*R* Square Change	*F* Change	*df* 1	*df* 2	Sig. *F* Change
1	.855[a] (.851[c])	.731 (.724)	.729 (.722)	7.980 (7.784)	.731 (.724)	323.757 (330.232)	2 (2)	238 (252)	<.001 (<.001)
2	.856[b] (.852[d])	.732 (.726)	.728 (.722)	7.999 (7.785)	.001 (.002)	.431 (.970)	2 (2)	236 (250)	.651 (.380)

Note. HMR = Hierarchical multiple regression; 2022-2023 values in parentheses; MAP = Measure of Academic Progress, RIT = Rasch Unit Scale.

[a] Predictors: (Constant), Fall MAP RIT 2021, Sex

[b] Predictors: (Constant), Fall MAP RIT 2021, Sex, Fall Internalizing 2021 scale score, Fall Externalizing 2021 scale score

[c] Predictors: (Constant), Fall MAP RIT 2022, Sex

[d] Predictors: (Constant), Fall MAP RIT 2022, Sex, Fall Internalizing 2022 scale score, Fall Externalizing 2022 scale score

[e] Dependent variables: Spring MAP RIT 2022; Spring MAP RIT 2023

Table 8

HMR Model Summaries for 2021-2022 and 2022-2023 Using Dummy Coded Risk Levels

						Change Statistics			
Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate	*R* Square Change	*F* Change	*df* 1	*df* 2	Sig. *F* Change
1	.855[a] (.851[c])	.731 (.724)	.729 (.722)	7.980 (7.784)	.731 (.724)	323.757 (330.232)	2 (2)	238 (252)	<.001 (<.001)
2	.855[b] (.852[d])	.731 (.726)	.725 (.720)	8.044 (7.810)	.000 (.003)	.052 (.576)	4 (4)	234 (248)	.995 (.680)

Note. HMR = Hierarchical multiple regression; 2022-2023 values in parentheses; MAP = Measure of Academic Progress, RIT = Rasch Unit Scale.

[a] Predictors: (Constant), Fall MAP RIT 2021, Sex

[b] Predictors: (Constant), Fall MAP RIT 2021, Sex, Fall Internalizing 2021 dummy coded, Fall Externalizing 2021 dummy coded

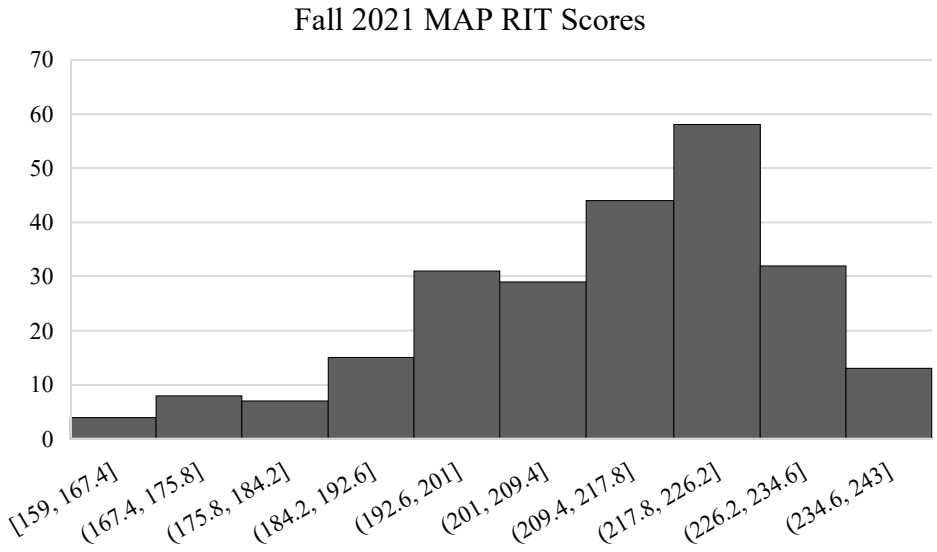
[c] Predictors: (Constant), Fall MAP RIT 2022, Sex

[d] Predictors: (Constant), Fall MAP RIT 2022, Sex, Fall Internalizing 2022 dummy coded, Fall Externalizing 2022 dummy coded

[e] Dependent variables: Spring MAP RIT 2022; Spring MAP RIT 2023

Figure 1

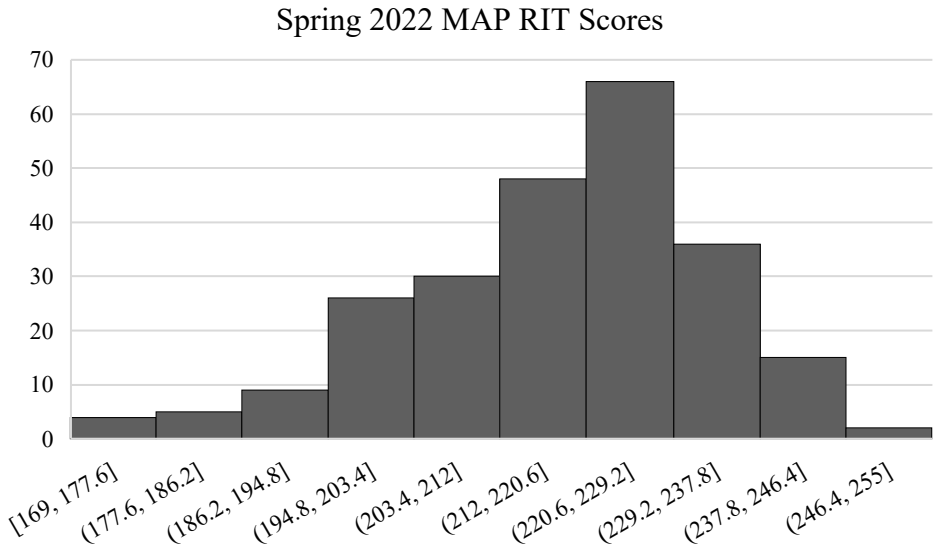
Histogram of Fall 2021 MAP RIT Scores



Note. MAP = Measure of Academic Progress, RIT = Rasch Unit Scale.

Figure 2

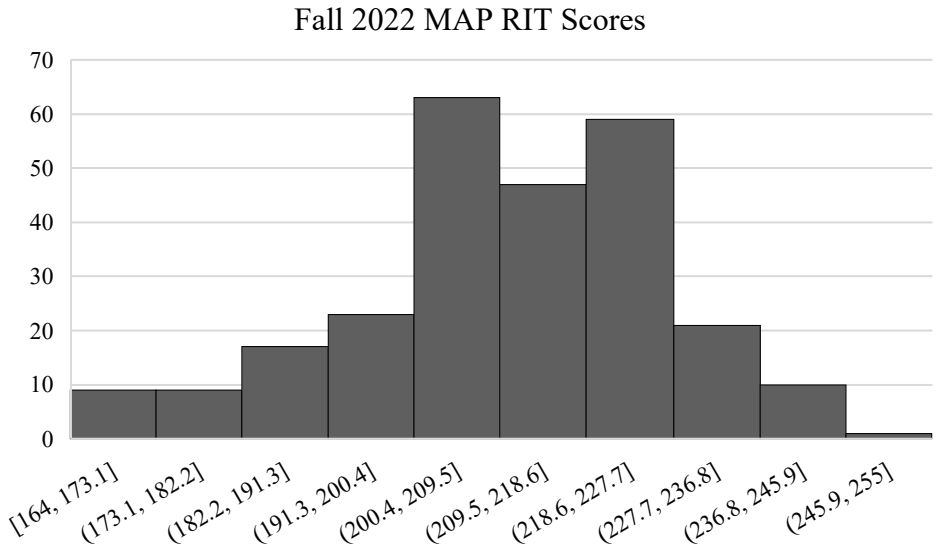
Histogram of Spring 2022 MAP RIT Scores



Note. MAP = Measure of Academic Progress, RIT = Rasch Unit Scale.

Figure 3

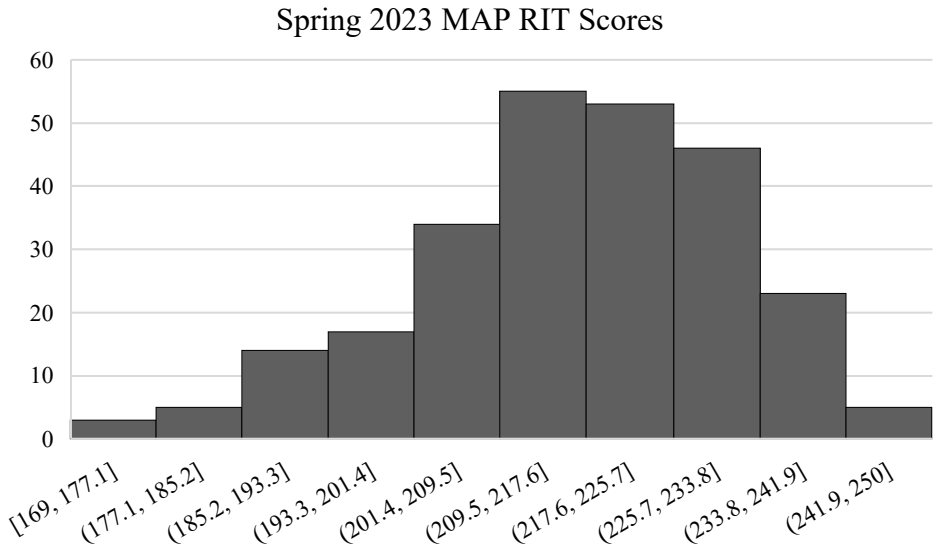
Histogram of Fall 2022 MAP RIT Scores



Note. MAP = Measure of Academic Progress, RIT = Rasch Unit Scale.

