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Walden University

College of Education

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Amanda Wentz

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Walden University
2020

Abstract

Effectiveness of Response to Intervention in Third Grade Reading Outcomes

by

Amanda Wentz

MA, Walden University, 2011

BS, University of Wyoming, 2009

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Walden University

December 2020

Abstract

Reading continues to be a struggle for many students beyond primary ages. Response to Intervention (RTI) is a common approach in practice to improve reading outcomes, but it has not been researched with all populations. Studies on 3rd grade struggling readers are needed to ensure they receive appropriate support to become more successful readers. The theoretical foundations for this quantitative study included Vygotsky's social constructivist theory and Maslow's hierarchy of needs. The research questions examined whether participating in RTI had a significant influence on 3rd grade students' reading outcomes from the beginning compared to the end of the school year. A 1-group pretest-posttest design was used to compare reading scores from fall to spring for students who received RTI. Reading scores included overall reading outcomes and reading areas. Archival data were collected from 1 public elementary school in the Western United States. Struggling 3rd grade readers (n=91) were identified for each of the 4 years from 2015-2019. Struggling readers were identified with scores below the 30th percentile on a standardized assessment and participation in RTI for inclusion in the study. Fall and spring data were analyzed using Wilcoxon signed-rank tests to determine significant differences with $p < 0.05$. Overall reading outcomes and reading areas were significant for medium effects sizes (0.509-0.599) except one reading area with a small effect size (0.446). Studying the effectiveness of RTI in meeting 3rd grade reading outcomes may contribute to positive social change by supporting educators and school administrators' efforts to improve reading outcomes for struggling 3rd grade readers by providing support for effective, evidence-based reading intervention.

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Chapter 1: Introduction to the Study

Response to Intervention (RTI) is a systematic approach to instruction for students at-risk of academic failure (Fuchs & Fuchs, 2017). RTI is composed of a three-tiered process where struggling readers are identified by standardized assessments (Cakiroglu, 2015). They then participate in small-group instruction targeted at their specific reading needs with the goal of returning to classroom instruction. RTI can prevent academic regression in struggling readers who will be followed with progress monitoring for needed adjustments to support academic success and placement decisions (Cakiroglu, 2015). RTI use is supported in the research, but more research on specific populations is needed (Solheim, Frijters, Lundetrae, & Uppstad, 2018). This relative dearth of RTI research includes population characteristics such as grade level, specific cognitive deficits, ethnicity, or gender (Solheim et al., 2018).

Wanzek et al. (2018) conducted a meta-analysis on early reading intervention finding support for RTI in improving reading outcomes for struggling readers but expressed a lack of research on the effectiveness of RTI in third grade. Focusing on 3rd grade RTI is paramount due to differences of grade level needs (Suggate, 2016; Wanzek et al., 2018). Students in primary grades need to focus on phonics and decoding, whereas upper elementary students focus on learning comprehension skills (Suggate, 2016). Third graders are in a unique stage of reading development, as they transition from reading to decode to comprehend (Suggate, 2016).

This study may contribute to positive social change on a state and national level by showing RTI is effective in reaching third-grade reading outcomes. Academic

policies and reading requirements may be taken into consideration based on the findings of this study. How educators provide instruction to struggling readers may be positively influenced. The study may also contribute to the development of effective interventions provided to struggling readers in third grade.

The major sections include a summary of background literature related to my study, a description of a gap in research on practice, and why my study was needed. The problem statement section provides details regarding the gap in research on practice, supported by current literature. Then I discuss the purpose of the study with basic study design and intent. I introduce the research questions and the null and alternative hypotheses studied. A brief description of how the theoretical framework applies to my study was provided. Further sections include assumptions, scope and delimitations, and limitations. Chapter 1 concludes with the significance of the study and a transition to Chapter 2.

