Examining the Influence of Multi-Tiered Support Systems (MTSS) and Early Warning Indicators on Student Outcomes

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Table of Contents

List of Tables

Abstract

This mixed-methods study explored the integration of Early Warning Indicators (EWIs) within a Multi-Tiered System of Supports (MTSS) framework in a virtual secondary school setting. The primary objective was to determine how predictive indicators—such as attendance, academic performance, and behavioral data—can be used to identify struggling students and guide timely, tiered interventions. Conducted at 21st Century Cyber Charter School, the research investigated three key questions: (1) Which EWIs most effectively identify at-risk students? (2) What barriers hinder MTSS implementation for these students? and (3) What strategies support successful integration of EWIs into MTSS? Quantitative data were drawn from attendance, academic, and behavioral records, while qualitative data were gathered from staff surveys and interviews. Findings revealed that chronic absenteeism and assignment completion rates were among the strongest predictors of student risk. Staff identified barriers including inconsistent data use, limited training, and challenges with intervention fidelity. However, collaborative practices, targeted professional development, and centralized data systems emerged as key facilitators of success. The study concludes that integrating EWIs into MTSS enhances early identification and support for at-risk students, leading to improvements in academic engagement and social-emotional outcomes. Recommendations include investing in staff capacity, refining data practices, and embedding EWI use into daily MTSS operations. These findings offer practical implications for virtual and traditional secondary schools seeking to improve student support systems through data-informed decision-making.

CHAPTER I

Introduction

Secondary education systems are under increasing pressure to address the needs of struggling students before academic failure becomes irreversible. The integration of Multi-Tiered Systems of Support (MTSS) and Early Warning Indicators (EWIs) has emerged as a promising approach to identifying and assisting at-risk students early in their academic journey. However, despite the widespread adoption of these frameworks, there remains a gap in understanding how they can be effectively integrated to provide comprehensive support. Research shows that students who do not receive timely intervention are significantly more likely to experience long-term academic and behavioral challenges, often falling behind their peers.

A 2017 study by Faria et al. found that behavioral data, such as chronic absenteeism and disciplinary actions, frequently precede academic decline and are essential for identifying at-risk students. This study aims to explore the integration of MTSS and EWIs in secondary schools, focusing on how these frameworks can work together to improve outcomes for struggling students. By emphasizing practical implementation and the fiscal implications for schools, this research will contribute to the growing body of knowledge on early intervention strategies and offer actionable insights for educators and administrators looking to better support their students.

Background

The importance of this research lies in its potential to address the growing academic, behavioral, and social-emotional challenges faced by secondary students, particularly those at risk of falling behind or dropping out. As the current Superintendent,

the researcher's primary goal is to ensure equitable educational outcomes for all students. One significant challenge in secondary education is effectively identifying students who are struggling and providing timely interventions that can prevent long-term setbacks.

Research indicates that data-driven, timely interventions are crucial for addressing the needs of at-risk students. Frameworks like MTSS and EWIs can provide schools with tools to support students in a structured, systematic way. As Hattie (2020) notes, "The effectiveness of interventions is greatly enhanced when the needs of students are identified early and responded to in a systematic manner." This researcher's role in ensuring that students at risk of failure receive the support they need reflects a strong commitment to utilizing data for timely interventions.

Capstone Focus

The focus of this research stems from the researcher's reflections on the challenges in supporting at-risk secondary students. With the increasing emphasis on data-driven decision-making, integrating EWIs into MTSS frameworks emerged as a solution to proactively address student needs. The researcher's experience in overseeing student services, coupled with a deep understanding of the complexities of identifying and supporting struggling students, led to the decision to explore how EWIs can be effectively used within the MTSS framework to improve student outcomes. This focus will provide actionable strategies for overcoming the common barriers schools face when implementing these frameworks.

The integration of EWIs and MTSS has the potential to improve academic outcomes, reduce behavioral issues, and enhance students' social-emotional development.

The research will examine how these frameworks can identify students early, tailor interventions to meet their needs, and foster a more supportive school environment.

Research Questions

This study is guided by the following research questions:

1. What are the most effective early warning indicators for identifying struggling students at the secondary level within a school?
2. What obstacles do instructional leaders and teachers encounter when implementing interventions for students identified through early warning systems?
3. What are the most effective intervention strategies that can be integrated into the MTSS framework to address the needs of students identified through early warning indicators?

These questions aim to pinpoint the key elements necessary for successfully implementing MTSS and EWIs, as well as identify the challenges schools face in utilizing these frameworks to support at-risk students.

Expected Outcomes

The expected outcomes of this research are twofold. First, the research aims to identify the most effective EWIs for predicting academic, behavioral, and social-emotional struggles in secondary students. These indicators will form the foundation for building a comprehensive system that guides early intervention strategies. Second, the research will explore the practical challenges schools face in integrating EWIs within the MTSS framework, including data quality, staff training, and resource allocation.

Desired outcomes also include identifying best practices for using these data to implement targeted interventions. This research will offer valuable insights into how schools can adopt a proactive approach to supporting at-risk students, leading to improved academic performance, reduced disciplinary actions, and enhanced social-emotional well-being. By focusing on the integration of these two frameworks, the researcher anticipates providing recommendations applicable across various school contexts, ultimately improving student outcomes.

Fiscal Implications

The fiscal implications of implementing MTSS and EWIs within schools are significant. Schools must invest in systems to collect and analyze data, as well as in professional development to ensure staff are trained to effectively interpret and use this data. Initial costs may include purchasing or upgrading data management systems, training educators, and providing resources to implement interventions across multiple support tiers.

While the financial investment in these frameworks is substantial, the long-term savings are considerable. By identifying and addressing student needs early, schools can reduce the need for costly remedial services and prevent the long-term consequences of academic failure, such as dropout rates and special education referrals. As Bowers and Sprott (2020) assert, “early intervention, when applied correctly, can significantly reduce the long-term costs associated with students failing to meet educational standards.” Therefore, investing in MTSS and EWIs is an investment in both student success and the sustainability of the education system.

Summary

This chapter has introduced the capstone research project by outlining its background, focus, research questions, expected outcomes, and fiscal implications. The integration of Early Warning Indicators and Multi-Tiered Systems of Support offers a promising strategy for addressing the diverse needs of secondary students, particularly those at risk of academic failure, behavioral issues, or social-emotional struggles. The researcher's commitment to improving educational outcomes has driven the selection of this research topic.

The findings from this research will contribute to understanding how these frameworks can be successfully implemented, identify barriers that need to be overcome, and provide evidence-based strategies for supporting at-risk students. The following chapters will delve into existing literature on MTSS, EWIs, and student outcomes, as well as examine the implications of these systems for practice and policy in secondary education.

CHAPTER II

Literature Review

In today's educational landscape, addressing the academic, social, and emotional needs of struggling secondary students is a critical priority. Schools face increasing pressure to improve student outcomes and reduce dropout rates, leading educators to seek systematic, data-driven approaches to identify and support at-risk students. Two key frameworks—Multi-Tiered Systems of Support (MTSS) and Early Warning Indicators (EWIs)—have emerged as central to these efforts. MTSS is a comprehensive model that provides a tiered approach to interventions, ensuring that students receive targeted support based on their unique academic, behavioral, and social-emotional needs. Meanwhile, EWIs offer essential data to identify students at risk of falling behind, allowing schools to intervene before challenges become insurmountable. Integrating these frameworks holds promise for improving outcomes among secondary students.

The significance of MTSS in secondary education cannot be overstated. Hattie (2020) highlights that targeted interventions embedded within data-driven systems like MTSS can significantly impact student achievement. In his synthesis of over 800 meta-analyses, Hattie emphasizes that the effectiveness of these interventions largely depends on the timely and accurate identification of students' needs—an area where EWIs are particularly valuable. By providing predictive data on academic performance, attendance, behavior, and social-emotional well-being, EWIs enable educators to identify students at risk of poor outcomes. This data allows schools to respond with appropriate interventions across the MTSS tiers. Thus, studying the integration of MTSS and EWIs is essential to understanding how schools can effectively address the diverse needs of their students.

Despite the potential of these systems, implementing them poses significant challenges. School leaders, teachers, and support staff often encounter obstacles when delivering interventions for students identified through EWIs. As Faria et al. (2017) point out, a primary barrier is the need for schools to foster a culture of data use and ensure staff are trained to interpret and act on early warning data. Additionally, coordinating academic, behavioral, and social-emotional interventions across MTSS tiers can be particularly challenging in schools with limited resources. These challenges highlight the importance of understanding not only effective practices but also the practical strategies needed to overcome hurdles that may impede the full integration of MTSS and EWIs.

This literature review delves into the critical challenges of implementing early warning indicators (EWIs) and integrating them within Multi-Tiered Systems of Support (MTSS) to improve outcomes for struggling secondary students. The discussion is organized around three guiding themes: identifying effective EWIs, addressing implementation obstacles, and determining best practices for intervention strategies within MTSS. Identifying effective EWIs is a foundational step in any intervention system, as these indicators enable schools to proactively address student needs. Research, such as that by Balfanz and Byrnes (2018), underscores the predictive value of metrics like attendance, behavioral records, and course performance. However, their effectiveness often varies depending on the school context, demographic factors, and the availability of resources to act on the data.

Despite the value of EWIs, translating data into actionable interventions presents significant challenges. Instructional leaders and teachers face obstacles such as limited resources, inadequate training, and inconsistencies in data collection and analysis.

Gordon and Rajan (2021) highlight these barriers, emphasizing the importance of leadership, professional development, and systemic support in enabling schools to effectively use EWI data. Additional challenges, including time constraints, staff buy-in, and equity concerns, further complicate the implementation process. Addressing these issues is essential to ensure that EWI systems are both effective and equitable.

Integrating intervention strategies within the MTSS framework requires a seamless alignment between data-driven decision-making and tiered supports. McIntosh et al. (2018) provide insights into implementing interventions tailored to the needs identified by EWIs, emphasizing the importance of school-wide Tier 1 supports for improving engagement, as well as more targeted Tier 2 and Tier 3 interventions for students with significant academic or behavioral needs. Best practices for fidelity of implementation, scalability, and sustainability in diverse school settings are also explored in the literature.

Together, these guiding themes offer a comprehensive framework for understanding how EWIs and MTSS can intersect to promote equity and improve student outcomes. The works of Balfanz and Byrnes (2018), Gordon and Rajan (2021), and McIntosh et al. (2018) provide a strong foundation for this exploration, highlighting the effectiveness of early interventions while also identifying barriers and pointing to the need for further research on refining practices in diverse educational contexts.

This literature review aims to address gaps in existing research by focusing on the effective integration of MTSS and EWIs in secondary schools. It will explore not only the types of EWIs most predictive of student success but also the challenges schools face in utilizing these data and implementing targeted interventions. By analyzing current

research and case studies, this review will offer insights into how schools can apply evidence-based strategies to support struggling students and improve academic, behavioral, and social-emotional outcomes. The findings have practical implications for educators, policymakers, and administrators seeking to optimize MTSS and EWI systems for maximum impact.

Early Warning Indicators

Early Warning Indicators (EWIs) are essential tools in education for identifying students at risk of academic failure, dropout, or other adverse outcomes. These indicators provide a predictive framework that examines key data points, such as attendance, grades, behavior, and social-emotional factors, to identify students who may require intervention. As the foundation of early warning systems, EWIs enable educators to monitor student progress and intervene proactively before issues escalate. Rosenbaum et al. (2020) highlight the importance of EWIs in various educational contexts, particularly in urban schools, where early identification can lead to targeted interventions. In many secondary schools, ninth grade is considered a critical turning point, as students face increased academic and social challenges during the transition from middle to high school. Bowers and Sprott (2020) emphasize focusing on this pivotal year, demonstrating how predictive indicators at this stage can help identify students most at risk of dropping out or falling behind.

The purpose of EWIs extends beyond mere identification. By tracking academic, behavioral, and social-emotional data, these indicators enable educators to intervene systematically and promptly. When integrated within the MTSS framework, early intervention can help prevent long-term academic failure and disengagement. Used

effectively, EWIs empower schools to reduce dropout rates, improve academic performance, and enhance students' overall well-being. Moreover, EWIs provide a data-driven foundation for personalized interventions tailored to address the unique needs of individual students.

Types of Early Warning Indicators

EWIs can be divided into three primary categories: academic, behavioral, and social-emotional indicators.

Academic Indicators

Academic indicators, including grades, test scores, and course completion rates, serve as direct measures of a student's academic performance. For example, students who consistently score low on standardized tests or show a significant decline in grades over time are often flagged as at risk. Soland et al. (2019) argue that academic indicators are particularly reliable when combined with data analytics, as they offer objective, quantifiable measures of student progress. Additionally, Allensworth and Easton (2007) report that students who fall behind in credits by the end of ninth grade face a significantly higher risk of dropping out. Consequently, academic indicators are invaluable for predicting a student's likelihood of graduating on time.

Integrating artificial intelligence (AI) into early warning systems could enhance our ability to detect at-risk students by analyzing data more comprehensively than traditional methods. By leveraging AI, we could identify complex, subtle patterns within academic indicators such as grades, standardized test scores, and course completion rates that may signal a risk trajectory. This aligns with research by Soland et al. (2019), which emphasizes the reliability of academic indicators when combined with advanced data

analytics, allowing educators to access objective, quantifiable measures of student progress in real time.

Moreover, the work of Allensworth and Easton (2007) highlights how students falling behind in credits by the end of ninth grade face a heightened risk of not graduating on time, reinforcing the value of academic indicators in early identification efforts. With AI, we could automate the analysis of these indicators, detecting declines or inconsistencies in performance early. This proactive approach could significantly aid in developing targeted interventions, potentially reducing dropout rates and improving student outcomes.

Behavioral Indicators

Behavioral indicators, including attendance patterns and disciplinary records, serve as critical data points within Early Warning Indicator (EWI) systems. These indicators often reveal underlying social, emotional, or environmental issues affecting a student's overall well-being, which can subsequently influence academic success. Chronic absenteeism, frequent disciplinary actions, or sudden increases in disruptive behavior are particularly telling. These signs frequently appear before any measurable academic decline, acting as early markers for potential academic risk. By tracking behavioral patterns, educators can detect when a student may be disengaging, facing personal or social challenges, or struggling to manage behavior—all of which are crucial to address for proactive support.

Incorporating behavioral indicators into an EWI system allows schools to go beyond academic data, gaining a more nuanced perspective of each student's experience. For example, Faria et al. (2017) emphasize that the value of these non-academic insights

is substantial, as they can highlight areas where interventions might prevent further disengagement. Recognizing patterns such as repeated tardiness, truancy, or escalating disciplinary actions can help schools quickly identify students who may be on a path toward greater academic challenges. This proactive approach fits well within the Multi-Tiered System of Supports (MTSS) framework, allowing educators to tailor interventions across different tiers based on the intensity and frequency of the behavioral indicators identified. By integrating these behavioral insights into MTSS, schools can implement targeted supports more effectively, aiming to re-engage students before more serious academic impacts arise. This comprehensive approach to EWIs not only deepens an understanding of student risk but also enhances the effectiveness of early interventions, ultimately creating a more supportive and responsive school environment.

Social-Emotional Indicators

Social-emotional indicators encompass aspects of students' mental health, peer and teacher relationships, and general emotional well-being, each playing a significant role in students' academic and personal success. These indicators, while challenging to quantify, offer critical insights into students' psychological and social states. Identifying students struggling with anxiety, depression, or social disengagement can be complex, but understanding these indicators allows educators to provide support through focused interventions. For instance, students dealing with social isolation may benefit from group-based activities or peer mentorship, while those with anxiety might find support through individual counseling sessions or stress-reduction programs. Addressing social-emotional needs not only supports individual students but also contributes to a positive, inclusive school environment where all students can feel safe and supported.

Early Warning Indicators (EWIs) are pivotal in identifying and assisting struggling students. By analyzing a range of data, including academic performance, behavior patterns, and social-emotional well-being, schools can proactively create interventions that address students' diverse needs. EWIs empower educators to identify potential issues before they escalate, allowing for timely, preventive action. Within a Multi-Tiered System of Supports (MTSS), EWIs form a data-informed foundation that supports a holistic, responsive approach to student needs. This integration provides a comprehensive pathway for addressing academic and behavioral challenges, fostering student success, and creating a nurturing, responsive school environment where secondary students can thrive academically, socially, and emotionally.