Figure 4

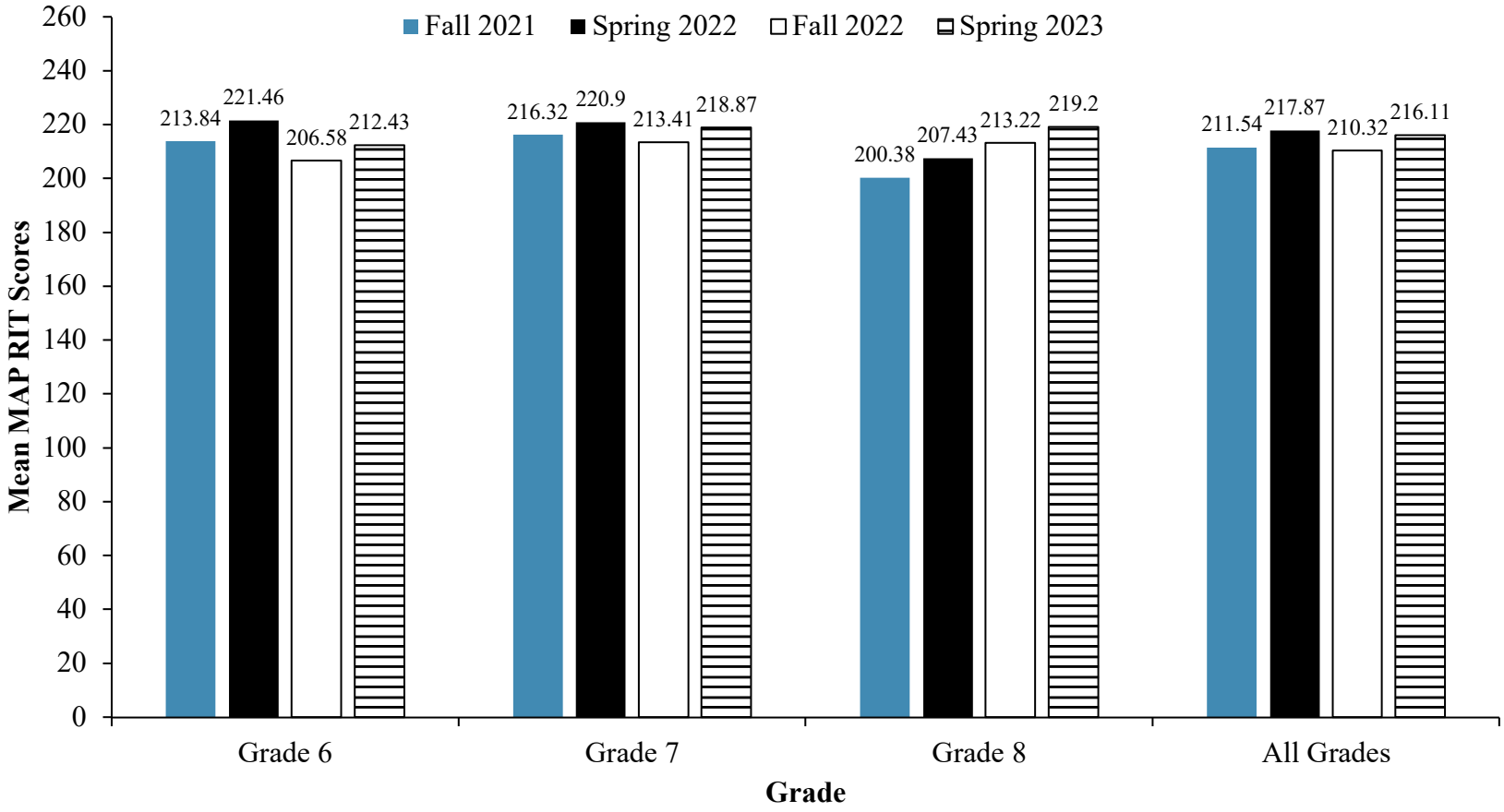
Histogram of Spring 2023 MAP RIT Scores



Note. MAP = Measure of Academic Progress, RIT = Rasch Unit Scale.

Figure 5

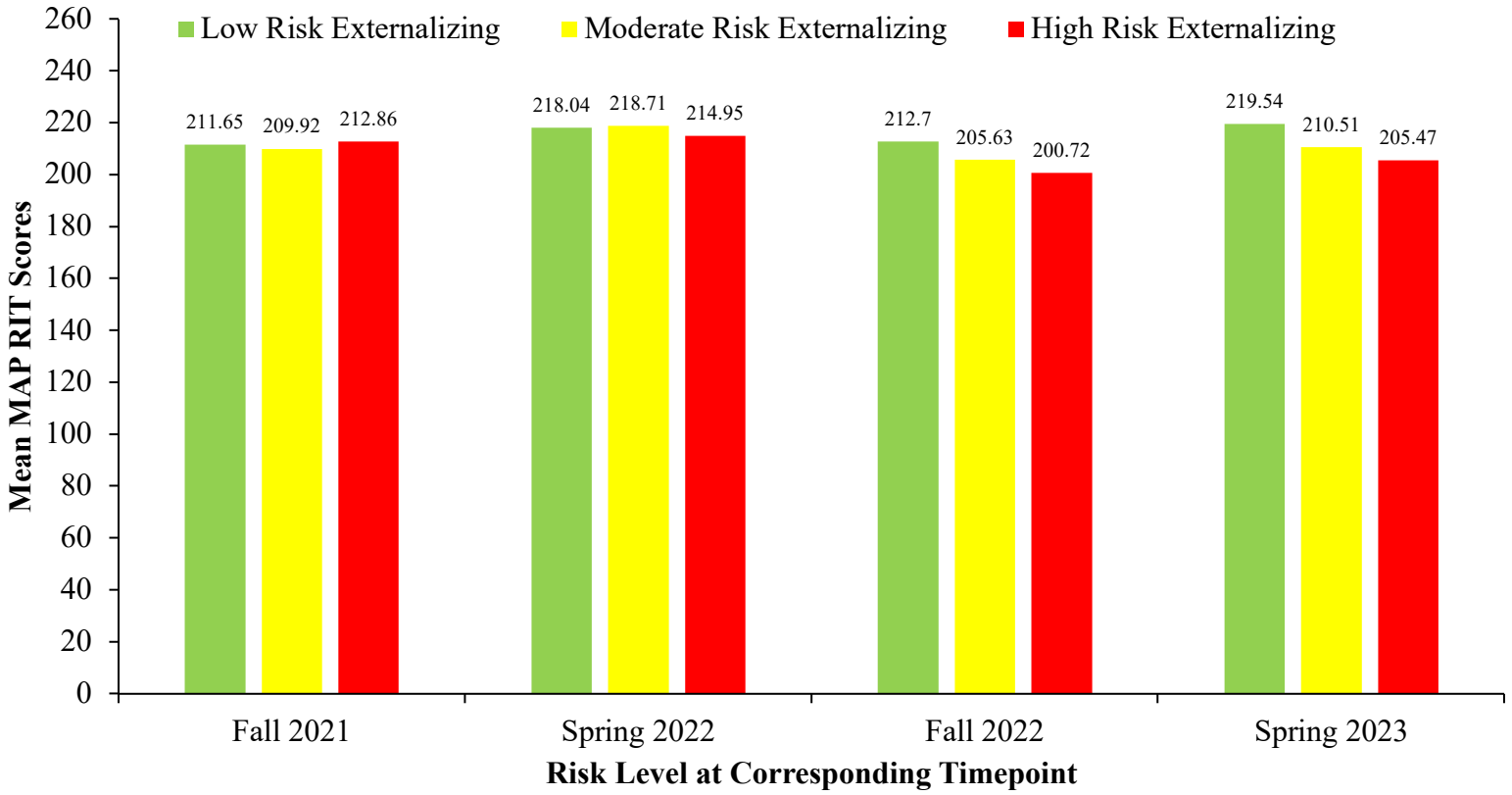
Mean MAP RIT Scores by Grade Level Over Time



Note. Mean = average score; MAP = Measure of Academic Progress, RIT = Rasch Unit Scale.

Figure 6

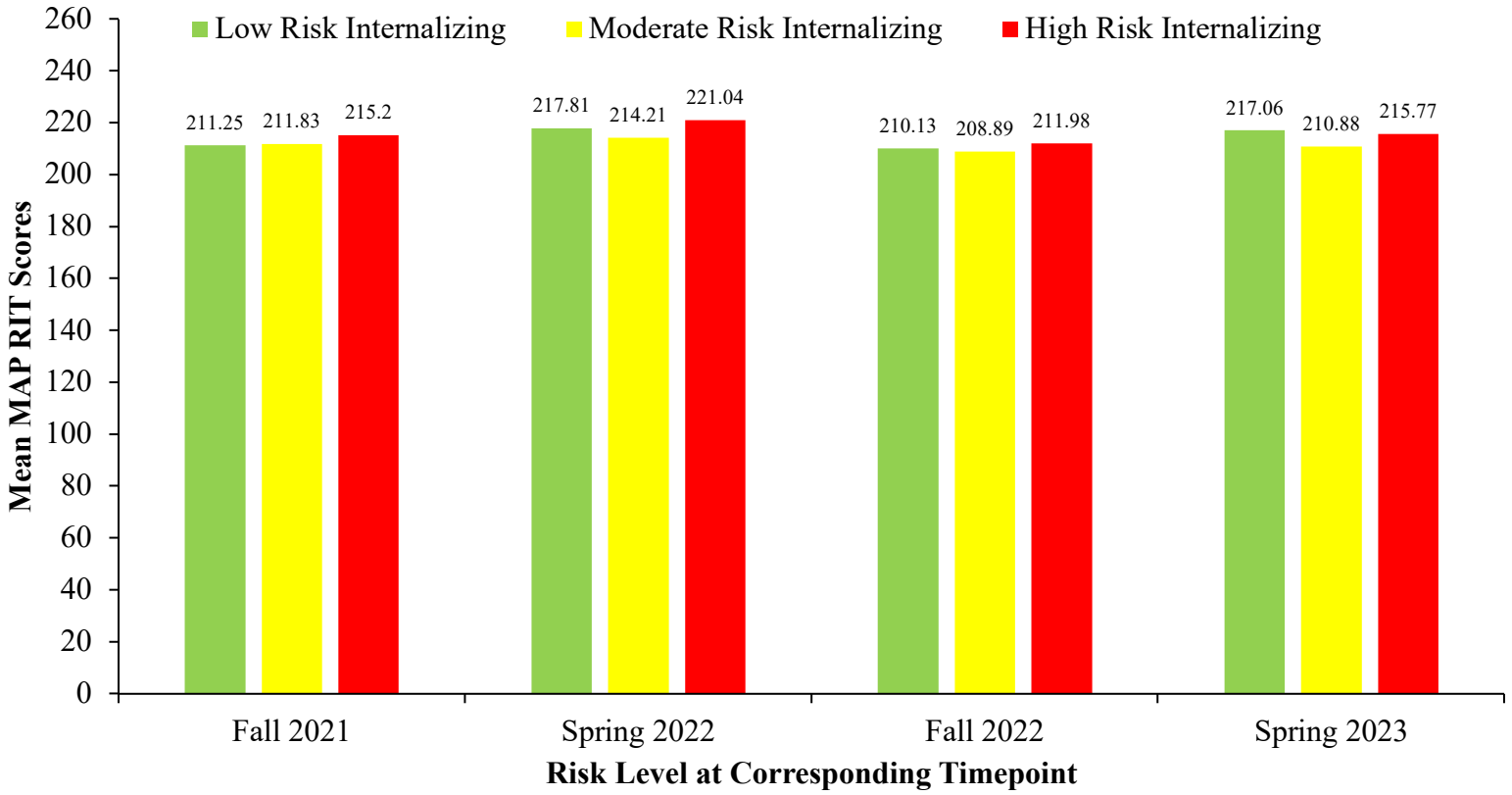
Mean MAP RIT Scores by SRSS-IE Externalizing Risk Level Over Time