Background

Elementary classrooms are composed of many students who are unable to read at grade level (Sanders et al., 2019). The number of students in each grade who are below grade level in reading increases as students advance toward the third grade (Gilmour, Fuchs, & Wehby, 2019; U.S. Department of Education, 2020). By fourth grade 70% of students in the general classroom are not reading at grade level, and this figure remains stable through at least eighth grade (Sanders et al., 2019, p. 339). These struggling readers (readers below grade level) often have poor scores in early elementary and are

likely to continue to struggle throughout their academic career (Borre, Bernhard, Bleiker, & Winsler, 2019).

High rates of readers struggling to meet grade level expectations in elementary grades is concerning considering the necessity of reading as a basic skill. Reading may be the most imperative academic skill considering its range of utility from entertainment to professional life (Sanders et al., 2019). Struggling readers are at increased risk of struggling in a variety of academic and personal areas of life (Amendum & Liebfreund, 2019; Huang et al., 2020). Reading intervention is the most important strategy to reverse the trend of poor academic and personal outcomes for struggling readers (Amendum & Liebfreund, 2019).

The need for an organized method of assessment to identify children with reading deficiencies, provide intervention targets, and progress monitor readers has been recognized for decades (Gustafson, Svensson, & Falth, 2014). The U.S. Department of Education (2020) supports the need for reading interventions, citing reading scores for students continue to worsen at all academic levels. The Individuals with Disabilities Education Act (IDEA) of 2004 prioritized the development and implementation of evidence-based interventions, leading the way to RTI (Gustafson et al., 2014). RTI is commonly implemented in the small group setting with individualized intervention based on the student's level of need (Cakiroglu, 2015). The model is flexible and can be structured or presented differently where researchers have found improved effect sizes by altering literacy targets, but not all populations have been studied (Connor et al., 2018; Swart et al., 2017). There is a lack of research on the effectiveness of RTI for struggling

readers in third grade (Wanzek et al., 2018). RTI is still widely implemented at all elementary grade levels, including third grade (Cakiroglu, 2015). Lack of evidence to support RTI in third grade places these struggling readers at risk of inferior intervention strategies (Myrberg, Johansson, & Rosen, 2019).

My study targeted the gap in research on practice by analyzing the effectiveness of RTI in improving reading outcomes for struggling readers in third grade. Addressing the lack of data on the effectiveness of RTI for third-grade students is necessary to support schools. Policymakers and school administrators need support in forming policies on evidence-based interventions, and third-grade teachers and tutors need confidence in their instruction approaches. Focusing on supporting use for RTI at grade level allows researchers to focus on other demographics and intervention strategies (Nelson, Van Norman, & Parker, 2018).

Problem Statement

Researchers have focused on the effects of early reading intervention in kindergarten and first grade; however, the problem is there is a significant lack of evidence for effectiveness of such programs when students move into second and third grade (Cakiroglu, 2015; Simmons et al., 2014; Wanzek et al., 2018). This is a gap in research on practice considering school districts strive for students to read on grade level by the end of third grade (Schugar & Dreher, 2017). Greenwood et al. (2014) indicated that one in three third graders struggle with reading. This foundational problem has significance in their immediate futures, as the U.S. Department of Education (2020)

shared 65% of students nationwide are reading below grade level at the end of fourth grade (para. 1).

Reading is an essential life skill. Children who cannot read by the end of third grade are at risk of academic struggles, not graduating, exhibiting behavioral issues, and low self-esteem (Greenwood et al., 2014; Partanen & Siegel, 2014). Reduced literacy leads to the immediate academic risk of school failure and future risk of underemployment (Jones, Ostojic, Menard, Picard, & Miller, 2017). This is concerning considering there is a national problem in reduced literacy (Schugar & Dreher, 2017; Wanzek et al., 2018). My study targeted the problem and gap in research on practice by using quantitative methods to study the effectiveness of RTI in helping struggling readers meet third-grade reading outcomes.