Predictive Power of EWIs

The predictive power of Early Warning Indicators (EWIs) lies in their ability to provide insights into future student outcomes based on a detailed analysis of historical data. When EWIs are accurately gathered and carefully analyzed, they offer schools a robust tool for identifying students who may be at risk of academic failure or behavioral issues. This proactive approach is supported by studies like Therrien et al. (2020), which examine the accuracy and effectiveness of EWIs within a Multi-Tiered System of Supports (MTSS) framework. Therrien and colleagues found that early warning systems, when implemented within MTSS, can help schools' pinpoint students at high risk, allowing educators to address potential issues before they escalate into more severe problems, such as course failures or disciplinary actions that might lead to suspension or expulsion. The predictive insights provided by EWIs are invaluable for guiding timely interventions, ultimately helping to keep students on track for success.

However, the reliability of EWIs depends heavily on the quality, accuracy, and timeliness of the data being used. Incomplete, inconsistent, or outdated data can significantly reduce the efficacy of early warning systems, leading to misidentifications or missed opportunities to intervene. Sugai and Horner (2019) underscore the importance of maintaining high-quality data practices within the MTSS model, noting that the sustainability and long-term success of early warning systems require regular data updates and continuous monitoring. Without these ongoing processes, schools risk basing decisions on stale data, which limits their ability to adapt to the ever-changing needs of their students. Therefore, the true potential of EWIs is realized when schools invest in systems and practices that ensure data remains current and actionable, allowing educators to make informed, evidence-based decisions that positively impact student outcomes. Through a dynamic integration of EWIs within MTSS, schools are better positioned to foster an environment where at-risk students receive timely support, ultimately improving their educational journey.

Challenges in Implementing EWIs

Implementing Early Warning Indicators (EWIs) within schools presents complex challenges that extend beyond simple data collection and analysis. One major hurdle is ensuring data accuracy and consistency across different school systems. Schools often use multiple platforms and databases to record student information, making it difficult to synchronize EWI data across platforms. Inconsistent data entry practices or incompatible systems can result in gaps or inaccuracies in the information available to educators, which can compromise the reliability of the EWI system. Additionally, the Institute of Education Sciences (IES, 2021) highlights that many schools lack the infrastructure and

training necessary to collect and interpret this data accurately. Without adequate technological infrastructure, schools may struggle to manage and store vast amounts of student data effectively, which is essential for identifying trends and patterns that indicate risk. Further, integrating EWIs into existing systems, such as learning management systems or district-wide databases, can pose logistical challenges that require substantial technological investment. Staff training, essential for interpreting data accurately, also requires both time and resources, which may be limited, especially in underfunded districts. Teachers and support staff often need specialized training in data literacy to make informed decisions based on EWI data. Without this training, they might struggle to differentiate between students who need immediate intervention and those experiencing temporary setbacks.

Another challenge lies in tracking and measuring social-emotional indicators, which are increasingly recognized as critical to student success but are inherently more subjective. While academic and behavioral data are relatively straightforward to track, social-emotional indicators, such as student engagement, resilience, and self-regulation, are less tangible and harder to quantify. Tools for measuring these indicators, such as surveys or observational assessments, may lack reliability or face inconsistencies in implementation. Additionally, teachers and school staff may not feel equipped to interpret these indicators accurately, leading to potential misclassification of students. As a result, schools might struggle to create a comprehensive risk profile for each student, especially if social-emotional data is unreliable or inconsistently collected.

Overidentification is another significant risk in implementing EWI systems, particularly in schools that rely heavily on automated data analysis. Automated systems,

while efficient, can lack the nuance necessary to capture a student's unique context. In under-resourced schools, where staffing shortages or time constraints might lead educators to lean heavily on automated alerts, this overreliance could exacerbate issues of inequity. Burns and Gibbons (2012) caution that without careful oversight, EWI systems could disproportionately flag students from marginalized backgrounds due to systemic biases embedded in the data or algorithms. This misidentification could lead to unnecessary interventions that might inadvertently stigmatize or marginalize these students further. Therefore, integrating professional judgment and contextual understanding alongside EWI data is essential to avoid the ethical dilemmas that can arise from overidentification.

Another challenge in EWI implementation is the difficulty of sustaining consistent intervention support after students are identified as at-risk. Once flagged by an EWI, a student may need intensive support, but not all schools have the resources to provide sustained interventions, especially for students who may require long-term or multi-tiered support. For schools with limited personnel or funding, the inability to provide consistent follow-up risks undermining the EWI system's effectiveness. For example, an at-risk student identified for frequent absences may initially receive attention but may slip through the cracks without continuous monitoring and support. Maintaining an effective EWI system thus requires substantial, ongoing resources and a commitment to follow through with timely, evidence-based interventions.

In summary, while EWIs offer valuable insights into student performance, successful implementation demands overcoming significant challenges related to data collection, interpretation, and the ethical implications of intervention. Addressing these

challenges requires not only technological investment but also a commitment to professional training and ethical oversight. When these elements are in place, EWIs can serve as a transformative tool within the MTSS framework, enabling schools to intervene early and support students more effectively, thereby improving long-term academic and social outcomes.

Multi-Tiered System of Supports (MTSS)

The Multi-Tiered System of Supports (MTSS) is a structured, multi-layered framework that addresses the diverse academic, behavioral, and social-emotional needs of students, offering tailored support through a continuum of interventions. At its foundation, MTSS operates on three distinct levels, or "tiers," to provide appropriate support based on each student's unique needs. Tier 1 focuses on universal supports, ensuring that all students have access to high-quality instruction and general supports designed to foster success in the mainstream learning environment. Students who exhibit additional needs receive more focused, small-group interventions through Tier 2, addressing specific academic or behavioral challenges in a more targeted way. For students requiring the most intensive support, Tier 3 offers highly individualized interventions, often involving specialized strategies and frequent progress monitoring. This tiered structure allows educators to adjust intervention levels according to each student's progress, making MTSS a dynamic and responsive framework for addressing challenges before they grow. Strom and Strom (2021) highlight that the data-driven nature of MTSS is especially critical in high schools, where timely and coordinated responses to student issues are crucial, given the more complex academic and social-emotional landscape faced by adolescents.

A key distinguishing feature of MTSS is its integration of both academic and behavioral support systems. This whole-child approach is a step beyond traditional frameworks like Response to Intervention (RTI), which has historically focused on academic interventions alone. MTSS combines the strengths of RTI with additional layers of behavioral and social-emotional support, creating a robust and comprehensive system that can better address the full range of student needs. This inclusive model is particularly advantageous in secondary schools, where students are not only managing academic demands but also grappling with unique developmental challenges, such as navigating peer relationships, mental health issues, and potential disengagement from school. By interweaving academic, behavioral, and social-emotional supports, MTSS addresses these varied aspects, promoting well-rounded student development and resilience. Research by Gonzalez and Lambert (2022) underscores the efficacy of MTSS in secondary education, as it creates a responsive environment where educators can provide proactive, holistic support for students, ultimately contributing to improved outcomes across all facets of student life.

Integration of Early Warning Indicators (EWIs) in MTSS

Early Warning Indicators (EWIs) are essential for the effective implementation of MTSS in secondary schools, serving as the initial mechanism for identifying students who require additional support. These indicators—such as attendance, behavior, and course performance—enable educators to proactively address potential issues, ideally before they escalate. Within the MTSS framework, EWIs trigger interventions based on a comprehensive range of data from academic, behavioral, and social-emotional domains. Balfanz and Byrnes (2018) provide a detailed guide on embedding EWIs into MTSS,

offering a structured methodology for educators to integrate early warning systems with broader intervention strategies.

Case studies highlight the success of incorporating EWIs into MTSS. For instance, Therrien et al. (2020) report that schools using EWIs within MTSS are better equipped to identify and support students at risk of academic failure or dropping out. In these cases, EWIs serve as a diagnostic tool, providing timely, actionable data that informs decisions about the appropriate intervention tier for each student. As educational institutions increasingly adopt data-driven approaches, integrating EWIs into MTSS has become a key strategy for improving secondary students' academic and social outcomes.

Research supports MTSS's effectiveness in promoting both academic and social-emotional growth among secondary students. For academic progress, MTSS provides a structured, multi-tiered approach that addresses individual student needs through targeted interventions. Gonzalez and Lambert (2022) specifically examine MTSS's role in fostering students' social-emotional learning (SEL), finding that it enhances students' emotional well-being and school engagement, while also improving academic performance.

Effectiveness of MTSS in Secondary Schools

MTSS is particularly effective in addressing the social-emotional and behavioral challenges that can hinder academic achievement. Gonzalez and Lambert (2022) find that students receiving targeted MTSS interventions experience positive changes in emotional regulation, peer relationships, and mental health. These benefits lead to increased student engagement, a reduction in behavioral incidents, and a more supportive school

environment overall. By addressing these non-academic factors, MTSS ensures that students receive the comprehensive support necessary for academic success.

Nonetheless, maintaining the effectiveness of MTSS requires ongoing commitment and resources. Sugai and Horner (2019) highlight the importance of consistently adhering to MTSS principles over time, particularly in secondary schools where staff turnover and limited resources may hinder consistent implementation. Sustaining MTSS practices involves regular professional development, leadership support, and continuous access to up-to-date data. Furthermore, integrating EWIs within MTSS ensures that interventions are data-driven, thereby increasing the likelihood of positive, long-term outcomes for students requiring additional support.

MTSS provides a comprehensive framework that addresses students' academic, behavioral, and social-emotional needs. The integration of EWIs within MTSS enables schools to effectively identify at-risk students and deliver targeted, tiered interventions. MTSS's demonstrated impact on both academic and emotional development highlights its value as a crucial support system in secondary education. However, the successful implementation of MTSS requires ongoing dedication to data-informed practices, staff training, and adequate resources to sustain these interventions over time.

Student Outcomes

Academic Outcomes

The integration of Early Warning Indicators (EWIs) and Multi-Tiered Systems of Support (MTSS) in secondary education aims to address and mitigate academic challenges that can hinder student achievement. By proactively identifying students at risk of academic failure, schools can implement tailored, data-driven support strategies

that directly address individual needs. This support spans core subjects, where students often face the greatest challenges, and seeks to enhance their performance on standardized assessments. Research underscores the effectiveness of these interventions, showing that combining MTSS frameworks with EWIs can lead to notable improvements in student grades and test scores. For instance, Gordon and Rajan (2021) found in their systematic review of MTSS in secondary schools that students in schools utilizing these frameworks consistently outperformed their peers in settings without MTSS. The data reflects not only short-term academic gains but also sustained growth when interventions are continuously monitored and adapted to meet the evolving needs of students.

The broader impact of MTSS goes beyond improving individual academic scores, as it also addresses systemic issues like dropout rates. Through early identification of at-risk students and the timely implementation of supportive interventions, MTSS fosters an educational environment where students feel capable and motivated to persevere. Allensworth and Easton (2007) demonstrated the success of such an approach in Chicago Public Schools, where students flagged by EWIs who subsequently received targeted interventions had a significantly higher likelihood of staying on track for graduation. This preventative model reduces the risk of students becoming overwhelmed and discouraged to the point of disengagement, which has historically led many to leave school prematurely. MTSS cultivates a school culture centered on academic success and personal growth, both of which are instrumental in motivating students to continue their education and reach graduation. In essence, MTSS and EWIs together create a structured, supportive environment that enhances not only academic performance but also the long-term educational outcomes for students.

Social-Emotional Outcomes

MTSS provides a comprehensive framework for addressing students' academic and social-emotional needs, which are increasingly crucial in secondary education as students navigate complex developmental and emotional challenges. Adolescents today face heightened mental health concerns, from anxiety and depression to the social pressures of school and the broader social world. These social-emotional demands can significantly impact academic performance, attendance, and engagement if left unaddressed. Within MTSS, Social-Emotional Learning (SEL) serves as a core component, recognizing that students' emotional well-being directly influences their academic success and overall school experience. Schools that integrate SEL within MTSS, according to Gonzalez and Lambert (2022), observe improvements in student engagement, emotional stability, and overall school climate. This approach promotes a more supportive, inclusive environment that prioritizes students' holistic development.

Research further supports the positive impact of SEL through MTSS frameworks on students' mental health. Durlak et al. (2010) meta-analysis of SEL programs revealed that such interventions lead to meaningful reductions in anxiety and depression, as well as improvements in self-regulation, empathy, and social skills. These effects are especially powerful when SEL is tiered to meet individual needs, as MTSS enables schools to provide universal, targeted, and intensive support depending on each student's level of need. As a result, students who participate in SEL interventions not only experience a stronger sense of belonging within their school communities but also achieve better academic outcomes. The correlation between social-emotional health and academic success is well-documented: students who feel emotionally secure and valued

are more likely to engage in their studies, persist through challenges, and succeed academically.

Behavioral Outcomes

In addition to academic and social-emotional improvements, MTSS has a substantial impact on student behavior. Schools that implement MTSS frameworks often observe reductions in disciplinary actions, such as suspensions and expulsions. This decline stems from MTSS's proactive approach to identifying and addressing behavioral issues early. Sugai and Horner (2019) discuss MTSS's emphasis on positive behavior support, utilizing tiered interventions to address behavioral challenges promptly. By intervening early, schools can prevent minor behavioral issues from escalating into more serious infractions.

Another beneficial outcome of MTSS is improved student attendance. Chronic absenteeism is a strong predictor of poor academic performance and higher dropout rates. When schools monitor attendance through EWIs and employ MTSS to provide timely support, they can effectively intervene with students displaying patterns of absenteeism. Sugai and Horner (2019) suggest that schools with robust MTSS frameworks experience notable reductions in absenteeism. By identifying disengaged students, schools can offer targeted support to re-engage them, enhancing overall attendance and strengthening their connection to the school community. MTSS's early intervention approach ensures that both academic and behavioral challenges are addressed comprehensively, equipping students with the tools they need to succeed.

In summary, MTSS positively impacts academic, social-emotional, and behavioral outcomes, highlighting its value in secondary education. By integrating EWIs

into the support system, schools can provide timely assistance to students, leading to improved academic performance, emotional stability, and better behavior.

Barriers and Challenges

A significant barrier to the successful implementation of MTSS and EWIs is achieving school-wide adoption. While MTSS offers a comprehensive support framework, securing buy-in from all stakeholders can be challenging. Schools often face difficulties in ensuring consistent implementation across departments, grade levels, and staff members. Fixsen et al. (2005) highlight that the fidelity of any intervention system, including MTSS, is frequently compromised by inconsistent application. Schools may struggle to develop a unified approach to integrating EWIs into their MTSS practices, particularly when the importance of such systems is not uniformly recognized.

Staff resistance is another common obstacle, particularly among those who are hesitant to adopt new frameworks or feel unprepared for the data-driven decision-making that MTSS entails. According to the National Center on Intensive Intervention (2021), staff resistance is especially prevalent in secondary settings, where educators may prefer traditional intervention models or lack experience with EWIs to guide instructional decisions. Additionally, training gaps often hinder staff from fully implementing MTSS. Without adequate professional development, educators may feel unequipped to utilize EWI-generated data or to carry out tiered interventions effectively.

Resource Allocations

Resource allocation also poses a significant barrier to the implementation of MTSS and EWIs. Sustaining these systems requires substantial financial investment, particularly in underfunded schools or districts. Funding is needed for staff training, data

management systems, and intervention programs, all of which can strain already limited budgets. The Council of the Great City Schools (2019) emphasizes that successful MTSS implementation often demands a long-term financial commitment, especially in urban districts where resources may be stretched thin.

Technological limitations also pose challenges to the integration of MTSS and EWIs, as schools require reliable data systems to monitor and analyze student progress. Effective data collection, storage, and analysis demand sophisticated technological infrastructure, which can be costly and difficult to implement. The Education Trust (2020) highlights those technological deficiencies, such as outdated or limited data systems, can hinder the real-time use of EWIs. Schools without adequate technology may struggle to effectively integrate EWIs into the MTSS framework. Without proper data management tools, EWIs lose their predictive value, and MTSS's ability to provide timely interventions is compromised.