Note. Mean = average score; MAP = Measure of Academic Progress, RIT = Rasch Unit Scale; externalizing scores came from the SRSS-E7 = *Student Risk Screening Scale—Externalizing.*

Figure 7

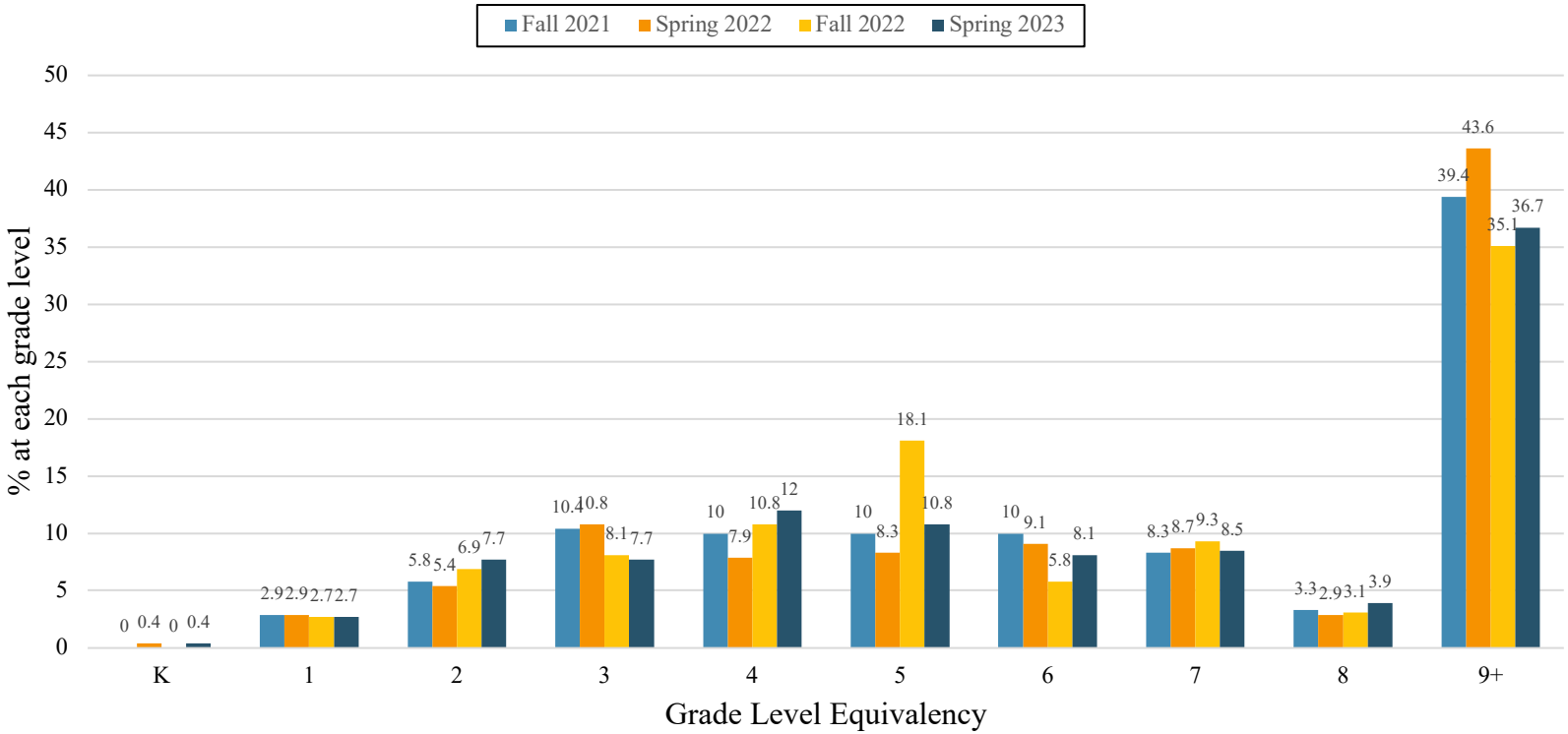
Mean MAP RIT Scores by SRSS-IE Internalizing Risk Level Over Time



Note. Mean = average score; MAP = Measure of Academic Progress, RIT = Rasch Unit Scale*;* internalizing scores came from the SRSS-I6 = *Student Risk Screening Scale—Internalizing.*

Figure 8

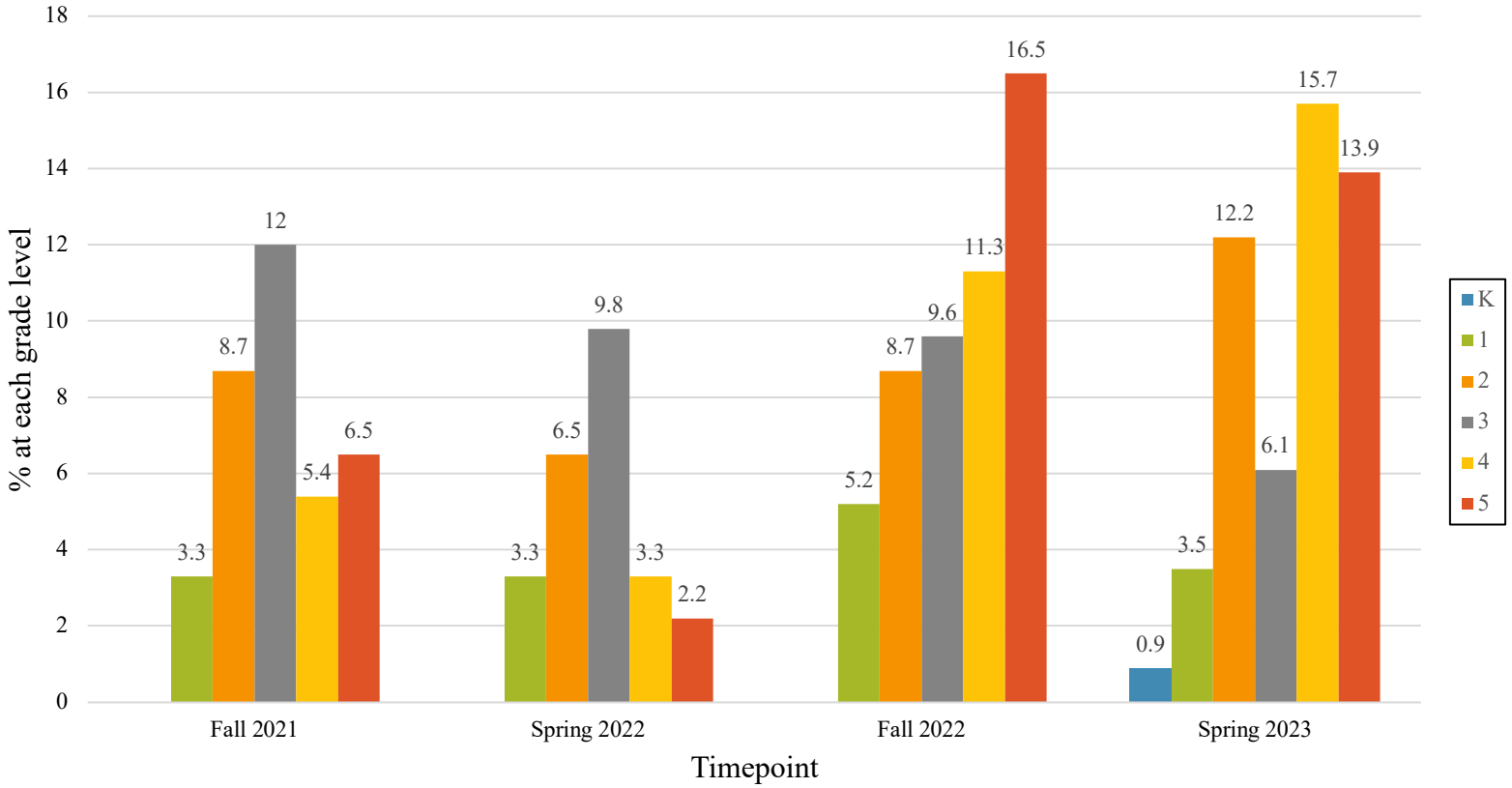
MAP Reading Grade Level Equivalencies for All Students



Note. MAP = Measure of Academic Progress; students' grade level equivalencies were determined based on RIT (Rasch Unit Scale) cut-off scores for the 50th percentile from Thum & Kuhfeld, 2020; data were collected at four timepoints over two school years.