Purpose of the Study

The purpose of this quantitative, one-group pretest-posttest study was to investigate if participating in RTI is successful for third-grade students in improving reading outcomes from the beginning to the end of the school year. This is important because little focus has been given on the effectiveness of RTI in helping students reach crucial reading benchmarks in third grade (see Wanzek et al., 2018). This study compared struggling readers' scores from the beginning to the end of the school year. Overall reading outcomes and reading areas were included in the data analysis. The dependent variable measured was reading scores as determined by Measures of Academic Progress (MAP), a standardized assessment. RTI was the quasi-independent

variable in my study. A quasi-independent variable is not manipulated in the study but is the factor of interest (Johnson & Christensen, 2020).

Research Questions and Hypotheses

RQ1: Does participating in RTI have a significant influence on third-grade students' overall reading outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0$1: Participating in RTI has no statistically significant influence on third-grade students' overall reading outcomes.

H_a1: Participating in RTI has statistically significant influences on third-grade students' overall reading outcomes.

RQ2: Does participating in RTI have a significant influence on third-grade students' foundational skills outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0$2: Participating in RTI has no statistically significant influence on third-grade students' foundational skills outcomes.

H_a2: Participating in RTI has statistically significant influences on third-grade students' foundational skills outcomes.

RQ3: Does participating in RTI have a significant influence on third-grade students' language and writing outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0$3: Participating in RTI has no statistically significant influence on third-grade students' language and writing outcomes.

H_a3: Participating in RTI has statistically significant influences on third-grade students' language and writing outcomes.

RQ4: Does participating in RTI have a significant influence on third-grade students' vocabulary use and functions outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0 4$: Participating in RTI has no statistically significant influence on third-grade students' vocabulary use and functions outcomes.

$H_a 4$: Participating in RTI has statistically significant influences on third-grade students' vocabulary use and functions outcomes.

RQ5: Does participating in RTI have a significant influence on third-grade students' literature and informational text outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0 5$: Participating in RTI has no statistically significant influence on third-grade students' literature and informational text outcomes.

$H_a 5$: Participating in RTI has statistically significant influences on third-grade students' literature and informational text outcomes.

Theoretical Foundation

One of the theoretical frameworks for this study was Vygotsky's (1978) social constructivist theory. The social constructivist theory indicates that individuals have unique experiences and must be active participants in their education to effectively meet their needs (Antlová, Chudý, Buchtová, & Kučerová, 2015). Vygotsky reported that children have specific developmental needs that must be considered in their education.

The zone of proximal development (ZPD) is what students can do with and without support from a knowledgeable instructor (Vygotsky, 1978). Vygotsky expressed that instruction should guide students to focus on their unique ZPD in order to be effective. My study included data from struggling readers who were identified by standardized testing to be below grade level. The classroom education provided at the study school is generalized to grade level but may not meet the unique developmental needs of struggling readers. The RTI intervention approach is tailored to each student's cognitive abilities and guided by small group (Cakiroglu, 2015). My research questions included analysis of reading outcomes for struggling readers before and after they receive RTI targeted at their reading needs.

The second theoretical framework for this study was Maslow's hierarchy of needs (1943) theory. This theory includes five categories of human needs which provides a hierarchical framework for understanding motivation of behavior (Maslow, 1943). The esteem needs include the component of self-esteem (Maslow, 1943) and is particularly relevant to my study. Children with low reading abilities often lack motivation to work (Kellerman, 2014; Maslow, 1943). Struggling readers in the general classroom likely lack desire to work from reduced self-esteem and helplessness due to an inappropriate level of instruction (Kellerman, 2014). Poor self-esteem is correlated with poor reading performance (Unrau et al., 2018). Yang, Tian, Huebner, and Zhu (2019) found that providing struggling readers with intervention can support improvement in self-esteem. Achievement and appreciation are fundamental to improving self-esteem and are necessary factors in considering education approaches (Maslow, 1943). My study's

research questions analyzed the effectiveness of RTI in helping students achieve improved reading outcomes. RTI incorporates high quality instruction and teacher practices for students where previous approaches have failed and provides struggling readers with the opportunity for improved self-esteem through an appropriate level of instruction (Cakiroglu, 2015). RTI at the study school is gauged to students' abilities and allows them the opportunity to gain confidence as they work toward exiting the program. Improving self-esteem in students is necessary to allow them to focus on their cognitive needs (Maslow, 1943). My study analyzed the effectiveness of RTI in supporting students in their cognitive reading development as measured by standardized assessments. Chapter 2 includes a more detailed description of these theories and how they relate to my study.