Teacher and Staff Training

The quality of professional development for teachers and staff is a crucial determinant of the success of MTSS and EWI systems. Training ensures educators can implement MTSS with fidelity and use EWIs to inform interventions. Burns and Gibbons (2012) emphasize the importance of continuous professional development that equips staff with the skills needed for data collection and analysis, interpreting early warning indicators, and applying tiered support interventions.

Effective teacher training programs are comprehensive and ongoing, providing the necessary tools and support throughout the implementation process. Horner and Sugai (2020) advocate for a systems-level training approach, where teachers, administrators,

and support staff learn not only about the technical aspects of MTSS and EWIs but also about the collaborative nature of the framework. Schools must foster a culture of shared responsibility, where staff are collectively invested in student success. This shared responsibility necessitates training that addresses both the theoretical foundations of MTSS and its practical applications.

In addition to general professional development, specialized training is essential for teachers working with students facing more severe academic, behavioral, or social-emotional challenges. MTSS aims to meet the needs of all students, so training must equip staff to effectively implement both universal (Tier 1) and targeted (Tiers 2 and 3) interventions. Without comprehensive training, MTSS implementation can become inconsistent, resulting in suboptimal support for the students who need it most.

Within the MTSS framework, various types of interventions address students' diverse needs, categorized into academic, behavioral, and social-emotional supports, each tailored to specific challenges.

Intervention Strategies

Within the Multi-Tiered Systems of Support (MTSS) framework, intervention strategies play a crucial role in addressing the diverse needs of students across academic, behavioral, and social-emotional domains. Academic interventions specifically target students who are struggling in core academic areas, providing them with the tools necessary to bridge gaps in achievement. These interventions range from one-on-one tutoring and small-group instruction to structured remediation programs. The RTI Action Network (2019a) highlights that interventions such as differentiated instruction, supplemental learning, and additional tutoring can be tailored to address specific

weaknesses identified through Early Warning Indicators (EWIs). These supports are particularly effective in closing achievement gaps by reinforcing essential skills in subjects like literacy and mathematics, ensuring that students who fall behind receive intensive, personalized attention to help them get back on track.

Behavioral interventions within MTSS aim to support students facing attendance issues, discipline challenges, or difficulties with social interactions. Positive Behavioral Interventions and Supports (PBIS), a widely recognized behavioral framework within MTSS, promotes positive behavior through reinforcement and structured support systems. Interventions such as counseling, behavioral contracts, and mentorship programs provide individualized support, helping students navigate challenges while fostering a positive school environment. According to the RTI Action Network (2019b) behavioral interventions are most effective when aligned with EWI data, particularly for students who are chronically absent or exhibit frequent disciplinary issues. By addressing behavior proactively, MTSS frameworks help schools manage minor issues before they escalate, fostering a more constructive school climate.

In recent years, social-emotional interventions have gained prominence within MTSS as schools recognize the impact of emotional well-being on academic and behavioral success. Social-Emotional Learning (SEL) programs focus on helping students build skills such as self-regulation, empathy, and problem-solving. The American Institutes for Research (2022) notes that integrating SEL programs into the MTSS framework can yield impressive results, particularly in addressing common issues among adolescents, including anxiety, stress, and bullying. Schools that implement tiered SEL programs not only support academic performance but also promote mental health and

overall well-being, fostering an environment where students feel supported both emotionally and academically.

Case Studies

The efficacy of MTSS interventions is illustrated through various case studies highlighting its successful application in underfunded, diverse school settings. In Chicago Public Schools (CPS), MTSS was implemented to tackle both academic and behavioral challenges across a large, diverse student population. Through a focus on professional development, data-driven decision-making, and early interventions, CPS experienced positive outcomes, particularly in literacy. Targeted elementary schools, for example, saw significant improvements in literacy rates among students identified as at-risk following the implementation of tiered reading interventions. Additionally, CPS introduced social-emotional supports that helped students build resilience and manage behavior, leading to fewer disciplinary referrals and a more supportive learning environment (Durlak et al., 2010).

In Texas, Pasadena Independent School District (PISD) serves a predominantly low-income, Hispanic student population, and has successfully applied MTSS to boost academic performance and address social-emotional needs. PISD tracked early warning indicators (EWI) such as attendance, grades, and behavior to identify students requiring Tier 2 and Tier 3 interventions, which included small-group instruction and individualized support. By focusing on early, targeted interventions, PISD observed improved reading comprehension and math scores and reported a reduction in dropout rates. These successes were attributed to strong teacher collaboration and partnerships

with community organizations that provided additional resources (Education Trust, 2020).

Similarly, Oakland Unified School District (OUSD) adopted MTSS to close achievement gaps and reduce suspension rates in a highly diverse, resource-limited district. OUSD's MTSS framework included academic supports tailored to varying student needs and restorative justice practices that promoted social-emotional learning and reduced reliance on punitive discipline. Furthermore, OUSD embedded culturally responsive teaching within MTSS to ensure interventions were both equitable and relevant to its student population. This approach led to an increase in grade completion rates and a decrease in behavioral incidents, demonstrating the positive impact of culturally competent, data-informed interventions on student outcomes (Education Trust, 2020).

These cases underscore MTSS's adaptability and effectiveness in driving student success in diverse, underfunded school environments. When paired with data-informed decision-making, staff training, and a holistic view of student needs, MTSS proves to be an invaluable framework for promoting academic achievement and social-emotional development, even in settings with limited resources.

Best Practices

Research consistently highlights several best practices within the MTSS framework to improve student outcomes. One of the most significant is data-driven decision-making, which enables schools to implement interventions that are precise, timely, and tailored to individual student needs. Schools with robust data management systems and frequent progress monitoring are more effective at identifying at-risk

students early, allowing them to respond with appropriate support measures. The American Institutes for Research (2022) reports that schools utilizing continuous progress monitoring experience substantial improvements in academic performance and reductions in behavioral issues, as data-informed interventions can be rapidly adjusted to meet changing student needs.

Professional development for educators is another critical component of successful MTSS implementation. Teachers and support staff need ongoing training to effectively apply tiered interventions, interpret EWI data, and adapt their instructional practices. Schools that invest in comprehensive, high-quality professional development foster a culture of continuous improvement, which directly benefits student outcomes. According to The Education Trust (2020), schools with structured professional development experience sustained gains in student engagement and achievement, as educators are better equipped to support diverse learners.

Collaboration among educators is also a best practice essential to the success of MTSS. Effective implementation requires cross-functional teams that include teachers, administrators, counselors, and data specialists working together to design and monitor interventions. Regular meetings to review student data, assess intervention effectiveness, and share insights ensure that students receive consistent, coordinated support. These collaborative practices help ensure that MTSS is implemented with fidelity, as staff members from various departments work together to address each student's unique academic, behavioral, and social-emotional needs.

The integration of MTSS in schools through evidence-based intervention strategies, collaborative practices, data-driven decision-making, and ongoing professional

development has been shown to significantly improve student outcomes. By adopting these best practices, schools can ensure that MTSS frameworks effectively support students' academic performance, reduce dropout rates, and foster a positive and inclusive learning environment.

Key Findings

This literature review has explored the pivotal role that Early Warning Indicators (EWIs) and the Multi-Tiered System of Supports (MTSS) play in identifying and addressing the needs of struggling secondary students. EWIs serve as invaluable tools for educators, enabling them to predict which students are at risk of academic failure, behavioral challenges, or social-emotional difficulties. By highlighting academic, behavioral, and social-emotional indicators, EWIs allow schools to implement early and effective interventions. Integrating EWIs within the MTSS framework fosters a comprehensive support system capable of meeting the diverse needs of students. The evidence gathered underscores the significant positive impact that MTSS has on student outcomes, particularly when interventions are tailored to support at-risk students.

A key finding from this review is the demonstrated effectiveness of MTSS in improving student outcomes at the secondary level. Research consistently shows that MTSS positively impacts both academic achievement and social-emotional well-being, especially when interventions are tailored to students' specific needs. The integration of EWIs into MTSS further enhances its effectiveness by providing a data-informed approach to identifying students who require additional support. For example, studies by Balfanz and Byrnes (2018) and Sugai and Horner (2019) indicate that schools using EWI data within their MTSS practices experience marked improvements in graduation rates,

student behavior, and overall engagement. This suggests that reliable, data-driven intervention practices can significantly improve student outcomes and underscores the importance of schools prioritizing the systematic use of EWI data to guide intervention decisions.

Implications for Practice and Policy

The implications for practice and policy underscore a pressing need for schools to establish comprehensive frameworks for the integration of Early Warning Indicators (EWIs) within Multi-Tiered Systems of Support (MTSS). Schools must prioritize investing in high-quality data systems that allow for real-time tracking of indicators such as attendance, behavior, and course performance. These systems should be user-friendly, accessible, and able to compile data in ways that clearly highlight student needs. Additionally, to support the effective use of EWIs, schools need ongoing, targeted professional development for teachers and staff, equipping them with the skills to interpret data accurately and apply it in intervention strategies. Effective use of EWIs requires both a shared understanding of student risk factors and a commitment to data-driven decision-making across all levels of school staff. This holistic approach enables educators to move beyond reactive strategies, fostering early intervention and support tailored to individual students' needs.

From a policy perspective, federal and state support is critical to ensuring that all schools, especially those in under-resourced communities, have the resources to implement MTSS and EWI systems effectively. The U.S. Department of Education (2020) emphasizes the role of policy in bridging resource gaps, particularly in schools with high populations of low-income or minority students. Funding for professional

development, data infrastructure, and technological support must be allocated in ways that prioritize equity, ensuring that all schools, regardless of funding or location, can maintain robust MTSS frameworks. Moreover, state-level policies should facilitate access to a standardized set of EWI metrics and processes, enabling consistency in implementation across districts and supporting schools in building a sustainable data culture. For example, mandating annual reviews of EWI data and intervention effectiveness at the district level could help standardize practices, track progress, and identify specific areas for policy intervention.

Further, policies must account for the unique needs of schools in different socioeconomic contexts. Schools in high-risk or low-income areas may require additional resources or flexibility to address community-specific challenges, such as higher rates of chronic absenteeism or exposure to adverse childhood experiences. Policymakers should explore avenues for enhanced funding streams, such as grants for mental health support, family engagement initiatives, or community partnerships, to support schools in these areas. Addressing these challenges may also involve incentivizing collaboration between schools and local agencies, as well as expanding school-based social services. Additionally, equitable resource allocation is essential to closing achievement gaps and promoting student well-being across diverse school settings.

Finally, successful implementation of MTSS and EWI systems depends heavily on the skills and knowledge of educators and support staff. Therefore, schools must prioritize not only initial training but also ongoing professional development to build capacity in data-driven intervention practices. Teachers, administrators, and support personnel need regular opportunities to deepen their understanding of MTSS processes,

practice interpreting EWIs, and engage in collaborative problem-solving to address student needs. Evidence indicates that schools where staff are well-prepared to monitor and respond to EWI data achieve more consistent improvements in student outcomes (The Education Trust, 2020). As such, policies should encourage partnerships with local universities or educational organizations to provide professional development in MTSS best practices and data literacy.

Conclusion

The integration of Early Warning Indicators (EWIs) within the Multi-Tiered System of Supports (MTSS) holds significant promise in proactively addressing the needs of struggling secondary students. By identifying students who are at risk academically, behaviorally, and socially-emotionally, schools can apply targeted interventions before students fall irreversibly behind. However, achieving this potential requires a unified commitment across all levels of the educational system. Teachers, administrators, policymakers, and support staff must work cohesively to create an environment where MTSS is not only implemented but is also refined to adapt to the diverse and evolving needs of secondary students.

For the full benefits of MTSS and EWIs to be realized, a foundation of strong policy support is essential. Policies at the district, state, and national levels can ensure that schools have the funding, training, and infrastructure required to sustain MTSS initiatives over the long term. For instance, providing consistent funding for professional development can equip educators with the skills to effectively analyze EWI data and implement timely interventions. Likewise, policies that promote data sharing and integration across educational platforms can help streamline processes and improve the

accuracy of EWI systems, enabling educators to make data-informed decisions with confidence. Without these supports, the MTSS framework may be underutilized or inconsistently applied, limiting its impact on student outcomes.

At the practice level, the effectiveness of MTSS relies on a culture of collaboration and shared responsibility within schools. Teachers, counselors, and administrators must coordinate their efforts to develop and monitor intervention strategies that respond to both academic and behavioral indicators of student risk. Professional development and collaborative planning time are essential to cultivate a school-wide commitment to MTSS, ensuring that each staff member understands the purpose and function of EWIs within the MTSS framework. Furthermore, fostering a culture of continuous improvement allows educators to refine their approaches based on data and feedback, adapting to the specific needs of their student population. This collaborative environment empowers educators to respond to the multifaceted challenges faced by secondary students, providing interventions that are both timely and effective.

Ultimately, as this literature review highlights, the successful implementation of MTSS and EWI practices depends on a commitment to early intervention, equitable resource distribution, and a data-informed approach to student support. Policymakers and educational leaders must prioritize these foundational elements to ensure that MTSS initiatives are accessible to all schools, regardless of their resources or demographic composition. By recognizing the importance of early indicators and taking proactive steps to address them, schools can create a supportive framework that fosters academic success, social-emotional well-being, and positive outcomes for all students. Moving forward, further research and innovation in MTSS and EWI integration will continue to

shape an education system that meets the needs of every learner, empowering students to achieve their fullest potential in an equitable and supportive environment.

CHAPTER III

Methodology

This chapter provides a comprehensive overview of the research methodology employed in this study, which investigates the integration of EWI data within the MTSS framework to enhance outcomes for at-risk secondary learners. The chapter outlines the systematic approach used to address the research questions, ensuring clarity and transparency in the methods chosen for data collection and analysis. The methodology section begins with a detailed articulation of the research purpose, emphasizing the significance of identifying effective EWIs and their role in guiding timely interventions within the MTSS framework. This is followed by a thorough description of the research setting and the characteristics of the participants involved, providing essential context for understanding the study's environment and population.

Additionally, this chapter presents the intervention plan, outlining the specific strategies and processes implemented to examine the effectiveness of EWIs in supporting at-risk students. The research design is discussed in depth, including the chosen methodology, study type, and rationale for selecting a particular approach. Furthermore, the data collection methods are described, detailing the tools, instruments, and procedures used to gather qualitative and quantitative data relevant to the study's objectives.

To ensure the rigor and credibility of the findings, this chapter also addresses the measures taken to establish validity and reliability within the research process. Ethical considerations of the study are acknowledged to provide a balanced and transparent account of the research framework. By systematically presenting these components, this chapter aims to offer a clear and well-structured methodology that supports the integrity

of the study and ensures that the research findings are both meaningful and applicable in the context of improving intervention frameworks for at-risk secondary learners.

Purpose of the Study

The primary purpose of this study was to examine the effectiveness of integrating EWI data into the MTSS framework within secondary school settings. This integration aimed to enhance the early identification of students at risk of academic failure or disengagement and to facilitate the implementation of personalized and responsive supports tailored to students' holistic student needs. By aligning predictive data with evidence-based support strategies, the study sought to explore how evidence-based strategies could strengthen the responsiveness of MTSS and ultimately enhance student success.

More specifically, the study aimed to investigate key questions related to the application and impact of EWIs in secondary education. It explored which indicators, such as attendance patterns, behavioral incidents, and academic performance, were most predictive of student challenges. In addition, the study examined the practical and systemic challenges educators and school leaders encountered when incorporating EWIs into an existing MTSS framework. Finally, it identified effective strategies and best practices for optimizing the use of EWIs to support students across all tiers of intervention.

Through a comprehensive and structured analysis of these components, the study intended to generate actionable insights that could inform policy, guide professional practice, and support continuous improvement efforts in schools. The findings were

expected to assist educators and administrators in refining intervention frameworks and improving the academic and social-emotional success of at-risk secondary learners.

Research Questions

To guide this investigation, the study is structured around the following key research questions:

1. What are the most effective EWI data for identifying at-risk secondary students?
2. What obstacles are encountered in implementing MTSS for students identified by EWIs?
3. What strategies are most effective for integrating EWIs into MTSS?