Figure 9

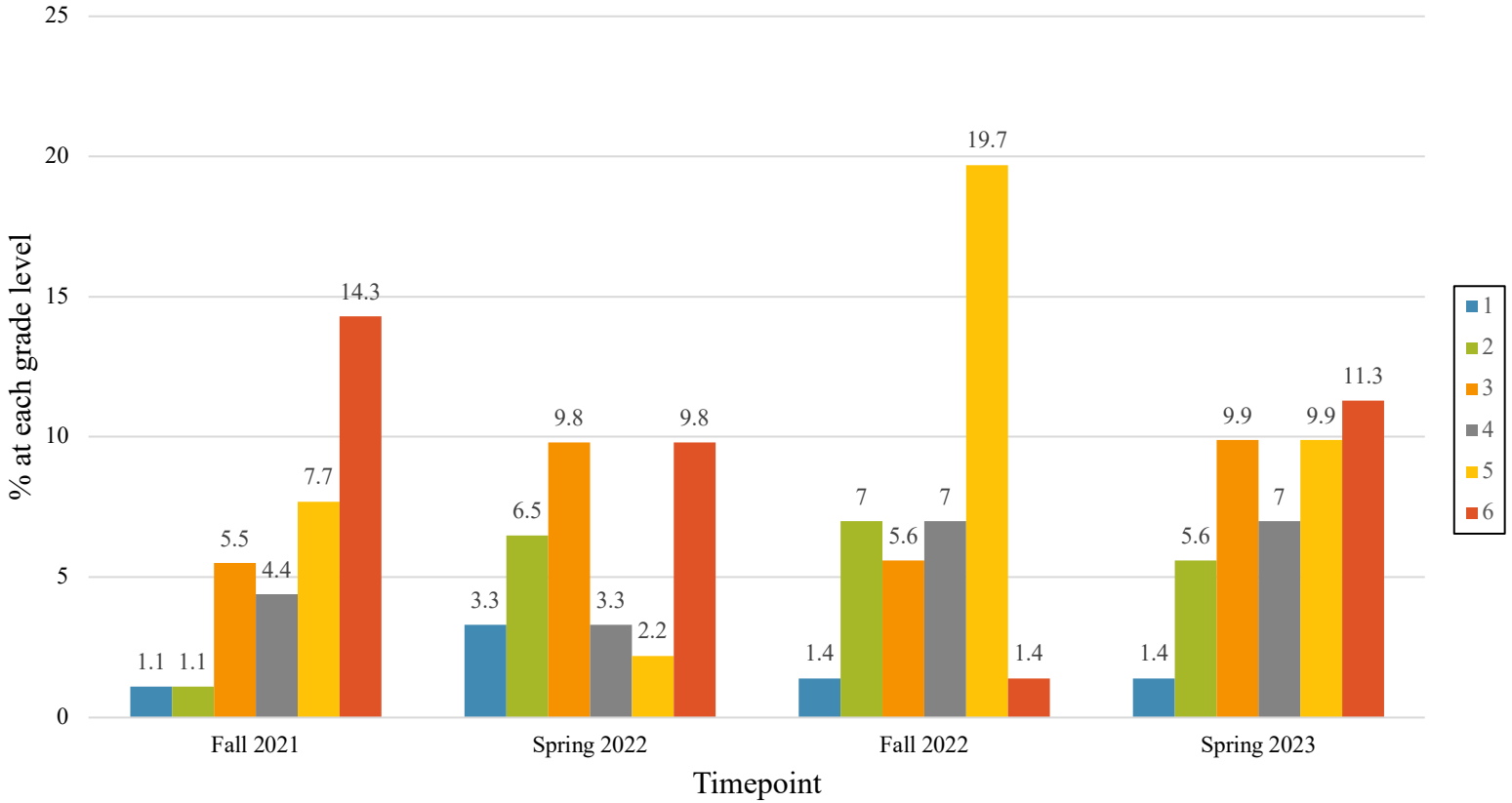
MAP Reading Grade Level Equivalencies Grade 6 Students Below Grade Level



Note. MAP = Measure of Academic Progress; students' grade level equivalencies were determined based on RIT (Rasch Unit Scale) cut-off scores for the 50th percentile from Thum & Kuhfeld, 2020; data were collected at four timepoints over two school years.

Figure 10

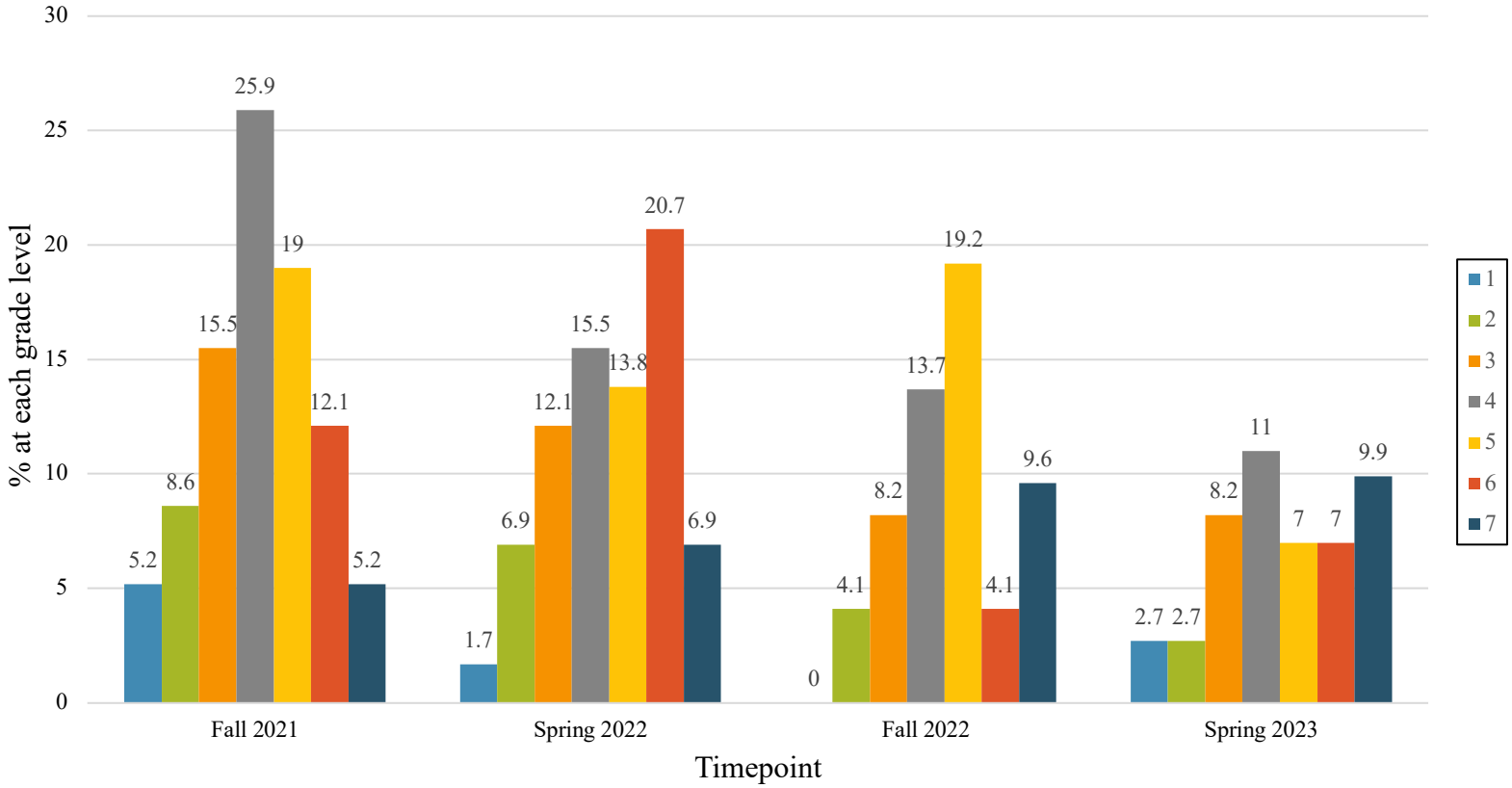
MAP Reading Grade Level Equivalencies Grade 7 Students Below Grade Level



Note. MAP = Measure of Academic Progress; students' grade level equivalencies were determined based on RIT (Rasch Unit Scale) cut-off scores for the 50th percentile from Thum & Kuhfeld, 2020; data were collected at four timepoints over two school years.

Figure 11

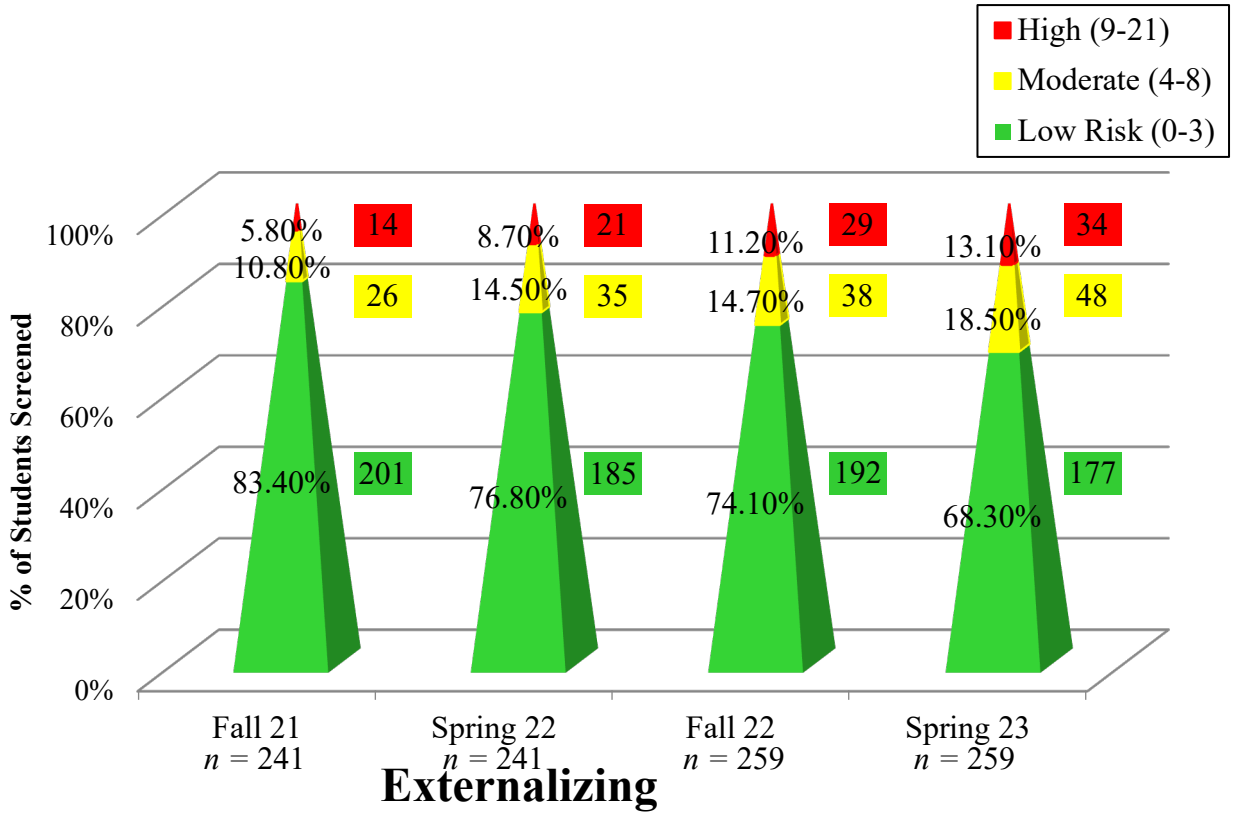
MAP Reading Grade Level Equivalencies Grade 8 Students Below Grade Level