Nature of the Study

A quantitative, one-group pretest-posttest design was selected for my study to investigate the effectiveness of RTI in improving reading outcomes in struggling readers in third grade. Quantitative research is ideal to analyze a specific reading intervention and for providing clear recommendations to practice (Creswell, 2012; Liu & Maxwell, 2019). This design was used to study if reading intervention allows struggling readers to improve from the beginning of the year to the end of the year. Qualitative and mixed methods research are ideal for broader questions (Creswell, 2012), and were not used in my study with a clear focus. The one-group pretest-posttest design is commonly used in education as data on intervention effectiveness before and after implementation is helpful to make practical decisions such as placement (Liu & Maxwell, 2019). The study setting

was one public elementary school in the Western United States and focused on third graders struggling in reading. This school had five third-grade classrooms with approximately 24 total students with about 30% of students receiving RTI. My study included archival data from the past 3 years with a total of 91 students considering inclusion and exclusion criteria.

My study included the quasi-independent variable of RTI instruction and the dependent variable of MAP reading scores. RTI at the study school was implemented by tutors in the small-group setting. The MAP standardized assessment is well validated in its purpose to provide accurate reading scores (Northwest Evaluation Association [NWEA], 2011). The study school used the assessment to identify struggling readers with reading proficiency scores below the 30th percentile. MAP scores in the fall determined each student's RTI placement, and students were re-evaluated in the spring.

My study was further described as an ex-post facto design using archival data. The researcher does not manipulate the independent variable in an ex-post facto design (Allen, 2017). RTI status and MAP scores are logged at the study school in the fall and spring after testing in a system called Infinite Campus. Proper permission from the study school district was collected, and Walden University's Institutional Review Board (IRB) approval was granted. Only then did I move onto data collection, which took a couple of days. Information was collected from the past 3 years and organized into fall and spring for the purpose of forming the two groups of student data. The fall and spring timeframes represent data from before and after RTI. Collecting archival MAP data were beneficial in allowing for analysis of RTI in the natural classroom setting. The archival

data included deidentified students coded with a numeric score for their beginning and end of third-grade reading outcomes. A categorical label for the presence or lack of RTI was also used. A computer program called Statistical Package for Social Sciences (SPSS) was used to cleanse and analyze the data. A paired *t* test showed a comparison of pretest and posttest reading outcomes to evaluate the effectiveness of RTI in struggling readers. Descriptive analysis for the mean and standard deviation of the pretest and posttest groups of study data was also included.

Definitions

Achievement Gap: Any persistent disparity in educational outcomes or achievement between different groups of students (Gilmour et al., 2019).

Data-based Individualization: Intervention approach where educators customize strategies based on student data (Hammerschmidt-Snidarich, McComas, & Simonson, 2019).

Early Childhood Education: The term is used to describe students in prekindergarten through second grade (Milburn, Lonigan, & Phillips, 2017).

Measures of Academic Progress (MAP): A standardized assessment used to measure students' reading abilities (Burns & Young, 2019).

Rasch Unit (RIT) Score: A measurement used to quantify each student's instructional level and is sometimes referred to as a RIT ruler (NWEA, 2019b).

Reading Comprehension: The ability to understand an isolated word and to process oral information (Swart et al., 2017).

Response to Intervention (RTI): A multitiered model designed to support at-risk students. RTI is composed of three tiers: Tier 1, Tier 2, and Tier 3. Tier 1 is composed of all students in the classroom setting. Tier 2 is provided in a small-group setting to support classroom instruction with targeted instruction. Students in Tier 3 received individualized instruction based on individual need(s) in a small-group setting (Fuchs & Fuchs, 2017).