These questions are designed to align with the overarching purpose of the study, ensuring a focused exploration of the integration of EWIs within the MTSS framework. By addressing these aspects, the research will provide a clearer understanding of how schools can utilize EWIs to enhance student identification processes, overcome implementation barriers, and refine intervention strategies.

Significance and Connection to Existing Research

This study expanded upon a well-established body of research emphasizing the critical importance of early identification of at-risk students and the effectiveness of the Multi-Tiered Systems of Support (MTSS) framework in delivering differentiated, tiered interventions. Previous studies had demonstrated that EWI data, including patterns of chronic absenteeism, disciplinary infractions, and declining academic performance, served as reliable predictors of future student disengagement, academic failure, and potential dropout. Despite these findings, significant gaps remained in the literature

concerning how these indicators could be systematically and effectively integrated into the MTSS process, particularly at the secondary school level where student needs often become more complex.

By addressing these gaps, this study contributed to the field of education by offering empirical insights into the predictive validity of specific EWIs and by examining the real-world challenges secondary schools faced when attempting to incorporate EWI data into existing MTSS frameworks. The research explored how schools interpreted, utilized, and responded to early warning data, and it identified the organizational, technical, and cultural barriers that impacted successful implementation. Furthermore, the study investigated effective strategies for bridging those barriers, with the goal of improving the fidelity and impact of intervention frameworks designed to meet the diverse needs of struggling students.

The findings from this research provided a foundation for refining intervention models and strengthening data-informed decision-making processes in schools. They also offered practical guidance to educators, school leaders, and policymakers seeking to develop more responsive, proactive approaches to student support. Ultimately, the study aimed to close the gap between data identification and intervention delivery, ensuring that at-risk secondary students received timely, appropriate, and effective supports to enhance their academic achievement and social-emotional well-being, thereby reducing the likelihood of school failure or dropout.

Setting and Participants

This study was conducted at 21st Century Cyber Charter School (21CCCS), a public cyber charter school serving approximately 1,000 students in grades 9-12 across

Pennsylvania. As a fully online school, 21CCCS provided a unique setting for investigating the integration of EWI data into the MTSS framework. Unlike traditional brick-and-mortar schools, cyber charter schools rely heavily on digital learning platforms, virtual interactions, and remote student engagement, making data-driven decision-making particularly crucial in identifying and supporting at-risk students.

21CCCS enrolls a diverse student population, including students from various socio-economic backgrounds, academic performance levels, and geographic locations across the state. The school was committed to leveraging technology and analytics to enhance student support services, making it an ideal environment for studying how EWIs could be effectively integrated within an MTSS framework in a virtual learning context. Given the school's focus on personalized learning and intervention strategies, this study explored how EWIs, such as attendance patterns in virtual classrooms, assignment completion rates, and engagement with online learning tools, were utilized to enhance student success. The study was approved by PennWest University's Institutional Review Board (Appendix A).

Participants

Students. This study focused on patterns and trends among secondary students who were identified as at risk for academic failure or behavioral disengagement based on specific Early Warning Indicators. These indicators included chronic absenteeism (e.g., failure to log in or participate in virtual sessions), declining academic performance (e.g., low grades or incomplete assignments), and behavioral concerns (e.g., lack of engagement or minimal interaction with support staff).

Aggregate student data were drawn from existing school records, including attendance

logs, course progress reports, and behavior referrals, and were used to inform analysis of MTSS implementation effectiveness. No individual student identifiers were collected or reported. All data were de-identified, and no direct student participation occurred in the study. This approach ensured compliance with ethical research standards and Institutional Review Board (IRB) guidelines.

Staff. A total of 36 staff members completed both the anonymous pre- and post-surveys, and four staff members participated in semi-structured interviews. The focus group was composed of the MTSS Core Team and included five administrators, two Intermediate Unit consultants, five teachers, two reading specialists, and two teaching assistants. All participants were directly involved in the implementation of the Multi-Tiered System of Supports (MTSS) at 21CCCS and had firsthand experience using Early Warning Indicator (EWI) data to support struggling students in a virtual learning environment.

Participants in this study represented a range of roles, including:

- **Teachers**, who identified at-risk students and implemented Tier 1 and Tier 2 academic and behavioral interventions
- **School counselors and MTSS coordinators**, who managed the intervention framework, analyzed student data, and coordinated support plans
- **Administrators and data specialists**, who contributed to policy development, technology integration, and decision-making related to MTSS implementation and student supports

Staff were selected based on their involvement in MTSS, familiarity with EWI-based practices, and direct engagement in student support processes. Their perspectives provided insight into the strengths and limitations of the current system, the challenges of integrating EWIs into MTSS in a virtual school setting, and recommendations for refining intervention strategies.

Incorporating the experiences of both students and staff, this study offers a comprehensive analysis of how EWIs function within the MTSS framework at 21CCCS, providing valuable guidance on best practices and areas for improvement in a cyber charter school setting.

Informed Consent

The informed consent form outlined the purpose of the study, the data collection procedures, potential risks, and the rights of participants. It also made clear that participation in the study was entirely voluntary and that participants could withdraw at any time without penalty.

Ethical Considerations

Throughout the course of this study, the researcher remained committed to upholding the highest ethical standards in the design, implementation, and reporting of the research. Because the study involved both student data and staff perspectives, the researcher carefully followed the guidelines outlined by PennWest University's Institutional Review Board (IRB) and obtained full approval prior to initiating data collection.

One of the primary ethical concerns was ensuring the protection of participants' rights and privacy. All student data used in the study were de-identified prior to analysis to maintain confidentiality. No personally identifiable information was included in any reports, presentations, or publications. For qualitative components such as staff surveys and interviews, anonymity was preserved by collecting responses without names or employee identification numbers. The researcher took extra steps to ensure that participants understood their involvement was voluntary and that participation would have no impact on their professional standing.

Informed consent was obtained from all adult participants. Consent forms outlined the purpose of the study, the procedures involved, any potential risks or benefits, and the right to withdraw from the study at any time without penalty (Appendix B).

The researcher also considered the ethical implications of holding a dual role as both a school administrator and the primary investigator. To minimize any perception of coercion or power imbalance, the researcher ensured that participation was optional, communicated clearly that data would be used solely for research purposes, and utilized anonymous methods of data collection. During interviews and focus groups, the researcher maintained a neutral tone and encouraged honest feedback, regardless of whether input was supportive or critical of current practices.

By adhering to these ethical principles, the researcher aimed to protect participant well-being, preserve the integrity of the research process, and contribute responsibly to the body of knowledge on MTSS and Early Warning Indicators in virtual education settings.

Researcher Positionality

As the Supervisor of Student Services at 21st Century Cyber Charter School (21CCCS), the researcher held a dual role as both a practitioner and an investigator throughout the study. This professional position allowed the researcher to closely observe and influence the systems and practices being examined, particularly the integration of EWI data into the MTSS framework. This unique perspective enabled the researcher to approach the study with a comprehensive understanding of the school's culture, student needs, and intervention processes within a virtual learning environment.

The researcher's positionality provided several advantages. With direct access to relevant data systems, familiarity with the structure and goals of MTSS at 21CCCS, and established relationships with staff participants, the researcher was able to facilitate trust during data collection. This level of access also allowed for the design of interview protocols and surveys that accurately reflected the real-world challenges educators face in an online educational setting.

However, the researcher acknowledged the potential for bias due to active involvement in the development and implementation of some of the practices under evaluation. To address this, several safeguards were implemented to maintain the integrity of the research process. Participant feedback was collected anonymously, and it was clearly communicated that participation in the study was entirely voluntary and would not influence professional evaluations or relationships. Additionally, the researcher utilized strategies such as peer debriefing and member checking to reduce subjectivity during data analysis. In focus groups and interviews conducted by the

researcher, a neutral stance was maintained to promote open dialogue and honest feedback.

By recognizing and addressing the implications of this dual role, the researcher aimed to increase the transparency, trustworthiness, and credibility of the study. The intent was not only to evaluate the effectiveness of EWI integration within the MTSS framework, but also to reflect on how virtual school systems can evolve through intentional, data-informed practices that support students more equitably and effectively.

Research Plan

The research plan for this study was grounded in established scholarship highlighting the role of EWI data in identifying students at risk for academic failure, behavioral issues, or disengagement. Previous research, including studies by Faria et al. (2017) and Balfanz et al. (2007), has demonstrated the predictive reliability of indicators such as chronic absenteeism, declining academic performance, and behavioral incidents. However, practical guidance on how to systematically incorporate these indicators into a Multi-Tiered System of Supports (MTSS), particularly within a secondary virtual school setting, remains limited. This study sought to address that gap through the design, implementation, and evaluation of a targeted intervention aligned with MTSS principles.

The intervention established a standardized process for identifying students based on specific EWIs and assigning them to appropriate levels of support within the MTSS framework. Tier 1 interventions encompassed universal strategies designed to promote overall student engagement and academic success. Tier 2 supports involved targeted, small-group interventions for students exhibiting moderate risk factors. Tier 3 provided intensive, individualized services for students requiring the highest level of support.

Student placement was determined by a combination of data thresholds and professional judgment, with the goal of delivering timely and proportionate responses to student needs.

Implementation was led by a cross-functional team that included teachers, counselors, academic advisors, administrators, and data specialists. The team met bi-weekly to review current data, assess student progress, and refine interventions as needed. This collaborative approach ensured that academic, behavioral, and social-emotional considerations were integrated into support decisions, and that student outcomes were monitored consistently.

To support data access and analysis, the intervention utilized existing platforms such as the LinkIt! Data Warehouse. These tools enabled efficient tracking of student performance across academic, attendance, and behavioral domains. Embedding EWI monitoring into routine practices streamlined identification efforts, reduced response time, and facilitated communication among support staff. The system was designed to be scalable and adaptable to the evolving needs of a virtual secondary school population.

A mixed-methods research design was employed to evaluate the effectiveness of the intervention. Quantitative data were collected before and after implementation, capturing trends in student performance indicators such as GPA, course pass rates, attendance patterns, and behavioral incidents. Descriptive analyses were conducted to identify changes over time and assess the overall impact of the MTSS-EWI model.

Complementing these quantitative measures, qualitative data were collected through anonymous staff surveys and semi-structured focus groups. These methods provided insight into implementation fidelity, staff perceptions, and contextual factors

that influenced the success of the intervention. Surveys included a mix of scaled and open-ended items, while focus group discussions explored themes such as training effectiveness, collaboration, and perceived barriers. Thematic analysis of these responses offered a nuanced understanding of how the intervention functioned within the organizational culture of the school.

This research design reflects a theory-driven approach grounded in the belief that early identification and tiered supports are essential to improving student outcomes. The integration of EWIs into MTSS offers a proactive strategy for addressing student needs in real time, rather than reacting to failure after it occurs. By operationalizing this integration in a virtual environment, the study contributes to the field by offering a replicable model for data-informed decision-making and student support.

Ultimately, this research aimed to evaluate the practical application of EWI-MTSS integration in a virtual secondary school and to generate actionable recommendations for improving intervention frameworks. In doing so, the study offers insight into how predictive indicators can inform equitable and effective intervention models, with implications for both virtual and traditional educational settings.

Research Methods & Data Collection

Research Design

Building upon the intervention design, this study employed a mixed-methods research approach to evaluate the integration of EWI data into a Multi-Tiered System of Supports (MTSS) framework in a virtual secondary school setting. This approach was selected to provide both measurable evidence of the intervention's effectiveness and contextual insight into its implementation. By combining quantitative and qualitative data

sources, the research sought to capture not only what changed, but also how and why those changes occurred.

The quantitative component focused on student-level outcomes over the duration of the intervention. Data were extracted from the LinkIt! Data Warehouse and included key indicators such as:

- Attendance records, including total absences and rates of chronic absenteeism;
- Academic performance metrics, such as course grades, GPA trends, benchmark assessment scores, and standardized test results; and
- Behavioral data, including the frequency and types of disciplinary infractions, office referrals, and behavior incident reports.

These datasets were disaggregated by demographic and performance groups to ensure equity-focused analysis. Descriptive statistics were used to identify patterns, track changes over time, and determine which indicators were most strongly correlated with negative student outcomes. Pre- and post-intervention comparisons allowed for the evaluation of the impact of EWI-informed supports. Quantitative analysis was conducted using Google Sheets to facilitate data organization, trend visualization, and interpretation.

Complementing these numerical findings, the qualitative component explored staff experiences with the intervention through anonymous surveys and semi-structured interviews. Participants included educators, school counselors, MTSS coordinators, and administrators directly involved in student support efforts. Surveys were administered via Google Forms and included both scaled-response and open-ended questions to capture perceptions related to training, data usage, collaboration, and intervention challenges (Appendix C). Semi-structured interviews provided deeper insight into staff

understanding of MTSS, their experiences using EWI data, and the contextual variables that influenced implementation fidelity (Appendix D).

Interview responses were audio-recorded and analyzed through a manual coding process. Emerging themes were identified using qualitative analysis techniques to highlight recurring patterns, stakeholder insights, and areas for potential refinement. These themes were cross-referenced with the quantitative results to ensure alignment and strengthen the reliability of findings.

The integration of both data types offered a comprehensive view of how EWIs functioned within an MTSS framework. Quantitative analysis demonstrated tangible impacts on student outcomes, while qualitative feedback illuminated the internal mechanisms and practical considerations that shaped those outcomes. This methodological triangulation enhanced the credibility of the study and supported the development of actionable recommendations for schools seeking to implement similar interventions in virtual or hybrid environments.

Data Collection Methods

To evaluate the integration of EWI data into the Multi-Tiered System of Supports (MTSS) framework, both quantitative and qualitative data were collected using a range of tools and platforms. This dual approach ensured that the study captured both the measurable impact of the intervention on student outcomes and the lived experiences of the educators engaged in its implementation.

Quantitative Data Collection. Quantitative data were collected from existing school records and the LinkIt! Data Warehouse, which served as the primary source for attendance, academic, and behavioral metrics. The following data sets were gathered:

- Attendance Records: Total days absent and instances of chronic absenteeism were tracked to assess the impact of intervention strategies on student attendance.
- Academic Performance: Course grades, benchmark assessments, and standardized test scores were analyzed to identify changes in academic performance over the course of the intervention.
- Behavioral Data: Disciplinary records, including behavior incident reports and office referrals, were collected to evaluate behavioral trends and identify students requiring additional supports.

The collected data were entered and managed using Google Sheets, which facilitated the organization, cleaning, and analysis of large datasets. Descriptive statistics, including averages, percentages, and frequency counts, were used to summarize data and evaluate changes before and after the MTSS interventions.

Qualitative Data Collection. Qualitative data were collected to supplement the quantitative findings and to gain a deeper understanding of the implementation process from the perspective of school personnel. This data was gathered through anonymous surveys and semi-structured interviews.

- Surveys: Staff participants completed surveys administered via Google Forms. The surveys included both closed-ended questions (e.g., Likert scale items) and open-ended prompts to gather perceptions regarding the use of EWIs within MTSS, the quality of staff training, and overall implementation challenges and successes.
- Interviews: A purposive sample of staff members participated in one-on-one, semi-structured interviews designed to explore their experiences in greater depth.

Interview protocols guided discussion around implementation strategies, system-level supports, student responsiveness, and recommendations for improvement. Interviews were recorded, transcribed, and analyzed thematically to identify recurring themes and patterns.

- Focus Group: A single focus group session was conducted with sixteen participants selected based on their active roles in MTSS implementation and data-informed intervention planning. Participants were recruited via email and volunteered to join based on their availability and interest. The focus group lasted approximately 60 minutes and was conducted in a virtual meeting format to accommodate participant schedules. The session was guided by a semi-structured protocol and focused on themes such as collaboration, data accessibility, barriers to implementation, and intervention fidelity. Responses were audio-recorded, transcribed, and analyzed using thematic coding. The focus group provided in-depth insights into the shared experiences and collective perspectives of the MTSS Core Team, supplementing the findings from surveys and interviews. (Appendix E)

Themes that emerged from the qualitative data were cross-referenced with trends identified in the quantitative analysis, allowing for triangulation of results and deeper interpretation of findings. This mixed-methods approach yielded a comprehensive and multi-dimensional view of the role of EWIs in MTSS, providing evidence to support future decision-making and strategic planning (see Table 1).