Note. MAP = Measure of Academic Progress; students' grade level equivalencies were determined based on RIT (Rasch Unit Scale) cut-off scores for the 50th percentile from Thum & Kuhfeld, 2020; data were collected at four timepoints over two school years.

Figure 12

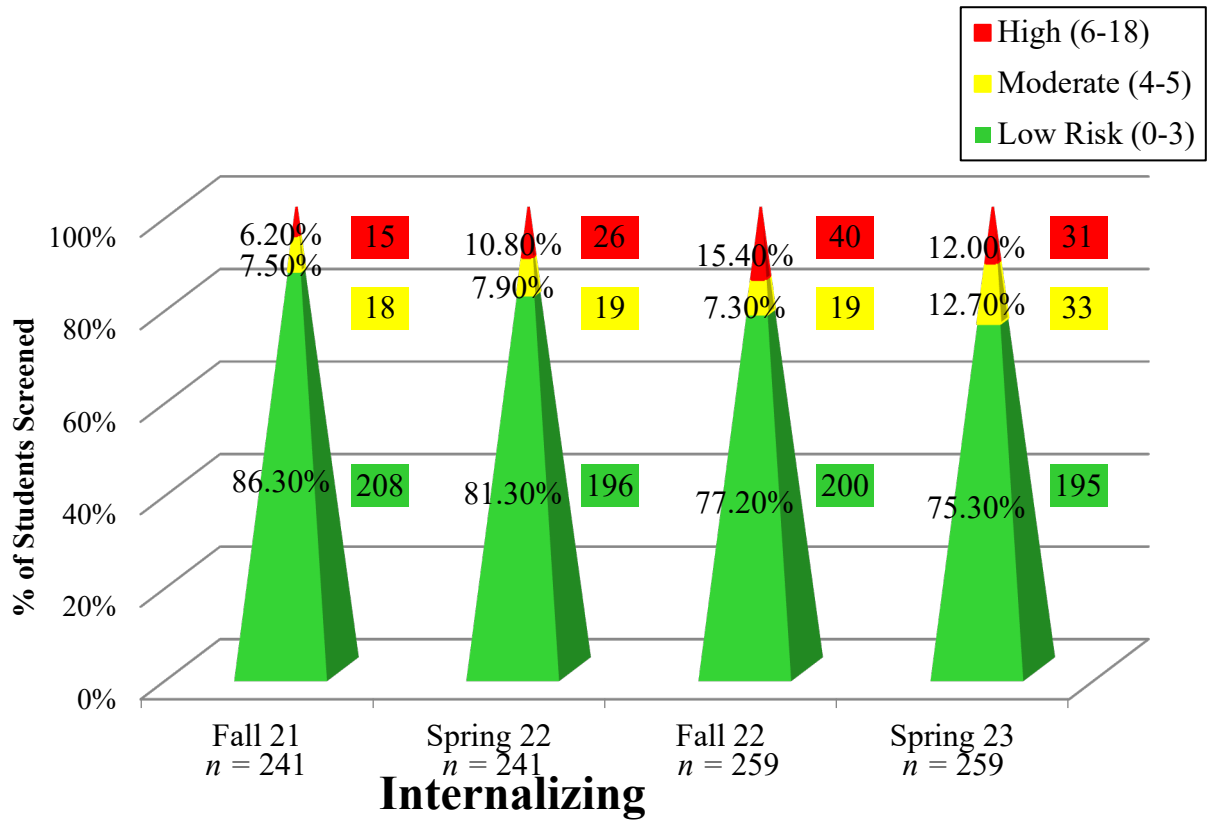
All Grades SRSS-E7 Scores Over Time



Note. SRSS-E7 = *Student Risk Screening Scale—Externalizing.*

Figure 13

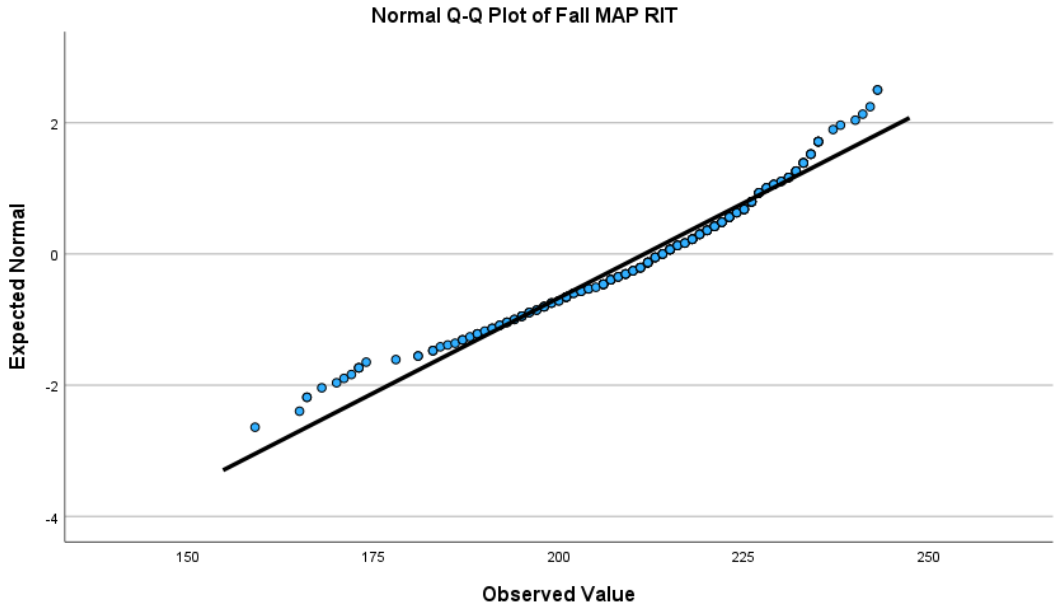
All Grades SRSS-I6 Scores Over Time



Note. SRSS-I6 = *Student Risk Screening Scale—Internalizing.*

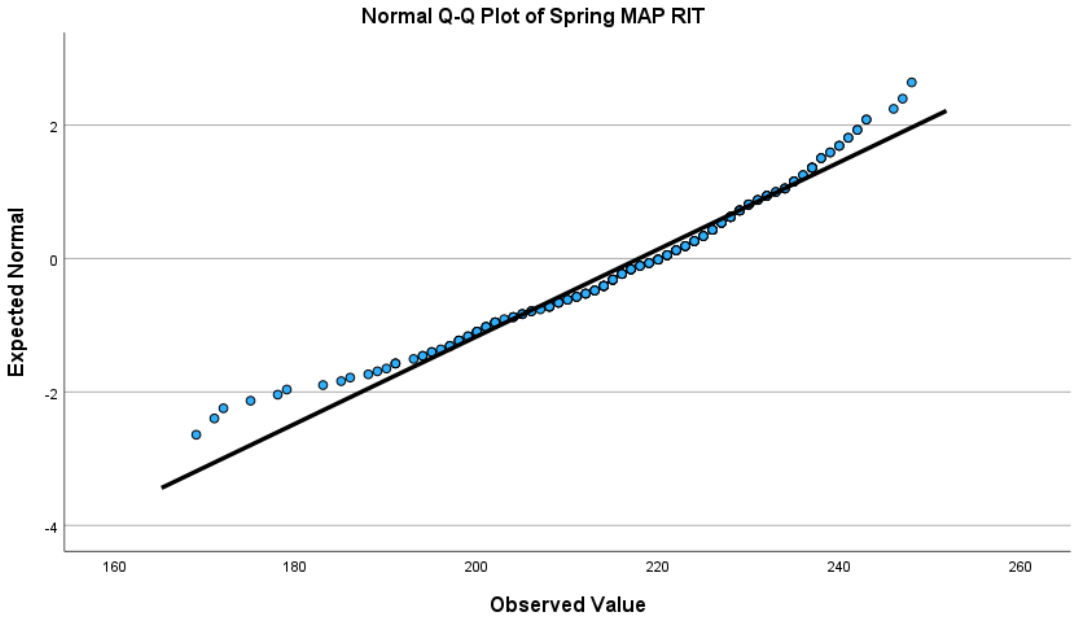
Appendix A

Q-Q Plot of Fall 2021 MAP RIT Scores