Socioeconomic Status: Refers to employment, financial means, level of education, income, educational level, and living conditions/situations (Dolean, Melby-Lervag, Tincas, Damsa, & Lervag, 2019).

Assumptions

Assumptions are accepted truths within research but are unconfirmed (Statistics, 2019). My first assumption was that RTI and MAP data were accurately recorded which requires educators to be trained and act professionally. My study approach to retrieve archival data depended on accurate records of RTI and MAP data for valid testing of my research questions. It was also assumed RTI was taught with fidelity by educators who were trained for this role. This was needed as the purpose of my study was to assess the effectiveness of RTI in its designed form. My final assumption was that MAP was administered with fidelity. MAP is a standardized assessment with clear direction for implementation required to replicate its high levels of validity and reliability (NWEA, 2011). The accurate administration of MAP was needed to provide my study with precise data for statistical analysis. These assumptions were unavoidable due to the use

of archival data after intervention implementation where variables were beyond control in this quantitative study.

Scope and Delimitations

The scope of this study was limited to struggling third-grade readers at one school in a rural community. Data were narrowly collected for struggling readers as defined by MAP readings scores below the 30th percentile. This study used archival student data that included RTI status and MAP scores from fall and spring. The quantitative, one-group pretest-posttest design generalizes to settings using similar approaches to RTI assessment and placement. My study setting and population are discussed for generalizability. My study included data from third-grade students at one public elementary school in the Western United States using the Common Core State Standards (CCSS). The majority of the population was White (67%) and Hispanic (16%) and composed of a large population of the middle class (Washoe County School District [WCSD], 2019). Study generalizability was limited considering the limited demographics including ethnicity, location of the study, grade level, and socioeconomic class. My study must also be carefully interpreted in other settings such as private schools, as they do not follow the same criteria as public schools. The study's scope did not extend to clarify reading outcomes for other subpopulations, such as ethnicity, gender, or socioeconomic groups.

Limitations

My study has several limitations to be discussed. The pretest-posttest design is commonly used to evaluate interventions in education (Cakiroglu, 2015) but has inherent weaknesses when inferring a relationship between the quasi-independent and dependent

variables (Johnson & Christensen, 2020). The study design limits the interpretation of a significant relationship between RTI and MAP reading outcomes for several reasons. There were numerous and unaccounted confounding variables during RTI which may influence reading outcomes. The third graders matured during the intervention with an effect on scores. The design to select struggling third graders made possible the regression toward higher scores. Many of these factors were not controlled due to the use of archival data. The use of archival data prevents researchers from controlling variables during an intervention (Allen, 2017). The convenience sample of data also limits the control of variables due to the nonrandomization of groups with limitation of cause and effect interpretation (Creswell, 2012). These limitations were addressed with the goal of a larger sample size than is statistically required. Large sample size can help to reduce the effects of covariates (Allen, 2017). My study used a strict data cleansing procedure including matching student data for MAP in spring and fall and removing incomplete data. Many of these variables represent RTI implementation in the natural educational environment. The study school is my current employer with an inherent risk of bias. The data collection occurred for a period before my employment, and I did not have direct oversight of third-grade students.

Incomplete ethnicity identification data and an unexpected proportion of male student data were additional limitations of the study. Interpretation of study results considering ethnic identifications was limited because archival data for ethnicity was only available for 1 out of 4 school years. More complete data on ethnic identification is required to confidently generalize results to other populations. Study result interpretation

was also limited due to a significantly higher number of student data from males compared to females who received RTI. Subsequently, this data is more difficult to generalize to populations with similar percentages of females to males which is typical of the United States elementary classroom (U.S. Department of Education, 2020). The ethnic and gender limitations of my study were addressed by recommendations for caution in generalizing results to practice or other research populations. Further studies were recommended to address the gap in research on practice for RTI in third-grade readers with more complete demographical data.