Table 1

Sources, Tools and Measures 1

	Quantitative	**Qualitative**
Source	LinkIt!, Infinite Campus (SIS)	Staff Surveys, Interviews, Focus Group
Tools	Google Sheets	Google Forms, Google Sheets, Audio Recordings, Google Docs
Measures	Attendance, Course Failures, Behavior	Staff Perceptions, Themes, Assignment Completion, Student Engagement

Data Collection Timeline

The data collection process took place over an 8-month period. The first phase involved the collection of baseline data (attendance, grades, behavior) for all students identified through EWIs. The second phase focused on the implementation of the MTSS interventions based on these indicators. The final phase will included follow-up data collection to assess changes in student outcomes and staff feedback on the intervention process (see Table 2).

Table 2

Data Collection, Method and Timeline

Data Collection Method	Timeline
Pre-Intervention Student Data	October-November 2024
MTSS Interventions Implementation	December 2024-April 2025
Post-Intervention Student Data	April-May 2025
Interviews with Staff	April-May 2025
Pre-Survey (Staff)	October-November 2024
Post-Survey (Staff)	April-May 2025
Focus Group (MTSS Core Team)	April 2025

Surveys were distributed via Google Forms at two points: the pre-survey was open from October to November 2024, and the post-survey was administered in April to May 2025. Interviews were conducted between April and May 2025 and lasted approximately 30 to 45 minutes each. The focus group session occurred in late April 2025 during the final implementation phase of the intervention and lasted approximately 60 minutes. These data collection activities were designed to capture both pre- and post-intervention insights from participants, providing a comprehensive understanding of the effectiveness and challenges of integrating Early Warning Indicators within the MTSS framework.

Fiscal Implications

The fiscal implications of this research plan included costs associated with data collection tools, such as survey platforms and software required for data analysis. The LinkIt! Data Warehouse was utilized to gather relevant student data, which required staff time to access, interpret, and apply the data within the MTSS framework. Additional fiscal considerations included the time commitment from staff to participate in surveys and interviews, as well as costs related to the intervention itself—such as professional development, training materials, and supplemental resources needed for MTSS implementation. These investments were necessary to ensure that the study was conducted with integrity and that the resulting data would offer meaningful insights applicable to educational practice.

Validity

To ensure the validity of the study, multiple strategies were employed throughout the research process to enhance the credibility, accuracy, and applicability of the findings. Each type of validity, internal, external, construct, and methodological**,** was intentionally addressed through the study's design and execution.

Internal validity was supported by maintaining consistent data collection procedures across all participants and ensuring that all data were gathered within a clearly defined timeframe. Standardized tools and platforms, such as LinkIt! and Google Forms, were used to ensure uniformity in how information was recorded and analyzed. Efforts were also made to minimize the influence of confounding variables, such as changes in school leadership or the implementation of new district-wide policies. These contextual

factors were closely monitored and documented throughout the study, and their potential impact on data interpretation was considered during the analysis phase.

External validity was addressed by conducting the study in a setting that reflects the characteristics of a typical virtual secondary school. 21st Century Cyber Charter School serves a diverse population of students across Pennsylvania, and its reliance on data-driven decision-making within a virtual MTSS framework is consistent with broader trends in online education. This design enhances the generalizability of the findings, making them transferable to other educational environments—particularly those implementing or exploring MTSS frameworks in virtual or hybrid models.

Construct validity was reinforced by utilizing multiple, well-established indicators of student success. These included academic performance metrics (such as GPA and course pass rates), behavioral data (including office referrals and incident reports), and attendance records (including chronic absenteeism). These indicators have been widely validated in prior research as reliable predictors of student risk and were carefully chosen for their alignment with the study's research questions. The consistent use of the LinkIt! Data Warehouse ensured accuracy and reliability in data collection, reducing the potential for measurement errors.

Methodological triangulation was employed to enhance the overall validity and depth of the findings. Both quantitative and qualitative data were collected and analyzed, offering a multifaceted view of the research problem. Quantitative data provided objective, numerical evidence of changes in student outcomes, while qualitative data—including open-ended survey responses and staff interviews—captured the lived experiences, perceptions, and implementation challenges from those involved in the

MTSS process. These diverse data sources were cross validated to corroborate trends, strengthen interpretation, and provide a more comprehensive understanding of how EWIs function within the MTSS framework.

Together, these strategies were intended to strengthen the trustworthiness and scholarly integrity of the study. By addressing multiple types of validity through deliberate planning and rigorous methodology, the research findings aim to offer both credible insights and practical implications for schools navigating student support in virtual environments.

Summary

This chapter detailed the methodology employed to investigate the integration of EWI data into the Multi-Tiered System of Supports (MTSS) framework within a virtual secondary school environment. A mixed-methods research design was utilized, incorporating both quantitative and qualitative approaches to offer a comprehensive and nuanced analysis of the research questions. This dual approach enabled the study to capture not only the quantifiable outcomes associated with EWI-driven interventions but also the contextual and experiential factors that shaped their implementation and effectiveness.

Quantitative data were drawn from student records, including attendance, academic performance, and behavioral incidents, and were systematically analyzed to identify patterns, track student progress, and evaluate the overall impact of MTSS over a defined period. This analysis helped establish correlations between early warning signs and subsequent student outcomes, providing a data-driven foundation for evaluating intervention success.

In parallel, qualitative data were collected through interviews and feedback sessions with key school personnel, such as teachers, administrators, and support staff. These narratives offered critical insights into the perceived effectiveness, challenges, and practical considerations of integrating EWIs into daily educational practices. Educators' perspectives illuminated the human and organizational dynamics that influenced the fidelity, scalability, and sustainability of MTSS implementation in a virtual setting.

Together, these methodological components contributed to a richer, more holistic understanding of how EWIs can be leveraged to support the early identification of at-risk students and to guide the delivery of targeted, tiered interventions aimed at improving academic achievement and behavioral outcomes. The findings from this research offered valuable implications for practice and policy in virtual and traditional secondary school contexts alike. The following chapter presents the results of the data analysis and highlights the key findings that emerged from this investigation.

CHAPTER IV

Data Analysis and Results

The purpose of this study was to examine how Multi-Tiered Systems of Support (MTSS) and Early Warning Indicators (EWIs) influence student outcomes in a cyber secondary school setting. Specifically, the research focused on how EWIs are used to identify at-risk students, the barriers educators face when implementing MTSS in a virtual environment, and the strategies that support effective integration of EWI data into tiered interventions.

The study was guided by the following research questions:

1. Which Early Warning Indicators are most effective in identifying at-risk secondary students?
2. What obstacles hinder the implementation of MTSS for students flagged by EWIs?
3. What strategies support successful integration of EWIs into MTSS practices?

A mixed-methods research design was employed to capture both quantitative and qualitative perspectives on the use of Early Warning Indicators (EWIs) within a Multi-Tiered System of Supports (MTSS) framework. Quantitative data were collected through pre- and post-intervention surveys distributed to teachers, counselors, administrators, and support staff. These surveys included both Likert-scale and open-ended items designed to assess perceptions of EWI effectiveness, confidence in identifying at-risk students, frequency of data use, collaboration practices, and the degree of integration of intervention strategies across MTSS tiers.

Qualitative data were gathered through multiple sources to enrich the analysis. A semi-structured focus group was conducted with members of the MTSS Core Team to explore systemic and instructional challenges related to implementation. Additionally, individual staff interviews were conducted with personnel representing diverse roles across the school, including general education, special education, and school counseling. These interviews provided nuanced insight into the lived experiences of staff engaging with EWI data and intervention planning.

Together, these data collection strategies offered a comprehensive and triangulated understanding of how EWIs are perceived, utilized, and operationalized in a virtual secondary school setting. The following sections present results aligned with each research question, highlighting key patterns in the data and practical insights from implementation.

Data Analysis Process

The data analysis process incorporated both quantitative and qualitative methods to ensure a thorough understanding of the research questions. This mixed-methods approach involved the analysis of pre- and post-survey data, pre- and post-intervention student data, MTSS intervention records, focus group responses, and staff interviews. Each data source was intentionally aligned to one or more of the three guiding research questions.

Quantitative Analysis

The pre- and post-surveys were developed using a structured format that included both closed- and open-ended items designed to assess staff perceptions regarding Early

Warning Indicators (EWIs). In the first section of the survey, respondents rated the effectiveness of specific indicators—such as academic performance, attendance, behavioral concerns, and social-emotional indicators—using a 5-point Likert scale ranging from "1 – Not Effective" to "5 – Highly Effective." As shown in Table 3, academic performance and attendance were perceived as the most effective indicators on the pre-survey, while peer relationships were rated as least effective. On the post-survey, participants demonstrated increased confidence in the value of all indicators, with notable gains in perceived effectiveness for academic performance, social-emotional indicators, and family and home life factors (see Table 4).

Survey participants were also asked how frequently they reviewed specific data sources when identifying struggling students. On the pre-survey, respondents reported frequent use of grade reports and attendance records, while behavioral logs, self-reports, and parent/guardian feedback were less frequently reviewed (see Table 5). Post-survey responses indicated increased use of behavioral logs and a more consistent review of attendance and counselor/psychologist reports, though self-reports and family feedback remained less frequently utilized (see Table 6).

Finally, respondents were asked to rate their confidence in their ability to identify struggling students early using current EWIs. On the pre-survey, only 6% reported feeling very confident, with a large proportion (43%) indicating they were only somewhat confident. In contrast, the post-survey results showed a notable shift, with a combined 60% of respondents indicating they felt confident or very confident in using EWIs effectively (see Table 7).

Table 3

Pre-Survey: Rate the effectiveness of each of the following indicators in identifying struggling students on a scale from 1 (Not Effective) to 5 (Highly Effective)

Indicator	5-Highly Effective	4-Effective	3-Moderatly Effective	2-Slightly Effective	1-Not Effective
Academic Performance	30%	51%	11%	8%	0%
Behavioral Issues	22%	46%	22%	11%	0%
Social-Emotional Indicators	30%	34%	14%	19%	3%
Family and Home Life Factors	24%	54%	22%	0%	0%
Peer Relationships	5%	38%	41%	16%	0%
Attendance	38%	32%	25%	5%	0%

Table 4

Post Survey: Rate the effectiveness of each of the following indicators in identifying struggling students on a scale from 1 (Not Effective) to 5 (Highly Effective)

Indicator	5-Highly Effective	4-Effective	3-Moderatly Effective	2-Slightly Effective	1-Not Effective
Academic Performance	46%	46%	9%	0%	0%
Behavioral Issues	32%	46%	9%	9%	5%
Social-Emotional Indicators	41%	32%	22.7%	4.5%	0%
Family and Home Life Factors	36%	41%	23%	0%	0%
Peer Relationships	14%	46%	23%	14%	5%
Attendance	32%	46%	18%	5%	0%

Table 5

Pre-Survey: How often do you review the following data sources to identify struggling students?

Data Source	Always	Often	Sometimes	Rarely	Never
Attendance Records	27%	30%	30%	11%	3%
Grader Reports	41%	54%	5%	0%	0%
Behavioral Logs	8%	16%	35%	32%	8%
Counselor/ Psychologist Reports	8%	19%	30%	30%	11%
Student Self-Reports	11%	14%	24%	27%	24%
Parent/Guardian Feedback	19%	22%	32%	24%	3%

Table 6

Post-Survey: How often do you review the following data sources to identify struggling students?

Data Source	Always	Often	Sometimes	Rarely	Never
Attendance Records	32%	18%	27%	18%	5%
Behavioral Logs	36%	59%	5%	0%	0%
Counselor/ Psychologist Reports	9%	32%	18%	36%	5%
Student Self-Reports	14%	14%	18%	18%	36%
Parent/Guardian Feedback	9%	14%	55%	14%	9%

Table 7

How Confident are you in your ability to identify struggling students early using the current EWIs?

	Very Confident	Confident	Neutral	Somewhat Confident	Not Confident
Pre-Survey	6%	38%	11%	43%	2%
Post-Survey	5%	55%	14%	27%	0%

In Section 2 of the survey, participants were asked to evaluate how Early Warning Indicators (EWIs) are utilized in their current workflow, including the level of integration into daily or weekly routines, the overall effectiveness of the system in identifying struggling students, and the frequency with which students are believed to be missed by the system.

As shown in Table 8, pre-survey results indicated that only 11% of respondents considered EWIs to be highly integrated into their workflow, with the majority (54%) reporting only slight integration. On the post-survey, there was a modest increase in perceived integration, with 18% indicating that EWIs were highly integrated and 41% reporting moderate integration.

Table 8

How integrated are EWIs in your daily/weekly workflow?

	Highly Integrated	**Moderately Integrated**	**Slightly Integrated**	**Not Integrated**
Pre-Survey	11%	32%	54%	3%
Post-Survey	18%	41%	36%	5%

Participants were also asked to rate the effectiveness of the current EWI process for identifying struggling students using a 5-point scale. Table 9 illustrates that pre-survey perceptions were largely centered around moderate or slight effectiveness, with no respondents rating the system as highly effective. Post-survey results showed a shift

toward greater confidence in the system, with a small percentage (5%) rating it as highly effective and 41% rating it as effective.

Table 9

Rate the effectiveness of the current process for identifying struggling students using EWIs on a scale from 1 (Not Effective) to 5 (Highly Effective)

	Highly Effective	**Effective**	**Moderately Effective**	**Slightly Effective**	**Not Effective**
Pre-Survey	0%	25%	40%	36%	0%
Post-Survey	5%	41%	36%	13%	5%

Finally, participants reflected on how often they believed the current EWI system failed to identify a struggling student. As shown in Table 10, most respondents on the pre-survey selected "sometimes" (58%) or "often" (36%), indicating a high rate of perceived misses. While the post-survey still reflected concerns—73% selected "sometimes"—there was a slight decline in the number of participants who felt that struggling students were frequently missed.

Table 10

How often do you feel the current EWI system misses identifying a struggling student?

	Never	Rarely	Sometimes	Often	Always
Pre-Survey	0%	6%	58%	36%	0%
Post-Survey	0%	9%	73%	18%	0%

Section 3 of the survey focused on staff-identified strategies used to support struggling students, the perceived outcomes of these strategies, and the barriers that hinder effective implementation of Early Warning Indicator (EWI) systems. Participants provided insight into both individual and schoolwide practices, highlighting the alignment between EWI data and intervention efforts within the Multi-Tiered System of Supports (MTSS) framework. Tables 11 through 13 present results related to the integration of interventions into MTSS, the frequency of staff collaboration, and satisfaction with outcomes.

As shown in Table 11, there was a noticeable improvement in the integration of intervention strategies into the MTSS process. Prior to the intervention, only 19% of staff rated interventions as highly integrated, while 39% selected moderate and 39% slight integration. On the post-survey, 29% reported high integration and 57% moderate integration, with no respondents selecting "not integrated."

Table 11

How well are these intervention strategies implemented into the MTSS framework?

	Highly Integrated	**Moderately Integrated**	**Slightly Integrated**	**Not Integrated**
Pre-Survey	19%	39%	39%	3%
Post-Survey	29%	57%	14%	0%

Survey responses also demonstrated a shift in collaboration practices. As seen in Table 12, pre-survey results indicated that most participants collaborated with others "often" (46%) or "sometimes" (27%), while only 19% reported "always." After the intervention, 32% reported "always" collaborating, and 36% selected "sometimes," suggesting a more distributed pattern of collaborative engagement.

Table 12

How often do you collaborate with other staff members (e.g., counselors, special education) to implement interventions?

	Always	**Often**	**Sometimes**	**Rarely**	**Never**
Pre-Survey	19%	46%	27%	5%	3%
Post-Survey	32%	27%	36%	5%	0%

Staff satisfaction with intervention outcomes also showed improvement. As presented in Table 13, only 13% of pre-survey respondents were satisfied, with the majority (60%) reporting neutral feelings and 22% slightly satisfied. Post-survey data revealed that 32% were satisfied and 5% were highly satisfied, suggesting increased confidence in the effectiveness of interventions over time.

These findings offer a deeper understanding of how contextual factors, including staff collaboration and the perceived value of interventions, contribute to the success of EWI-driven decision-making within MTSS.