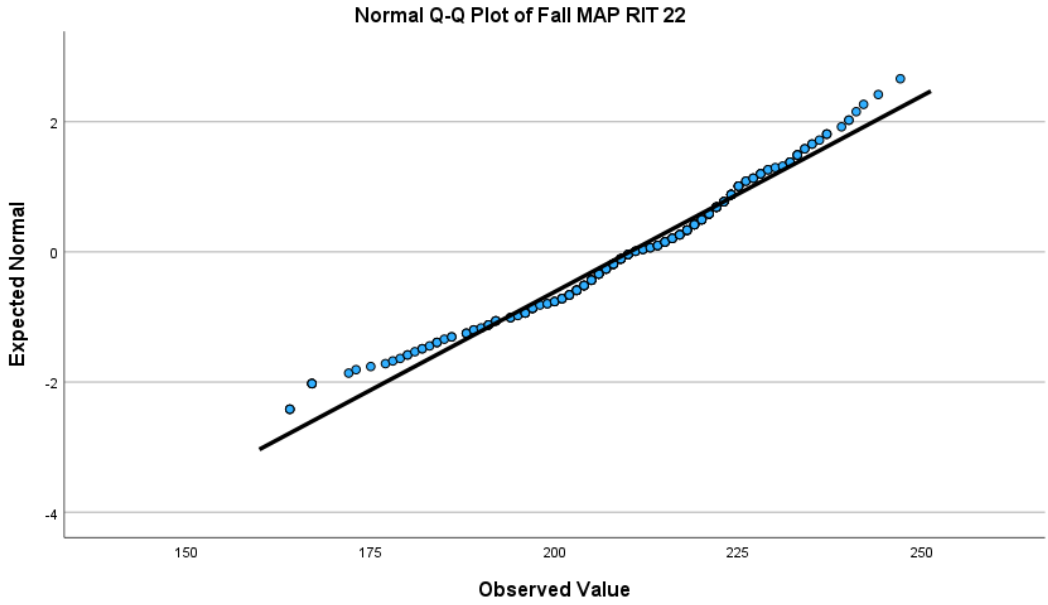
Appendix B

Q-Q Plot of Spring 2022 MAP RIT Scores



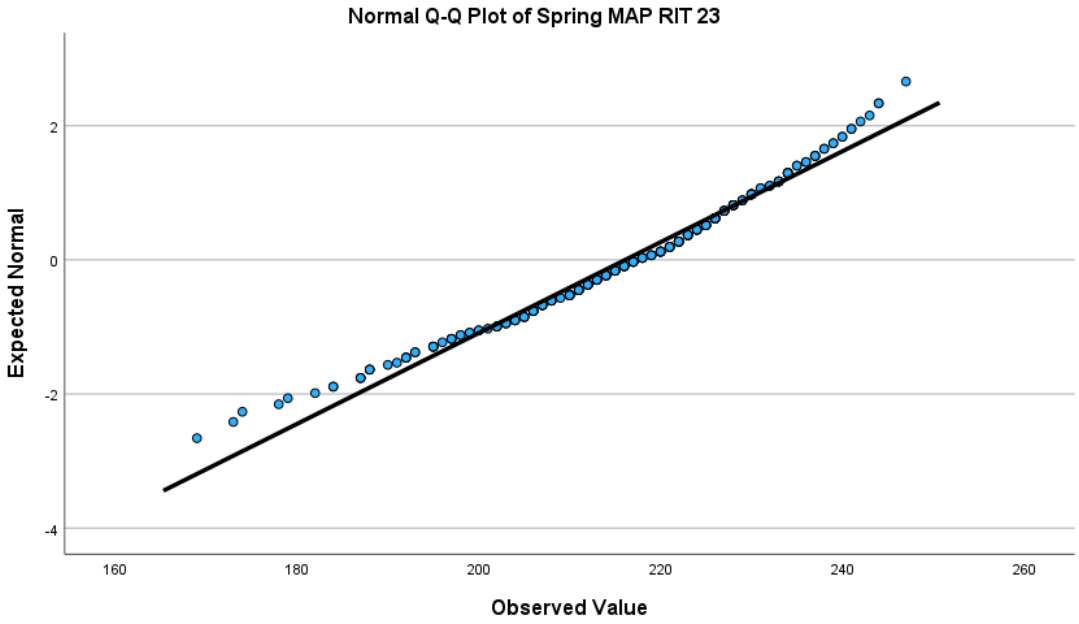
Appendix C

Q-Q Plot of Fall 2022 MAP RIT Scores



Appendix D

Q-Q Plot of Spring 2023 MAP RIT Scores



Appendix E

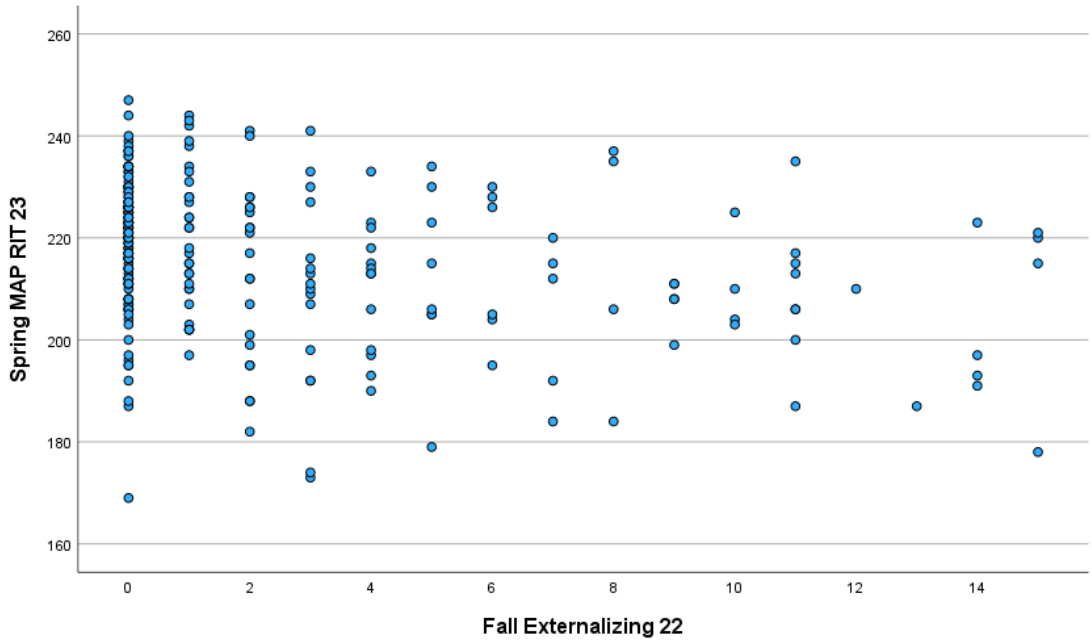
Reading MAP RIT Grade Level Scores for the 50th Percentile across Timepoints

	Fall	Winter	Spring
K	137	146	153
1	156	166	171
2	172	181	186
3	187	194	197
4	197	202	205
5	204	209	211
6	210	214	215
7	214	217	218
8	218	221	222
9	219	221	221
10	221	223	224
11	224	225	225
12	224	224	224

Note. RIT scores for the 50th percentile come from Thum & Kuhfeld, 2020.

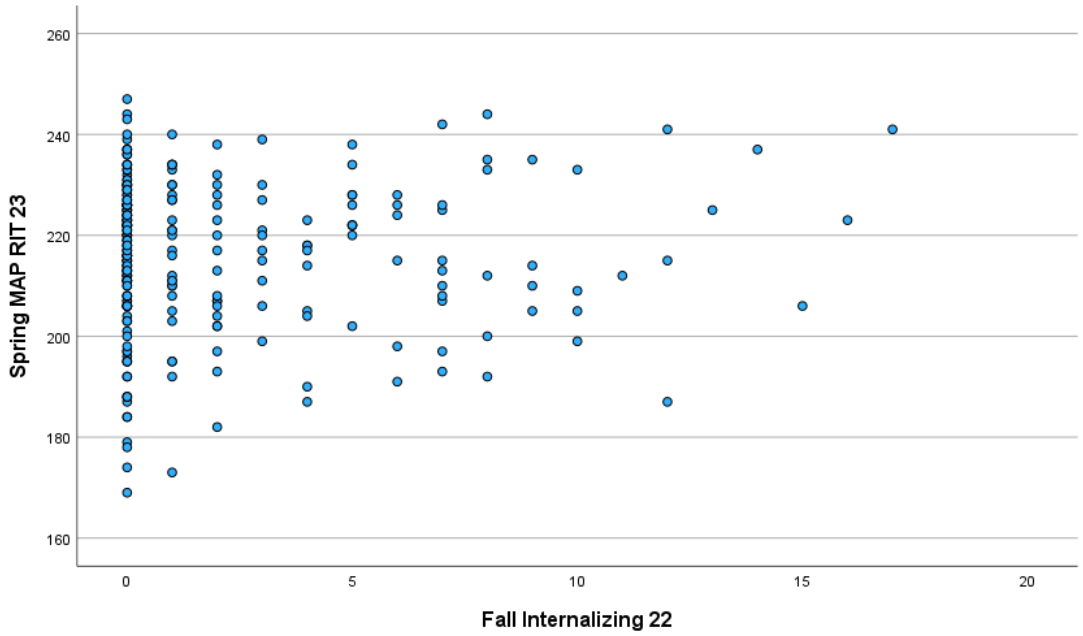
Appendix F

Scatterplot of 2023 Spring Reading MAP RIT and 2022 Fall Externalizing Scores



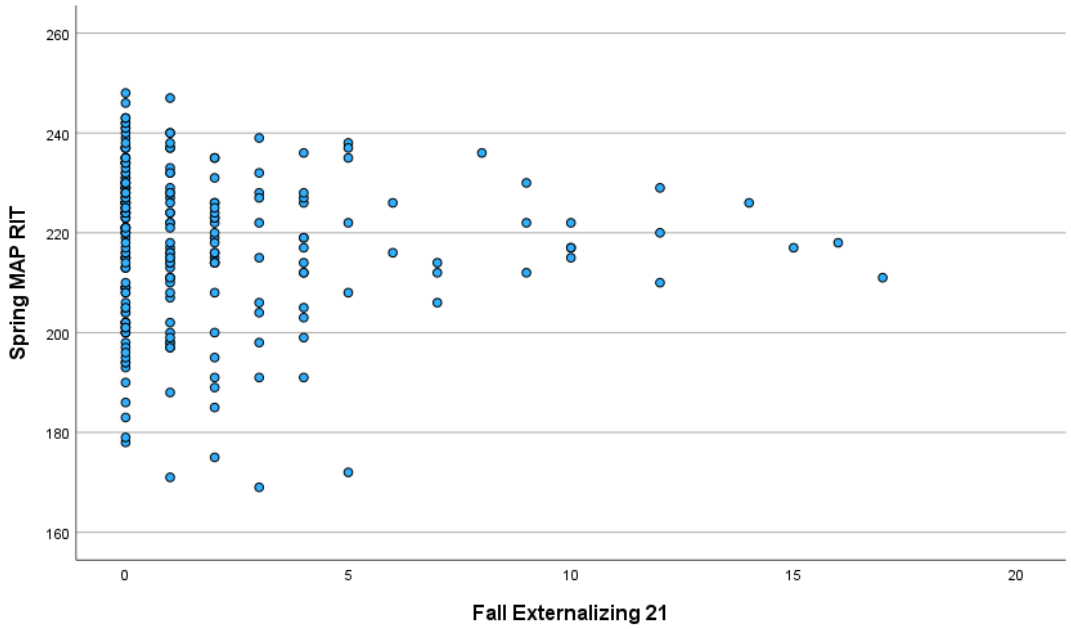
Appendix G

Scatterplot of 2023 Spring Reading MAP RIT and 2022 Fall Internalizing Scores



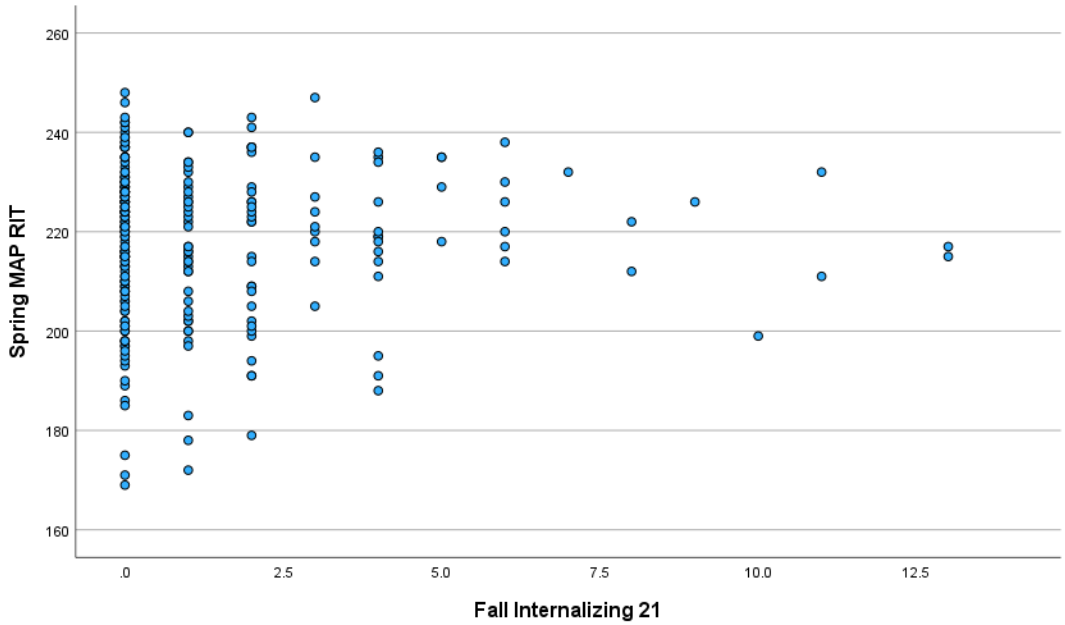
Appendix H

Scatterplot of 2022 Spring Reading MAP RIT and 2021 Fall Externalizing Scores



Appendix I

Scatterplot of 2022 Spring Reading MAP RIT and 2021 Fall Internalizing Scores



Appendix J

Existing Research on the Relations between SRSS-IE and Other Variables

Study	Variable	SRSS-E7	SRSS-I5
Gregory et al., 2021	Office Disciplinary Referrals Total (Spearman correlation)	0.35	0.08
Lane et al., 2019a	MAP reading (Pearson correlation coefficient)	-0.38	-0.21

Note. SRSS-IE = *Student Risk Screening Scale—Internalizing and Externalizing*; SRSS-E7 = Externalizing subscale of the SRSS-IE; SRSS-I5 = Internalizing subscale of the SRSS-IE.

Appendix K

List of Abbreviations

ADHD	attention deficit hyperactivity disorder
AppRISE	*Application for Readiness in Schools and Learning Evaluation*
AIR	American Institutes for Research
ANOVA	analysis of variance
ARS	*Acadience Reading Survey*
AYP	adequate yearly progress
BACESS	*Brief Academic Competence Evaluation Scales System*
BASC-3: BESS	*Behavior Assessment System for Children 3rd Edition: Behavioral & Emotional Screening System*
BESS	*Behavioral and Emotional Screening System*
CBM	curriculum-based measures
Ci3T	Comprehensive Integrated Three-tiered Model of Prevention
CRCs	category response curves
CTT	classical test theory
CEC	Council for Exceptional Children
Df	degrees of freedom
DI	Direct Instruction
DIBELS	*Dynamic Indicators of Basic Early Literacy Skills*
EAHCA	Education for All Handicapped Children Act of 1975
EBD	emotional behavior disorders
EBP	evidence-based practices

EPSB	Education Professional Standards Board
ED	emotional disturbance
ELL	English language learner
ES	effect size
ESEA	Elementary and Secondary Education Act of 1965
ESSA	Every Student Succeeds Act of 2015
FAPE	Free appropriate public education
GPA	grade point average
GRTR	*Get Ready to Read!*
HMR	hierarchical multiple regression
IDEA	Individuals with Disabilities Education Act
IEP	individual education program
IES	Institute of Education Sciences
IRB	Institutional Review Board
ISF	Interconnected Systems Framework
KAS	Kentucky academic standards
KDE	Kentucky Department of Education
KyMTSS	Kentucky multi-tiered system of supports
LRE	least restrictive environment
MAP	Measure of Academic Progress
MTSS	multi-tiered system of supports
NAEP	National Assessment of Educational Progress
NB	negative binomial

NCES	National Center for Education Statistics
NCII	National Center on Intensive Intervention
NCLB	No Child Left Behind Act of 2001
NCLD	National Center for Learning Disabilities
NWEA	Northwest Evaluation Association
ODRs	office disciplinary referrals
PBIS	Positive Behavioral Interventions and Supports
PPS	Percentage of Proficient Students
PSGs	*Performance Screening Guides*
RIT	Rasch unit scale score
RTI	Response to Intervention
SAEBRS	*Social, Academic, and Emotional Behavior Risk Screener*
SD	standard deviation
SDS	*Shaywitz Dyslexia Screen*
SDQ	*Strengths and Difficulties Questionnaire*
SCD	single-case design research
SEER	*Standards for Excellence in Education Research*
SoR	Science of Reading
SSBD	*Systematic Screening for Behavior Disorders*
SSiS	*Social Skills Improvement System*
SRSS	*Student Risk Screening Scale*
SRSS-IE	*Student Risk Screening Scale—Internalizing Externalizing*
WWC	What Works Clearinghouse

CURRICULUM VITAE

Abbi Marie Long, M.Ed., M.Div.
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EDUCATION

Ph.D.	University of Louisville, Louisville, KY Curriculum & Instruction, Special Education OSEP funded doctoral fellow	2024
Rank I	Western Kentucky University, Bowling Green, KY Educational Administration, Leadership, & Research	2018
M.Div.	Louisville Presbyterian Theological Seminary, Louisville, KY	2015
M.Ed.	University of Louisville, Louisville, KY Special Education, LBD	2008
B.S.	University of Southern Indiana, Evansville, IN Elementary Education Magna Cum Laude	2004

PROFESSIONAL EXPERIENCE

Curriculum, Instruction, and Assessment Coach West Middle School, Shelby County Public Schools	2023-present
Admissions and Release Committee Chairperson Shelby County Public Schools	2020-2023
Dean of Students East Middle School, Shelby County Public Schools	2019-2020
Special Education Teacher East Oldham Middle School, Oldham County Public Schools	2017-2019
Director of Ministry St. Matthew's Episcopal Church	2015-2017

Associate Minister, Youth 2012-2014
Middletown United Methodist Church

Special Education Teacher 2005-2012
Henderson County Public Schools

AWARDS

Outstanding Poster Presentation 2022
KY-Council for Children with Behavior Disorders

Carl Fenichel Memorial Research Award 2022
Council for Exceptional Children Division for Emotional and Behavioral Health

Outstanding Education Administration Student
Western Kentucky University 2017

EXTERNAL FUNDING

Math Achievement Fund Mini Grant 2024
West Middle School, Shelby County Public Schools
$40,000
Role in preparation: Author

Purpose: To provide developmentally appropriate diagnostic assessment and intervention services to students, primary through grade 12, to help them reach proficiency in mathematics. The MAF grant provides funding for purchase of materials needed for modification of instruction in mathematics and pay for extended time or release time for teachers to engage in professional learning of the new mathematics materials purchased.

Lowe's Toolbox for Education Grant 2006
South Heights Elementary School, Henderson County Public Schools
$5,000
Role in preparation: Author

Purpose: To create an outdoor learning environment for all students, designed and developed by students with behavioral needs.

PUBLICATIONS

Refereed Publications (peer reviewed, *n* = 2)

1. Elliott, M., **Long, A. M.,** Pollard, J., Fitchett, C., Courtade, G. (2024). Bridging the rural special educator gap: Mentoring to support alternative teacher preparation candidates. *Rural Special Education Quarterly, 43(1).* Online first.

2. **Long, A. M.**, Royer, D. J., Collins, L. (2024). *Increasing reading achievement for middle school students with or at risk of emotional behavior disorders using Seeing Stars* [Manuscript in preparation]. College of Education and Human Development, University of Louisville.

Published Books (*n* = 9)

1. Beaumont, J., & **Long, A. M.** (2017). *These are our bodies: Talking faith & sexuality at church & home, preschool & elementary leader guide.* Church Publishing.