Table 13

How satisfied are you with the outcomes of the current intervention strategies?

	Highly Satisfied	**Satisfied**	**Neutral**	**Slightly Satisfied**	**Not Satisfied**
Pre-Survey	0%	13%	60%	22%	5%
Post-Survey	5%	32%	50%	9%	4%

In response to the open-ended survey question, *"What barriers do you encounter when implementing these interventions?"*, both pre- and post-survey data revealed that student resistance was the most frequently cited challenge, indicating a persistent issue with engagement and follow-through. In the pre-survey, staff also identified time constraints, limited resources, and barriers unique to the cyber learning environment,

such as students not logging in or responding to outreach efforts. One respondent noted the variability in student needs across the 6–12 grade spectrum, emphasizing that no two situations are the same and that adaptability is essential.

In the post-survey, while student resistance remained the dominant theme, additional concerns emerged. These included a lack of communication from both students and parents, and difficulty maintaining consistent contact to build momentum for intervention efforts. These responses reflect an increased awareness of the importance of ongoing communication and family engagement in successfully implementing intervention strategies.

To further understand the effectiveness of MTSS interventions, staff-reported trends and implementation documentation were reviewed. Academic and behavioral data collected before and after the intervention period indicated improvements in key indicators such as assignment completion, attendance consistency, and student engagement. For instance, multiple staff members noted that students who initially struggled with low participation began submitting assignments more consistently after being assigned to targeted Tier 2 supports, such as academic mentoring or daily check-ins. These shifts in student behavior and performance were used to evaluate the impact of the implemented MTSS framework and to address Research Questions 1 and 3.

In addition to outcome trends, implementation fidelity was assessed using weekly MTSS team meeting notes, intervention logs, and internal communication records. These documents helped verify the consistency, structure, and frequency of supports provided across various teams. Interventions were categorized by tier level, strategy type,

responsible personnel, and delivery model. For example, some students received Tier 2 academic mentoring several times per week, while others participated in daily virtual check-ins with designated staff members. These records offered insight into how MTSS strategies were applied in practice and contributed to the broader analysis of Research Question 3.

Qualitative Analysis

Qualitative data were derived from three sources: a focus group with school personnel, individual staff interviews, and open-ended narrative responses (Appendix E). The focus group utilized open-ended prompts to explore challenges and facilitators related to MTSS implementation in a virtual environment. Key themes included resource limitations, difficulties with progress monitoring, the need for cyber-specific professional development, and barriers to family engagement.

Individual interviews were conducted with four staff members representing general education, special education, school counseling, and administration. These interviews provided deeper insights into role clarity, communication gaps, and perspectives on data accessibility. For example, one staff member emphasized the need for clearer follow-up responsibility, stating, “Sometimes we identify the issue but then it’s not clear who’s going to actually do the follow-up.”

Triangulation and Validation

To enhance the validity and credibility of the study’s findings, a triangulation strategy was employed by integrating data from multiple sources: pre- and post-

intervention staff surveys, student performance and engagement data, MTSS implementation records, a focus group, and individual staff interviews. This methodological triangulation ensured that conclusions were drawn from a convergence of evidence rather than from any single data source or stakeholder perspective.

Themes that consistently emerged across these diverse data streams were considered especially robust. For example, student disengagement was a recurring topic—identified in survey responses, discussed during the focus group, and emphasized throughout individual interviews. This cross-source agreement reinforced the reliability and trustworthiness of the findings by confirming key challenges through multiple lenses.

In addition to thematic consistency, triangulation allowed for a rich understanding of both system-level trends and the contextual nuances of implementation. The surveys provided quantifiable insights into staff perceptions and MTSS practices, while the focus group and interviews offered deeper professional reflections on barriers and facilitators. MTSS documentation, including intervention logs and meeting notes, added clarity on implementation fidelity and procedural alignment. Performance data further supported the assessment of student-level trends without relying on individualized tracking.

By aligning all sources of evidence with the study's three guiding research questions, the research achieved analytic coherence and depth. This alignment enabled a more confident interpretation of the results and ensured that findings were both evidence-based and directly applicable to the school's virtual learning environment. Moreover, the integration of diverse perspectives helped minimize potential bias associated with any single method, thereby strengthening the study's overall validity and practical relevance.

The next section presents the results, organized around the three guiding research questions, and demonstrates how the triangulated data informed each key finding.

Results

Research Question 1: What are the most effective EWI data for identifying at-risk secondary students?

This section presents findings related to the Early Warning Indicators (EWIs) school personnel identified as most effective for recognizing at-risk secondary students in a virtual school setting. Data were collected through pre- and post-surveys, a focus group, and teacher interviews with open-ended questions. Participants evaluated the perceived effectiveness of six key indicators: academic performance, behavioral issues, social-emotional indicators, family/home life factors, peer relationships, and attendance.

Quantitative Findings. Post-survey data revealed that academic performance, behavioral issues, social-emotional indicators, family/home life, and attendance were all rated as "Effective," "Moderately Effective," or "Highly Effective" by 100% of respondents. Peer relationships received lower overall ratings, with only 80% of participants rating it within those categories.

Academic performance, behavioral issues, and attendance were most frequently rated as "Highly Effective." These indicators are trackable through digital platforms, including gradebooks, assignment completion data, behavioral logs, and attendance records. Staff familiarity and access to these systems may contribute to their widespread use in identifying early signs of risk.

Social-emotional indicators showed an increase in perceived value from the pre-survey to the post-survey. This increase corresponded with the implementation of

structured tools such as Act 55 wellness checks and counselor outreach initiatives, which provided additional data beyond academic performance alone.

Qualitative Findings. Qualitative responses from open-ended survey questions, the focus group, and teacher interviews expanded upon the quantitative results by offering explanations for why certain indicators are prioritized. A repeated theme across all sources was the role of academic performance and attendance as the most visible and actionable forms of early risk data. One staff member shared, “We begin to see a problem when there’s a pattern of missed assignments and inconsistent attendance. That’s when we know to act.”

In the open-ended teacher interviews, participants were asked which indicators they relied on most to identify students in need of intervention and why. The majority referenced missing assignments, declining grades, and attendance data as immediate red flags. Teachers also emphasized the real-time accessibility of this information in the school’s learning management systems. One teacher stated, “If I see that a student hasn’t submitted work for three days and hasn’t logged in, I start reaching out. It’s a clear sign something’s off.”

Social-emotional indicators were frequently discussed in the interviews as gaining importance, particularly due to new schoolwide wellness initiatives. Several teachers acknowledged that prior to these efforts, emotional concerns often went undetected unless a student disclosed them directly. As one educator noted, “Now that we do more regular check-ins, we’re spotting kids who are struggling emotionally even when their grades look fine.”

Across all qualitative sources—including survey comments, focus group feedback, and interviews—academic performance, attendance, and social-emotional indicators emerged as the most effective EWIs. These were consistently identified as the primary sources used by staff to initiate interventions and monitor student risk. Academic and attendance data were considered reliable due to their immediacy and ease of access, while social-emotional indicators were valued for revealing underlying challenges not immediately evident through academic records.

However, staff across all qualitative sources expressed challenges in evaluating peer relationships within the cyber setting. The lack of spontaneous or observable social interaction limited their ability to assess peer conflict, isolation, or friendship dynamics. This difficulty was reflected in the lower survey ratings and supported by interview responses, where teachers reported limited opportunities to gather meaningful data related to student socialization.

Research Question 2: What obstacles are encountered in implementing MTSS for students identified by EWIs?

This section presents findings on the barriers educators encounter when implementing Multi-Tiered Systems of Support (MTSS) for students identified through Early Warning Indicators (EWIs). Data sources included pre- and post-surveys, a focus group, and staff interviews.

Quantitative Findings. Survey results revealed several recurring challenges to MTSS implementation. In the pre-survey, staff most frequently cited communication gaps, limited time, data access issues, and lack of training. In the post-survey, communication remained the most prominent concern, particularly the difficulty in

maintaining contact with students and families. Staff also noted persistent time constraints and some challenges with early identification of student needs.

While traditional EWI metrics such as grades, behavior, and attendance were reported as helpful, multiple respondents indicated these data points do not always provide a complete picture of student well-being. Informal indicators—like social-emotional check-ins or counselor observations—were described as valuable but not consistently tracked or integrated into formal systems.

Qualitative Findings. Focus group and interview data highlighted systemic and logistical barriers. Participants identified a need for more centralized access to student data, streamlined progress monitoring systems, and targeted professional development adapted to the cyber environment. Educators reported inconsistent tools for tracking intervention outcomes and described difficulties ensuring continuity across grade levels and roles.

Challenges in engaging families were also emphasized. Staff reported that some parents were unclear about the MTSS process or unsure how to support it, a concern that was magnified in the cyber context where communication is largely digital. Educators also shared experiences with students opting out of interventions or failing to follow through, especially when participation required additional time, effort, or accountability.

Observation from Practice. Staff participants shared real-world examples that highlighted how specific MTSS strategies were implemented in response to student needs. While not presented as formal case studies, these observations reflected patterns seen across the broader student population.

For example, some educators noted that students who were flagged through EWI data for poor attendance and missing assignments responded positively when given additional support through regular check-ins, structured goal setting, and access to targeted academic resources. Staff emphasized the importance of a proactive, tiered intervention system that adjusted supports based on ongoing data trends.

In several cases, behavioral interventions such as teacher-led communication loops, weekly accountability meetings, and SEL-focused supports contributed to measurable improvements in engagement. These experiences, while anecdotal, reinforced the value of EWI-driven planning within MTSS and demonstrated how timely interventions could re-engage at-risk students.

Research Question 3: What strategies are most effective for integrating EWIs into MTSS?

This section presents findings related to the strategies used by educators to integrate Early Warning Indicators (EWIs) into the Multi-Tiered System of Supports (MTSS) framework in a cyber secondary school setting. Relevant data were collected through the post-intervention staff survey, a focus group with MTSS team members, and open-ended teacher interviews. Participants shared practical examples and insights that highlighted how EWI data informed intervention planning and collaborative decision-making within the MTSS structure.

Quantitative Findings. Post-survey responses indicated improvement in staff perceptions of how well intervention strategies are integrated into the MTSS framework. Prior to implementation, only 11% of respondents rated intervention integration as highly

aligned with MTSS, while 57% described alignment as slight or lower. Following implementation, 40% of respondents rated integration as high and 60% as moderate, with no responses in the lower categories.

Staff reported frequent collaboration in intervention planning, with 100% of respondents indicating they collaborate “often” or “always” with colleagues such as school counselors, special education teachers, or administrators. Survey responses also identified the most used intervention strategies, which included tutoring, counselor involvement, home visits, parental engagement meetings, peer mentoring, and social worker services. These responses reflect an increase in both the range and frequency of interventions, particularly those aligning with Tier 2 supports.

While improvements in EWI use were noted, staff responses also indicated variability in how EWI data were applied to individualized student support plans. Some respondents described inconsistency in implementation across teams and noted the need for more structured follow-up procedures.

Qualitative Findings. Focus group discussions and teacher interviews identified several recurring practices that contributed to more effective integration of EWI data into MTSS. One key strategy was the use of centralized systems to aggregate academic, attendance, and behavioral data in a single view, supporting faster identification and planning. Participants also emphasized the importance of regular data review meetings and assigning clear staff roles for intervention follow-through.

Staff described success in engaging students more directly in the intervention process by incorporating goal setting and self-monitoring. One participant explained that student involvement in tracking their own progress helped increase accountability and

motivation. Additionally, educators noted the importance of adjusting intervention intensity and approach based on EWI patterns over time.

Across sources, the importance of aligning intervention planning with observed trends in EWI data—such as missed assignments, login patterns, or behavioral flags—was consistently emphasized. These strategies helped translate early warning signals into timely and structured action.

Observations from Practice. Staff reflections provided concrete examples of how Early Warning Indicator (EWI) data were used to guide individualized interventions during the MTSS implementation. In several instances, low assignment completion and disengagement prompted timely responses, including the introduction of weekly one-on-one academic mentoring sessions that connected coursework to student interests. Staff reported that this approach led to improved assignment completion rates and more consistent participation among targeted students.

Other staff members described situations where inconsistent login behavior and late submissions triggered daily virtual check-ins, not for academic support, but to offer structure, accountability, and routine. These check-ins helped students re-establish engagement habits and reduce avoidance behaviors, even in cases where academic skills were not the primary concern.

These patterns, reported across staff interviews, focus groups, and survey responses, reinforced the importance of using EWI data to personalize support strategies. Participants emphasized that meaningful progress occurred when interventions were

aligned to students' specific needs, implemented consistently, and monitored through ongoing MTSS collaboration.

Additionally, themes emerging from the qualitative data indicated that effective integration of EWI data into MTSS was supported by centralized access to student data, clear role definitions for intervention delivery, frequent collaboration among staff, and inclusion of students in goal-setting processes. While overall improvements in data use and intervention alignment were noted, some inconsistencies in applying EWI data to individualized planning persisted across teams, suggesting the need for continued training and system refinement.

Summary

This chapter presented findings aligned with the three guiding research questions, using triangulated data from pre- and post-surveys, a focus group, teacher interviews, and implementation documentation. The mixed-methods design provided a comprehensive examination of how Early Warning Indicators (EWIs) are understood and applied within a Multi-Tiered System of Supports (MTSS) framework in a cyber secondary school environment.

Quantitative data revealed changes in staff perceptions regarding the effectiveness of various EWI data points and the integration of interventions across MTSS tiers. Academic performance, attendance, and social-emotional indicators consistently emerged as the most valued and actionable data sources. Survey responses also showed

improvements in collaborative practices and overall integration of EWI-driven strategies following the implementation period.

Qualitative data from staff interviews and focus group discussions added depth to these trends, highlighting persistent barriers such as communication gaps, student resistance, and variability in intervention follow-through. Educators described the need for more centralized data systems, ongoing progress monitoring, and clear role delineation to enhance consistency. Practical examples shared by staff illustrated how EWI data informed individualized support efforts, demonstrating both the promise and the complexity of implementing targeted interventions in a virtual learning environment.

Together, these findings detail the current practices, challenges, and opportunities associated with EWI use in cyber MTSS implementation. The next chapter will offer a deeper interpretation of these results, including conclusions, implications for practice, and recommendations to support future development of targeted, data-driven intervention systems.

CHAPTER V

Conclusions and Recommendations

The final chapter of this doctoral capstone study presents a comprehensive synthesis of the research findings and examines their significance in the context of integrating Early Warning Indicators (EWIs) within a Multi-Tiered System of Supports (MTSS) framework in a virtual secondary school setting. This chapter reflects the culmination of a mixed-methods inquiry designed to determine which indicators are most effective in identifying at-risk students, how educators implement targeted interventions based on these indicators, and what challenges may hinder these efforts in an online learning environment. Drawing from a robust dataset that includes pre- and post-surveys, focus group feedback, individual staff interviews, and implementation documentation, this chapter integrates multiple perspectives to develop evidence-based conclusions.

These findings are used to assess the overall impact and practicality of the intervention, highlight the conditions necessary for successful implementation, and present meaningful insights that can inform future school policies and practices. In doing so, this chapter also addresses the broader implications for virtual learning environments, which often lack the traditional cues and face-to-face contact that guide early identification of student risk in brick-and-mortar settings. The study's intent is not only to validate the use of EWIs in virtual education but also to provide school leaders, teachers, and policymakers with a roadmap for applying data-driven practices that are sustainable, scalable, and student-centered.

Ultimately, this chapter aims to bridge the persistent gap between educational research and real-world application. By translating data into strategic action, schools can

more effectively identify students in need, deploy interventions with greater fidelity, and foster more equitable academic outcomes, especially for learners navigating the complexities of online education. The following sections outline the conclusions drawn from the study, their implications for practice and policy, considerations regarding fiscal impact and limitations, and recommendations for future research aimed at advancing MTSS and EWI integration in evolving educational landscapes.

Conclusions

Research Question 1: What are the most effective early warning indicators for identifying struggling students at the secondary level within a school?

This study concluded that academic performance indicators—such as assignment non-completion, missing coursework, and course failures—remain among the most reliable predictors of student disengagement and risk in a virtual learning environment. These indicators were frequently identified by staff through surveys and interviews as early red flags that prompted concern and intervention. Similarly, attendance-related indicators, including irregular login activity, low participation in synchronous sessions, and patterns of chronic absenteeism, were recognized as critically important. These behaviors often provided real-time signals of disengagement that preceded academic decline.

Findings drawn from the triangulation of quantitative survey responses, focus group discussions, and staff interviews reinforced the reliability and consistency of these traditional early warning signs. In addition, the study revealed a growing recognition among educators of the value of social-emotional indicators as part of a more holistic

approach to student support. Signs such as emotional withdrawal, limited interaction with peers or staff, and expressions of anxiety or apathy—though more difficult to quantify—were increasingly noted as relevant in a cyber setting, where the absence of physical presence and nonverbal cues makes student well-being harder to assess. This shift reflects an emerging need to expand early warning systems to include social-emotional learning (SEL) data, particularly for students who may require Tier 2 or Tier 3 interventions.

These findings support the adoption of dynamic, real-time data dashboards that integrate academic, behavioral, attendance, and social-emotional indicators into a centralized platform accessible to MTSS teams. Embedding clearly defined EWI thresholds within these systems enables staff to generate timely student watch lists and promotes early and consistent identification of at-risk students. Automated flagging features, when used in conjunction with platforms such as LinkIt! and Infinite Campus, can streamline the identification process, reduce manual oversight, and enhance responsiveness. The ability to visualize risk trends over time empowers educators to make informed, data-driven decisions that lead to more timely, equitable, and effective support for students navigating the challenges of virtual education.

Research Question 2: What obstacles do instructional leaders and teachers encounter when implementing interventions for students identified through early warning systems?

Findings revealed several significant systemic and operational barriers that impeded the effective implementation of interventions for students identified through Early Warning Indicators (EWIs). Educators consistently cited time constraints as one of

the most pressing challenges, noting that limited availability during the school day often restricted their ability to engage in collaborative problem-solving, plan individualized supports, or follow up on student progress. Many staff members reported that intervention efforts were often delayed or deprioritized due to competing responsibilities, including instructional planning, grading, and mandated reporting tasks.

In addition, the study highlighted the inadequacy of current data systems to support timely and efficient decision-making. Staff described difficulties navigating multiple platforms that housed fragmented student data, leading to delays in identifying trends and coordinating responses. The absence of a centralized system for tracking student risk levels, interventions provided, and progress monitoring further compounded the issue, often resulting in duplicated efforts or gaps in support delivery.

A lack of targeted training in MTSS implementation was also evident across staff responses. Many participants indicated that, while they understood the general goals of MTSS, they lacked specific skills in analyzing EWI data, selecting appropriate interventions, and documenting implementation fidelity, especially within the unique context of a cyber school. This gap in training left some educators unsure of their role within the MTSS framework or hesitant to take action without explicit direction.

Compounding these systemic issues were challenges specific to the virtual learning environment. Asynchronous communication limited real-time engagement with students, making it difficult to provide immediate feedback or support. Students' inconsistent participation, particularly in non-mandatory sessions, reduced opportunities for meaningful interaction and monitoring. Moreover, educators noted that low parental involvement, whether due to technological barriers, competing responsibilities, or

unfamiliarity with virtual education, further hindered their ability to form comprehensive support plans involving families.

These challenges were consistently validated across multiple data sources, including staff surveys and focus group discussions with the MTSS Core Team. Collectively, the data paint a clear picture of the systemic inefficiencies and resource gaps that hinder high-fidelity implementation of MTSS in a virtual context.

To address these barriers, this study recommends the establishment of a centralized MTSS leadership role within the school. This individual or team would be responsible for overseeing the synthesis of student data across platforms, coordinating intervention meetings, and monitoring implementation fidelity. By serving as the central point of contact, this leadership role would reduce fragmentation, ensure follow-through, and promote accountability within the MTSS process.

In tandem with this structural recommendation, the study advocates for the integration of ongoing, targeted professional development focused on MTSS best practices and the use of EWI data. Embedding these topics into the annual training calendar would equip staff with the knowledge and tools needed to navigate student data, implement interventions effectively, and engage with families more meaningfully. Professional learning opportunities should be differentiated based on staff roles and experience levels, ensuring that all team members, from general educators to school counselors, are empowered to contribute fully to the school's MTSS implementation.

Research Question 3: What are the most effective intervention strategies that can be integrated into the MTSS framework to address the needs of students identified through early warning indicators?

The analysis of intervention practices within the Multi-Tiered System of Supports (MTSS) framework revealed three distinct categories of high-impact strategies that, when implemented with fidelity, contributed to improved student engagement and academic outcomes in the virtual learning environment. Each intervention tier aligned with a specific level of student need, reinforcing the MTSS principle of delivering increasingly intensive support based on data-informed risk indicators.

Tier 1 interventions**,** which served the entire student population, focused on preventive and proactive strategies. Universal assignment reminders delivered through the learning management system or email helped students stay on track with deadlines and reinforced expectations for timely work completion. Asynchronous parent communication, such as weekly updates or behavior summaries, aimed to increase transparency and foster a sense of shared responsibility for student success. Additionally, structured outreach following missed logins functioned as an early engagement tool, allowing staff to reconnect with students and prevent emerging patterns of disengagement.

Tier 2 interventions offered targeted support to students exhibiting early signs of academic or behavioral risk, as identified through Early Warning Indicator (EWI) data. Weekly academic check-ins with advisors provided personalized feedback, progress monitoring, and goal setting. These one-on-one virtual sessions fostered accountability and built stronger student-staff relationships. Similarly, behavioral accountability check-ins addressed disengagement by helping staff identify root causes and connect students with additional resources as needed.

Tier 3 interventions were highly individualized and reserved for students facing persistent or complex challenges. These supports typically involved coordinated efforts among counselors, special education case managers, academic advisors, and administrators. Intervention plans at this level often incorporated academic accommodations, regular social-emotional check-ins, and strategies to increase family involvement. Progress was closely monitored and strategies were adjusted based on student responsiveness, ensuring a dynamic and adaptive support structure.

Staff feedback from surveys, interviews, and focus groups indicated that these interventions, when implemented consistently and in alignment with student needs, led to meaningful improvements in student outcomes. Educators reported increased assignment completion, more consistent participation, and stronger student-staff connections among those receiving Tier 2 and Tier 3 supports. These observations reinforced the importance of using EWI data not only to identify risk, but also to drive intervention planning and monitor effectiveness over time.

The findings also highlighted the importance of cross-role collaboration in delivering interventions. Successful MTSS implementation relied on coordination among departments and consistent communication across teams. When intervention planning was collaborative and sustained, supports were more likely to meet student needs holistically. The combination of individualized planning, data-informed decision-making, and consistent adult-student relationships emerged as key components in promoting student growth and resilience within the virtual learning environment.

Implications for School Practice

At 21st Century Cyber Charter School, the integration of Early Warning Indicator (EWI) data into a cohesive Multi-Tiered System of Supports (MTSS) framework has demonstrated considerable promise in addressing the diverse and complex needs of students within a fully virtual learning environment. The school's structured, data-informed approach has not only enhanced its capacity to identify at-risk students more effectively, but it has also established replicable practices that can be scaled across other cyber or hybrid educational settings. The implications for schoolwide practice are both practical and transformative, offering a clear blueprint for improving student outcomes through systematic and sustainable support structures.

One critical component contributing to this success is the proactive identification of struggling students. By integrating routine EWI data reviews into weekly student support team workflows, the school ensures early and ongoing detection of students exhibiting academic, behavioral, or attendance-related risk. Rather than relying solely on teacher referrals or final grades, staff utilize dynamic data dashboards that compile real-time performance metrics from platforms such as LinkIt! and Infinite Campus. These dashboards visually highlight emerging trends and automatically flag students who meet pre-defined risk thresholds. This approach empowers staff to intervene before challenges escalate, fostering a culture centered on early support rather than reactive crisis management.

Another essential factor is the alignment of structured interventions. Interventions are organized into a categorized menu based on tier level (Tier 1, Tier 2, or Tier 3) and

domain (academic, behavioral, or social-emotional), ensuring that supports are deliberately matched to each student's unique needs. This structure improves consistency and fidelity across the MTSS framework and removes the guesswork from intervention planning. Staff can select evidence-based strategies that correspond with the student's risk profile, increasing the likelihood of successful outcomes. Additionally, this system promotes accountability and continuity, particularly when multiple staff members are involved in executing a student's support plan.

The success of MTSS implementation at 21CCCS has also underscored the importance of clearly defined roles and effective collaboration. When responsibilities related to data review, intervention coordination, progress monitoring, and communication are explicitly assigned, team operations become more streamlined and efficient. For example, school counselors may lead Tier 2 behavioral check-ins, while academic advisors oversee academic mentoring. This delineation of duties strengthens accountability, enhances workflow, and allows staff to apply their expertise more effectively. Furthermore, cross-functional team meetings promote cohesive support plans for students, minimizing fragmentation and duplication of services.

Lastly, the study revealed a significant gap in parent understanding and engagement with the MTSS framework. Many parents were unfamiliar with the concept of tiered supports or were unclear about how data such as attendance and assignment completion translated into specific interventions. This lack of understanding often limited their ability to support the school's efforts at home or advocate for their child. In response, the school recognized the need for improved family outreach and education. By

developing asynchronous, on-demand resources—such as short video explainers, interactive infographics, and simplified written guides—the school aims to increase transparency and promote shared responsibility. Making these resources available in multiple languages and accessible formats will further enhance equity and empower parents as partners in the MTSS process.

Collectively, these implications suggest that the integration of EWIs within a virtual MTSS framework is not only feasible but highly beneficial when implemented with thoughtful planning, collaborative structures, and a commitment to continuous improvement. The school's experience provides a practical model that can be adapted and scaled in other online and hybrid learning environments striving to deliver equitable and proactive student support.

Fiscal Implications

While integrating EWI systems into MTSS requires initial investment, the long-term savings in student remediation and retention justify the expenditure. The fiscal implications identified in this study include:

1. **Technology Investments:** Ongoing licenses for tools like LinkIt! and Infinite Campus are necessary for effective tracking, along with periodic dashboard enhancements.
2. **Staffing and Coordination Time:** Protected time must be allocated for weekly MTSS meetings and case management. Consideration should be given to creating a dedicated MTSS Coordinator role.

3. **Professional Development:** MTSS and EWI training must be embedded into ongoing staff development. While this may require funds, leveraging virtual modules and internal trainers can reduce costs.
4. **Cost Avoidance:** Research supports the cost-effectiveness of early intervention. As Bowers and Sprott (2020) noted, improved identification reduces the need for costly interventions later, such as special education referrals or summer remediation.

Limitations

While this study yielded valuable insights into the integration of Early Warning Indicators (EWIs) within a Multi-Tiered System of Supports (MTSS) framework in a virtual secondary school setting, several limitations must be acknowledged. These limitations provide important context for interpreting the results and underscore the need for caution when generalizing the findings beyond the scope of this research.

1. **Contextual Generalizability:** The study was conducted within a single cyber charter school, 21st Century Cyber Charter School, located in Pennsylvania. Although the school serves a diverse population and shares characteristics with other virtual institutions, the findings may not be fully applicable to traditional brick-and-mortar or hybrid school settings. Differences in instructional delivery models, student demographics, technological infrastructure, and staffing structures may significantly influence how EWIs are interpreted and how MTSS frameworks are implemented. Consequently, while the results provide a strong foundation for understanding virtual MTSS integration, further research in a broader range of educational contexts is necessary to enhance generalizability.

2. **Measurement Constraints in Virtual Environments:** The metrics used to assess student behavior and engagement, such as login frequency, assignment submission rates, and asynchronous session participation, are specific to cyber education and may not reflect equivalent levels of student engagement in physical classrooms. For example, a student who logs into a learning platform may still be disengaged or unproductive, and a missed login may be due to technical difficulties rather than a lack of interest. These nuances in measurement introduce a layer of ambiguity that can affect the accuracy of data interpretation. Additionally, behavioral and social-emotional indicators, which are often observed more easily in face-to-face environments, are more difficult to detect in virtual settings and may be underrepresented in EWI data.
3. **Self-Reported Data and Response Bias:** A substantial portion of the qualitative data in this study was derived from self-reported sources, including staff surveys and focus group discussions. While these tools are valuable for capturing stakeholder perspectives, they are also subject to inherent biases. Participants may have provided socially desirable responses, especially given the study's connection to ongoing school initiatives, or may have felt constrained in their feedback due to perceived organizational expectations. Despite efforts to anonymize responses and encourage candor, the potential for bias remains, and it may have influenced how accurately certain challenges or successes were portrayed.
4. **Limited Sample Size:** The study engaged a relatively small sample of school personnel and students, which limits the statistical power and external validity of the findings. Although the data were triangulated across multiple sources to strengthen

internal credibility, the small sample size restricts the ability to generalize conclusions across larger populations or diverse school models. This limitation is particularly important when considering the variability in implementation fidelity, team structure, and student demographics that may exist across different educational institutions.

5. **Short-Term Scope of Implementation:** The intervention period spanned approximately eight months, which provided sufficient time to observe short-term changes in staff practices, student engagement, and intervention application. However, this timeframe was not long enough to assess long-term impacts on student outcomes, such as graduation rates, academic persistence, or post-secondary readiness. It also did not allow for the full institutionalization of MTSS structures or longitudinal monitoring of students who may require ongoing support. Future studies conducted over multiple academic years would offer a more comprehensive understanding of the sustained effects of MTSS and EWI integration.

In recognizing these limitations, this study maintains transparency in its methodology and interpretation. While the findings are encouraging and suggest promising strategies for virtual MTSS implementation, they also point to the importance of continued exploration, replication in varied contexts, and long-term evaluation to strengthen the evidence base and guide future practice.

Recommendations for Future Research

To build upon the findings of this study and support the broader application of Early Warning Indicators (EWIs) within Multi-Tiered System of Supports (MTSS) frameworks, several key areas of future research are recommended. These directions aim to deepen understanding, enhance implementation fidelity, and ensure equitable access to

interventions across diverse educational settings. By expanding the evidence base, future research can help refine data-informed practices and further establish MTSS as a transformative model for supporting at-risk students.

One important area of future inquiry involves longitudinal studies that explore the long-term impact of EWI-informed MTSS interventions on student outcomes across multiple academic years. While this study offered insight into short-term improvements in engagement, assignment completion, and attendance, it did not assess the sustainability of those gains. Longitudinal research could examine how early interventions influence retention, academic growth trajectories, graduation rates, and post-secondary readiness. Additionally, it would allow for the tracking of students as they transition between tiers of support and evaluate whether intervention effects persist over time.

Future research should also examine how MTSS frameworks function in different instructional contexts. Comparative studies across cyber, hybrid, and traditional brick-and-mortar settings could illuminate which components of EWI systems are universally effective and which must be adapted based on the learning environment. Factors such as teacher-student proximity, access to behavioral observations, and infrastructure for family communication vary significantly by modality. Understanding these contextual variables would support the development of differentiated MTSS models that retain core fidelity while addressing unique operational challenges.

Another critical research avenue involves the integration of culturally responsive data practices. As schools increasingly use data to guide decision-making, it is essential to examine how implicit biases might influence the collection, interpretation, and use of

EWI data. Disproportionate disciplinary actions, biased perceptions of behavior, and unequal access to interventions can lead to over-identification or misidentification of students from historically marginalized populations. Research should investigate how schools can audit their data systems to ensure equity, integrate culturally relevant indicators, involve inclusive stakeholder input, and provide anti-bias training for staff. Such efforts would contribute to making EWI systems more just and representative of all student experiences.

Exploration into the use of artificial intelligence (AI) and predictive analytics represents a promising and emerging domain. Future studies should investigate how AI-driven tools can identify complex patterns of student risk, minimize false positives and false negatives, and generate real-time intervention recommendations. At the same time, research must address ethical concerns related to AI, such as data privacy, transparency, and algorithmic bias. With thoughtful design and oversight, AI-enhanced systems could revolutionize how schools proactively identify and support students, especially in high-volume or resource-constrained environments.