2. Beaumont, J., & **Long, A. M.** (2017). *These are our bodies: Talking faith & sexuality at church & home, preschool & elementary intermediate participant book*. Church Publishing.

3. Beaumont, J., & **Long, A. M.** (2017). *These are our bodies: Talking faith & sexuality at church & home, preschool & elementary intermediate parent book*. Church Publishing.

4. Beaumont, J., & **Long, A. M.** (2017). *These are our bodies: Talking faith & sexuality at church & home, preschool & elementary primary participant book*. Church Publishing.

5. Beaumont, J., & **Long, A. M.** (2017). *These are our bodies: Talking faith & sexuality at church & home, preschool & elementary primary parent book*. Church Publishing.

6. Beaumont, J., & **Long, A. M.** (2017). *These are our bodies: Talking faith & sexuality at church & home, preschool & elementary preschool parent book*. Church Publishing.

7. Beaumont, J., & **Long, A. M.** (2016). *These are our bodies: Talking faith & sexuality at church & home, middle school leader guide*. Church Publishing.

8. Beaumont, J., & **Long, A. M.** (2016). *These are our bodies: Talking faith & sexuality at church & home, middle school participant book*. Church Publishing.

9. Beaumont, J., & **Long, A. M.** (2016). *These are our bodies: Talking faith & sexuality at church & home, middle school parent book*. Church Publishing.

PRESENTATIONS

Keynote Addresses (*n* = 5)

1. **Long, A. M.** (2023, July). *Our family story: Relationships.* [Keynote speaker]. Synod School, Storm Lake, IA. Invited.

2. **Long, A. M.** (2019, November). *Reality Retreat: REALationships*. [Keynote speaker]. Donegal Presbytery Annual Youth Retreat, Northeast, MD. Invited.

3. **Long, A. M.** (2018, March). *Youth ministry and gender.* [Keynote speaker].

Progressive Youth Ministry Conference, Montreat, NC. Invited.

4. **Long, A. M.** (2017, October). *These are our bodies.* Episcopal Missioners for Youth Training. [Keynote speaker] Atlanta, GA. Invited.

5. **Long, A. M.** (2017, January). *Am I good?* [Keynote speaker]. Winter Youth Retreat Southeastern Regional Youth Conference of the UCC, Blowing Rock, NC. Invited.

Invited Presentations and Workshops (n = 8)

1. **Long, A. M.** (2019, October). *These are our bodies: marriage and family therapy.* [Presentation]. Louisville Presbyterian Theological Seminary, Louisville, KY. Invited.

2. **Long, A. M.** (2019, March). *Boundaries, bodies, & consent.* [Staff and leader training] Knox Presbyterian Church, Cincinnati, OH. Invited.

3. **Long, A. M.** (2019, March). *REACH: Quadrants of behavior.* [Presentation] Oldham County Schools, Crestwood, KY. Invited.

4. **Long, A. M.** (2019, February). *REACH Teacher Session: PBIS.* [Presentation] Oldham County Schools, Crestwood, KY. Invited.

5. **Long, A. M.** (2018, September). *Stand by me: Upping classroom structures for all students.* [Workshop leader]. Oldham County Schools, Crestwood, KY. Invited.

6. **Long, A. M.** (2018, October). *Faith and sex: Empowering Christian families.* [Presentation]. Breaking the silence: Festival of theology & alumni reunion, Louisville, KY. Invited.

7. **Long, A. M.** (2018, July). *These are our bodies: Faith and human sexuality.* [Workshop leader]. For Everyone Born Conference, St. Louis, MO.

8. **Long, A. M.** (2017, March). *Complex conversations: Gender, identity, and bodies.* [Presentation] Progressive Youth Ministry Conference, Montreat, NC.

Refereed National Conference Presentations (*n* = 9)

1. Royer, D. J., **Long, A. M.** (2023, March). *Seeing Stars in Hawaii: Improving reading decoding during summer school.* [Poster presentation]. Council for Exceptional Children Annual Convention & Expo, Louisville, KY. Refereed.

2. **Long, A. M.**, Royer, D. J. (2023, March). *Implementing a reading intervention for middle school students with EBD.* [Poster presentation]. Council for Exceptional Children Annual Convention & Expo, Louisville, KY. Refereed.

3. Royer, D. J., **Long, A. M.** (2022, November). *Ethics and research in applied settings:*

Middle school reading intervention outcomes. [Presentation]. Teacher Educators for Children with Behavior Disorders Annual Conference, Tempe, AZ. Referred.

4. Zepp, L., **Long, A. M.**, Folkerts, R. (2022, July). *Collaborating to address the impact of COVID-19 on doctoral students.* [Poster presentation]. Office of Special Education Programs Leadership and Project Directors' Conference. Virtual. Refereed.

5. **Long, A. M.**, Elliott, M., Pollard, J., Fitchett, C., Courtade, G. (2022, January). *Ready or not? Feedback from teachers of students with ESN in an alternative teacher preparation program on their preparedness for implementing HLPs* [Poster presentation]. Council for Exceptional Children Annual Convention & Expo, Orlando, FL. Refereed.

6. Snider, K., **Long, A**. **M.**, Wright, E., O'Neill, K. (2022, January). *Everybody means everybody: FLIPD as a self-monitoring and reflection tool to evaluate PBIS implementation at the classroom level.* [Poster presentation]. Council for Exceptional Children Annual Convention & Expo, Orlando, FL. Refereed.

7. **Long, A. M.** (2021, November). *Increasing reading achievement for middle school students with EBD using Seeing Stars.* Teacher Educators for Children with Behavior Disorders Annual Conference, Tempe, AZ. Refereed.

8. Feger, J., Snider, K., **Long, A. M.** (2021, November). *Make that change! Accelerating transfer of knowledge to practice through FLIPD.* [Presentation]. Teacher Educators for Children with Behavior Disorders Annual Conference, Tempe, AZ. Refereed.

9. **Long, A. M.** (2021, November). *Seeing Stars: Increasing reading achievement for middle school students with or at risk for EBD.* [Poster Presentation]. Annual Conference of the Teacher Education Division of the Council for Exceptional Children-Kaleidoscope, Fort Worth, TX. Refereed.

State and Local Presentations (*n* = 7)

1. **Long, A.M.** (2024, February). [Presentation]. *Using reading MAP Growth data within Multi-Tiered Systems of Support*. Spring Research Conference, Louisville, KY. Refereed.

2. **Long, A. M.**, McDuffie Landrum, K. (2022, November). *How to incorporate specially designed instruction into co-taught settings.* [Presentation]. Kentucky Council for Exceptional Children Annual Conference, Louisville, KY. Refereed.

3. **Long, A. M.**, Elliott, M., Jones, K. (2022, November). *From surviving to thriving: How administrators can support and influence special education teacher retention.* [Presentation]. Kentucky Council for Exceptional Children Annual Conference, Louisville, KY. Refereed.

4. **Long, A. M.**, Royer, D. J., Bird, T. (2022, November). *Social validity matters: Selecting interventions that teachers and students prefer.* [Presentation]. Kentucky

Council for Exceptional Children Annual Conference, Louisville, KY. Refereed.

5. **Long, A. M.**, Royer, D. J. (2022, June). *Increasing reading achievement for middle school students with or at risk for EBD with Seeing Stars*. [Poster presentation]. Behavior Institute, Louisville, KY. Refereed.

6. **Long, A. M.,** Elliott, M., Pollard, J., Fitchett, C., Courtade, G. (2022, May). *What's working in an ATP program? Survey results and next steps for program development: HLPs, cultural competencies, mentoring, and more.* [Poster presentation]. Kentucky Excellence in Educator Preparation, Virtual Conference. Refereed.

7. Snider, K., **Long, A**. **M.**, Wright, E., O'Neil, K. (2021, May). *Decreasing Racial Disproportionality in Exclusionary Discipline: A Professional Development Implementation Tool.* [Poster presentation]. Kentucky Excellence in Educator Preparation, Virtual Conference. Refereed.

TEACHING EXPERIENCE

Instructor, University of Louisville	
EDSP 451: Practicum II	Spring 2023
Co-instructor, University of Louisville	
EDSP 260: Classroom and Behavior Management	Fall 2021
EDSP 518-75: Structured Literacy, Louisville Teacher Residency	Spring 2021
EDSP 518-01: Structured Literacy	Spring 2021
University Supervisor MSD Alternate Certification Program	2020-2021

TEACHING CERTIFICATIONS

KY State Administrative Certification, K-12, Level 2	2018
KY State Special Education, Learning & Behavior Disabilities, K-12	2008
KY State Elementary Education, K-5	2007

SERVICE

Morgan County Public Schools 2022-2023
Effectively Implementing Specially Designed Instruction in Co-Teaching

A two-day in person training with follow-up in person coaching sessions and observations.

Project EMPOWER Kentucky 2022-2023
Identifying and Supporting K-12 Students Within the Context of Three-Tiered Models of Prevention to Meet Students' Multiple Needs

A six-part series of 2-hour professional learning presentations in-person to Kentucky

educators in Louisville, KY.

- Behavior Screening Tools
- Empowering Educators with Low-Intensity Strategies to Increase Engagement and Minimize Disruption
- Supporting Students Who Need More Than Tier 1: Connecting Students with Tier 2 and Tier 3 Interventions
- Supporting Students Across the Tiers: Managing Acting-Out Behavior
- Supporting Students with Internalizing Behavior Patterns
- Supporting Student Self-Determination and Self-Advocacy Through Student Directed IEPs

Hawaii Department of Education
Summer 2022
Seeing Stars Reading Curriculum Four-Day Training Series

Office of Special Education Programs (OSEP) Scholars Steering Committee 2021-2023
Co-chair 2022-2023

Kentucky Educational Development Corporation 2022
From Surviving to Thriving: Supporting Exceptional Child Educators and Students with Disabilities

Greater Louisville Education Cooperative 2021
Framework for Learning Implementation & Professional Development (FLIPD)

PROFESSIONAL AFFILIATIONS

Council for Exceptional Children (CEC)
Teacher Education Division (TED)
Kentucky Teacher Education Division
Division for Research (CEC-DR)
Division of Emotional and Behavioral Health (DEBH)