The inclusion of student and parent perspectives in future research is also vital. While this study centered on educator viewpoints, understanding how students experience MTSS supports and what drives their engagement can provide essential insights. Similarly, collecting feedback from families on communication effectiveness, accessibility, and the clarity of intervention systems can help identify gaps and inform improvements. A participatory research approach that centers the voices of students and

families would contribute to the creation of more transparent, inclusive, and user-friendly MTSS frameworks.

Further research should also explore the influence of school leadership and team dynamics on MTSS implementation fidelity. Investigating how leadership vision, administrative support, and staff collaboration affect the consistency and quality of interventions can uncover conditions that contribute to sustainable, high-impact practices. Action research and case studies focused on distributed leadership, professional learning communities, and coaching structures may provide valuable models for strengthening internal capacity and fostering long-term success.

Finally, studies assessing the return on investment (ROI) and fiscal impact of MTSS and EWI systems would offer compelling evidence for educational leaders and policymakers. Comprehensive cost-benefit analyses could evaluate the financial effects of early intervention, including reduced remediation, fewer special education referrals, and increased graduation rates. Additionally, such research could measure efficiency gains through improved staff collaboration, lower student mobility, and decreased disciplinary actions. Presenting clear fiscal data may be key to securing stakeholder support and sustaining funding for data-driven support systems over time.

In combination, these areas of future research build upon the foundation laid by this study and reflect the growing imperative to ensure that MTSS and EWI frameworks are not only effective but also equitable, adaptable, and sustainable. As educational environments continue to evolve, particularly in the context of expanding digital learning,

ongoing research will play a critical role in shaping intervention models that meet the diverse needs of all learners.

Summary

This chapter synthesized the outcomes of a comprehensive mixed-methods study exploring how Early Warning Indicators (EWIs) can be effectively integrated into a Multi-Tiered System of Supports (MTSS) framework within a cyber secondary school. Through the triangulation of quantitative and qualitative data, including staff surveys, focus groups, and implementation records, the study validated that academic performance, behavioral incidents, and attendance patterns serve as reliable predictors for identifying students at risk of disengagement or failure in an online environment.

Despite notable barriers to implementation, such as time constraints, inconsistent student engagement, limited training, and data system fragmentation, school staff demonstrated that with structured processes, appropriate professional development, and coordinated leadership, MTSS frameworks can be both feasible and effective in a virtual setting. Educators were able to deploy interventions aligned to student needs and supported by real-time data, resulting in measurable improvements in student outcomes.

The study also emphasized the financial advantages of early identification and intervention. Investing in systems that support proactive data use and targeted support delivery not only improves student success but can reduce long-term expenditures related to academic failure, truancy, and intensive remediation.

Ultimately, the integration of EWIs into an MTSS model offers a scalable, proactive, and data-driven roadmap for addressing the increasingly complex needs of secondary students in digital learning environments. As educational landscapes continue

to shift toward hybrid and virtual modalities, the alignment of predictive analytics with responsive tiered interventions will be critical for ensuring equity, increasing efficiency, and supporting all students, especially those most vulnerable to falling through the cracks. This study contributes to the growing body of research supporting the expansion of MTSS into nontraditional settings and offers actionable insights for school leaders committed to building sustainable, student-centered systems of support.

References

Allensworth, E. M., & Easton, J. Q. (2007, July). *What matters for staying on-track and graduating in Chicago public high schools: A close look at course grades, failures, and attendance in the freshman year*. Consortium on Chicago School Research, University of Chicago. Retrieved from the University of Chicago CCSR website

American Institutes for Research. (2022). *Improving MTSS implementation: Lessons from the field*. American Institutes for Research. https://www.air.org/resource/improving-mtss-implementation-lessons-field

Balfanz, R., & Byrnes, V. (2018). Connecting EWIs to MTSS: A practical guide for educators. *American Journal of Education, 124*(2), 123-143.

Bowers, A. J., & Sprott, R. (2020). Predictive indicators of high school dropout and academic underachievement: The role of early warning systems. *Journal of Educational Psychology, 112*(4), 744-756.

Burns, M. K., & Gibbons, K. A. (2012). *Implementing response to intervention: A practical guide*. Guilford Press.

Council of the Great City Schools. (2019). *Using MTSS to close the achievement gap: The role of early warning indicators*. Council of the Great City Schools. https://www.cgcs.org/resource/using-mtss-to-close-achievement-gap

Durlak, J. A., Weissberg, R. P., & Pachan, M. (2010). A meta-analysis of the impact of school-based social and emotional learning programs. *Child Development, 81*(4), 1-17.

Faria, A. M., Kavulic, C., Johnson, T., Gray, L., & Hollingshead, A. (2017). Multi-tiered systems of support: What is MTSS and what is not? *Journal of Special Education, 50*(4), 229–243.

Fixsen, D. L., Naoom, S. F., Blase, K. A., Friedman, R. M., & Wallace, F. (2005). *Implementation research: A synthesis of the literature*. National Implementation Research Network, University of South Florida.

Gonzalez, M. T., & Lambert, R. (2022). Using MTSS to address social-emotional learning needs: A comprehensive review. *Journal of School Psychology, 62*(3), 145-159.

Gordon, M. F., & Rajan, R. S. (2021). The impact of MTSS on student achievement in secondary schools: A systematic review. *Journal of Educational Research, 114*(2), 123-145.

Hattie, J. (2020). *Visible learning: Feedback*. Routledge.

Horner, R. H., & Sugai, G. (2020). Frameworks for integrating academic and behavioral support in secondary schools: MTSS and beyond. *Journal of School Psychology, 77*(2), 154-166.

McIntosh, K., Ty, S. V., Lipschultz, J., & Hoselton, R (2018). MTSS implementation in high schools: Integrating EWIs for early identification of at-risk students. *Journal of Positive Behavior Interventions, 20*(4), 239-251.

National Center on Intensive Intervention. (2021). *Implementing MTSS for secondary students: Challenges and opportunities*.

RTI Action Network. (2019a). *Response to intervention (RTI) overview*. National Center for Learning Disabilities. https://www.rtinetwork.org/learn/what/whatisrti

RTI Action Network. (2019b). *The role of MTSS in addressing chronic absenteeism: A focus on early warning systems*. https://www.rtinetwork.org/resource/role-of-mtss-in-addressing-chronic-absenteeism

Rosenbaum, J. E., Deil-Amen, R., Person, A. E., & Heredia, A. M. (2020). Predictive indicators in MTSS: A case study of early warning indicators in urban schools. *Urban Education, 55*(8), 1241–1262.

Soland, J., Hamilton, L. S., & Stecher, B. M. (2019). Leveraging data analytics to improve early warning systems in education. *Educational Measurement: Issues and Practice, 38*(3), 23-34.

Sugai, G., & Horner, R. H. (2019). Sustaining effective MTSS practices: Lessons learned and future directions. *Preventing School Failure: Alternative Education for Children and Youth, 63*(2), 155-166.

Therrien, W. J., Cook, B. G., Fiore, T., & Smolkowski, K. (2020). The role of early warning indicators in identifying students at risk: An MTSS approach. *Intervention in School and Clinic, 55*(4), 204–213.

The Education Trust. (2020). *Effective implementation of MTSS in diverse schools: A case study approach*.

U.S. Department of Education. (2020). *Best practices for integrating EWIs in MTSS: A policy brief*.

APPENDICES

Appendix A

IRB Approval Letter

Institutional Review Board
250 University Avenue
California, PA 15419
instreviewboard@pennwest.edu
Melissa Sovak, Ph.D.

Dear Heather,

Please consider this email as official notification that your proposal titled "Examining the Influence of Multi-Tiered Support System (MTSS) and Early Warning Indicators on Student Outcomes" (Proposal #PW24-040) has been approved by the Pennsylvania Western University Institutional Review Board as submitted.
The effective date of approval is 09/20/2024 and the expiration date is 09/19/2025. These dates must appear on the consent form.
Please note that Federal Policy requires that you notify the IRB promptly regarding any of the following:

(1) Any additions or changes in procedures you might wish for your study (additions or changes must be approved by the IRB before they are implemented)
(2) Any events that affect the safety or well-being of subjects
(3) Any modifications of your study or other responses that are necessitated by any events reported in (2).
(4) To continue your research beyond the approval expiration date of 08/15/2025, you must file additional information to be considered for continuing review. Please contact instreviewboard@calu.edu
Please notify the Board when data collection is complete.

Regards,
Melissa Sovak, PhD.
Chair, Institutional Review Board

Appendix B

Informed Consent

Title of Study: Examining the Influence of Multi-Tiered Support Systems (MTSS) and Early Warning Indicators on Student Outcomes

KEY INFORMATION

You are being asked by Heather Messenger to participate in a research study. Participation in the study is voluntary, and you may stop anytime.

This research project aims to explore which specific EWIs are most predictive of academic, social, and emotional difficulties in students. Additionally, it will examine how these indicators can be systematically integrated into the MTSS framework to improve early identification processes. The research will also investigate the types of interventions that are most effective once at-risk students are identified, considering various factors such as academic support, counseling, and behavioral interventions.

In this study, you'll be asked to answer questions related to Multi-Tiered System of Supports (MTSS), early warning indicators, interventions, and their effectiveness.

Over the course of the school year, you'll be asked to dedicate approximately 2 hours to complete a pre-survey, a post-survey, and, if you choose to participate, an interview.

There are minimal to no risks to participate in this study. Remember, you may stop taking the survey at any time.

There are no direct benefits to participants from the research. It will help researchers better understand the influence of Multi-Tired Support Systems (MTSS) and Early Warning Indicators (EWI) on student outcomes.

SECURITY OF DATA

The online study is completely anonymous; you will not be asked to give any information that could identify you (e.g., name). The survey is NOT linked to IP addresses. Individual responses will not be presented, just the aggregated data.

Remember, taking part in this study is voluntary. If, while taking the survey, you feel uncomfortable or no longer want to participate, you may stop at any time. To stop taking the survey, you may either:

(1) proceed to the last page of the survey and press "Submit," or (2) if you wish to exit the survey, close your browser completely.

There are no consequences if you decide to stop participating in this study.

There is no identifiable information collected from you during this study; all other information from this study will be confidential within local, state, and federal laws. The PennWest University Institutional Review Board (IRB) may review the research records. The study results may be shared in aggregate form at a meeting or journal, but there is no identifiable information to be revealed. The records from this study will be maintained for a minimum of three (3) years after the study is complete.

Your information collected in this research *will not* be used or distributed for future research, even if all your identifiers are removed.

If you have questions about the research or a research-related injury, you can contact Dr. Mary Wolf at wolf@pennwest.edu. If you have a question about your rights as a research participant that you need to discuss with someone, you can contact the PennWest University Institutional Review Board at InstReviewBoard@pennwest.edu.

If you would like a copy of this informed consent, please print this screen or contact Heather Messenger at mes2680@pennwest.edu.

By clicking on the "I agree" box and continuing with the survey, you have acknowledged that you have read the informed consent and are at least 18 years old. Also, you acknowledge that you

agree to participate in the study and have the right not to answer any or all the questions in the survey. Finally, you understand your participation is entirely voluntary, and you may quit the study at any time without penalty.

Appendix C

Pre and Post Survey

Please take a moment to answer the questions below. Thank you for your participation.

Role:

Teacher

Counselor

Administrator

MTSS Team Member/Lead

Instructional Leader

Teaching Assistant

Academic Advisor

Other:

Years of experience at the school:

0-2

3-5

6-10

11+

Section 1: Early Warning Indicators (EWIs)

Rate the effectiveness of each of the following indicators in identifying struggling students on a scale from 1 (Not Effective) to 5 (Highly Effective):

1-Not Effective

2-Slightly Effective

3-Moderately Effective

4-Effective

5-Highly Effective

Academic Performance (e.g., low grades, missing assignments)

Behavioral Issues (e.g., frequent disciplinary actions, classroom disruptions)

Social-Emotional Indicators (e.g., withdrawal, reported anxiety)

Family and Home Life Factors (e.g., reported issues at home, lack of parental involvement)

Peer Relationships (e.g., bullying, social isolation)

Attendance (e.g., frequent absences, tardiness)

Academic Performance (e.g., low grades, missing assignments)

Behavioral Issues (e.g., frequent disciplinary actions, classroom disruptions)

Social-Emotional Indicators (e.g., withdrawal, reported anxiety)

Family and Home Life Factors (e.g., reported issues at home, lack of parental involvement)

Peer Relationships (e.g., bullying, social isolation)

Attendance (e.g., frequent absences, tardiness)

How often do you review the following data sources to identify struggling students?

Never

Rarely

Sometimes

Often

Always

Attendance records

Grader reports

Behavior logs

Counselor/psychologist reports

Student self-reports

Parent/guardian feedback

Attendance records

Grader reports

Behavior logs

Counselor/psychologist reports

Student self-reports

Parent/guardian feedback

How confident are you in your ability to identify struggling students early using the current EWIs?

Not Confident

Somewhat Confident

Neutral

Confident

Very Confident

Are there any other indicators you find useful?

Your answer

What improvements could be made to the current EWI system?

Your answer

Section 2: Utilization and Effectiveness of EWIs in Practice

How integrated are EWIs into your daily/weekly workflow?

Not Integrated

Slightly Integrated

Moderately Integrated

Highly Integrated

Rate the effectiveness of the current process for identifying struggling students using EWIs on a scale from 1 (Not Effective) to 5 (Highly Effective).

1-Not Effective

2-Slightly Effective

3-Moderately Effective

4-Effective

5-Highly Effective

How often do you feel the current EWI system misses identifying a struggling student?

Never

Rarely

Sometimes

Often

Always

What are the main barriers you face when trying to use EWIs effectively?

Lack of training

Insufficient time

Data accessibility issues

Communication gaps

Lack of communication from students and/or parents

Other:

How do these barriers impact your ability to support struggling students?

Your answer

What additional support or resources would help you better utilize EWIs to identify struggling students?

Your answer

Section 3: Intervention Strategies

Which of the following intervention strategies do you currently use to support struggling students?

Tutoring

School Counselor

Peer Mentoring

Parental Engagement Meetings

In-Person Work Sessions

Home Visits-Home Liaisons

Reading Specialist Support

Social Worker Services

Tier II Interventions, e.g. iXL

Other:

How well are these intervention strategies integrated into the MTSS framework?

Not Integrated

Slightly Integrated

Moderatly Integrated

Highly Integrated

How often do you collaborate with other staff members (e.g., counselors, special education) to implement interventions?

Never

Rarely

Sometimes

Often

Always

How satisfied are you with the outcomes of the current intervention strategies?

Not Satisfied

Slightly Satisfied

Neutral

Satisfied

Highly Satisfied

What barriers do you encounter when implementing these interventions?

Time constraints

Lack of resources

Insifficient training

Student Resistance

Other:

What improvements or additional supports would enhance the effectiveness of intervention strategies?

Appendix D

Interview Questions

1. What are the most significant resource-related challenges you face when implementing interventions for students identified by the EWS?
2. How do you ensure that interventions are implemented consistently and with fidelity across different grade levels?
3. What obstacles do you encounter in providing sufficient training and ongoing professional development for teachers to support intervention strategies?
4. How do you engage students and their families in the intervention process, and what barriers have you faced in gaining their full participation?
5. What broader systemic or organizational challenges do you face when implementing interventions through the MTSS framework?

Additional questions may be added to gain clarification and/or additional information.

Appendix E

Focus Group Protocol

The following questions were used to guide the focus group session with MTSS Core Team members: 5 Administrators, 2 Intermediate Unit Consultants, 5 Teachers, 2 reading Specialists and 2 Teaching Assistants

1. How has the integration of Early Warning Indicators (EWIs) influenced your ability to identify struggling students in a timely manner?
2. In what ways has the MTSS framework supported or challenged your efforts to respond to students' needs?
3. Can you describe any obstacles or limitations you've encountered when using EWI data for intervention planning?
4. How effective has the collaboration been among staff involved in implementing interventions?
5. What kinds of training or resources would have improved your confidence or capacity in applying MTSS strategies?
6. How has the virtual school environment affected your ability to implement MTSS compared to a traditional setting?
7. In your view, what were the most impactful strategies that emerged during the intervention period?
8. Are there any practices from this implementation that you believe should be sustained or scaled moving forward?