Significance

There has not been significant research to date on the effects of RTI for struggling readers in third grade (Cakiroglu, 2015; Simmons et al., 2014; Wanzek et al., 2018). This study looked to bridge the gap in research on practice in understanding the effectiveness of RTI programs in helping struggling readers in third-grade reading outcomes, a problem that reaches the national level (see Cakiroglu, 2015; Simmons et al., 2014; Wanzek et al., 2018). There are many ways this study might contribute to filling this gap. RTI was identified as beneficial to struggling readers in reaching third-grade proficiency, building upon research supporting RTI in other grade levels. School district administrators, principals, and teachers may be supported in using or recommending RTI for third graders. Elementary schools may improve their overall reading outcomes with appropriate use of RTI in third graders. Positive social change may occur on the state and national level with reduced burden of literacy since third-grade students may receive effective RTI intervention.

Summary

RTI is a widely used intervention that helps struggling readers improve through explicit instruction tailored to student needs (Amendum & Liebfreund, 2019). Being able to identify individual needs and progress makes RTI a valuable tool for teachers. Further research on RTI is needed to ensure evidence-driven interventions for various populations of struggling readers (Solheim et al., 2018). This study investigated the effectiveness of RTI on third-grade reading outcomes for struggling readers, and the results can build on research and support educators working with this population. Limitations of this study targeting one rural public school were considered among other variables and demographics in interpreting the potential results. The next chapter includes information regarding my literature research strategy and a thorough explanation of my theoretical foundation. Chapter 2 also includes a detailed description of the literature related to the key variables of my study.

Chapter 2: Literature Review

Current researchers focus on the effects of early reading intervention in kindergarten and first grade with a notable lack of research on RTI models in third grade (Wanzek et al., 2018). Kindergarten and first-grade teachers have the benefit of practicing with evidence-based research supporting removal of struggling readers from the classroom for RTI with guidance in placement and intervention targets (Al Otaiba et al., 2014a; Amendum & Liebfreund, 2019), yet, there is lack of evidence guiding third-grade teachers in appropriate use of RTI models (Wanzek et al., 2018). Wanzek et al. (2018) performed a meta-analysis of 25 studies to examine the overall effectiveness of RTI in kindergarten to third grade and found no studies since 2005 that addressed struggling readers in third grade. RTI models are commonly applied to third-grade classrooms regardless of the lack of evidence (Cakiroglu, 2015).

School administrators and teachers must be concerned with providing evidence-based interventions to struggling readers considering the significant failure in helping students achieve grade-level reading outcomes (U.S. Department of Education, 2020). The U.S. Department of Education (2020) shared 35% of fourth-grade students nationwide are reading at grade level by the end of the year (para. 1). Poor reading outcomes continue even considering school missions to help students read on grade level by the end of third grade (Schugar & Dreher, 2017; Wanzek et al., 2018). Failure of third graders to meet reading proficiency is concerning since students who do not meet reading proficiencies by the end of third grade are four times more likely to never graduate high school (Nelson et al., 2018). Further research on the effects of RTI must be considered in

an effort to close the gap between school district goals and current reading outcomes (U.S. Department of Education, 2020).

The purpose of this quantitative, one-group pretest-posttest study was to investigate if participating in RTI is successful for third-grade students in improving reading outcomes from the beginning to the end of the school year. RTI models have been shown to increase fluency, reading comprehension, and self-esteem in other populations (Bastug & Demirtas, 2016; Oostdam, Blok, & Boendermaker, 2015; Unrau et al., 2018). Nelson et al. (2018) reported the long-lasting benefits of effective early RTI and the reduced effectiveness as children progress past kindergarten. The school district in my study identified students below reading grade level as appropriate for small-group intervention and uses RTI models for a decision on placement and exiting strategy. My study approach was to use quantitative methods to study the effectiveness of RTI to help struggling readers reach third-grade proficiency by comparing their reading outcomes at the beginning to the end of the year.

My study will support third-grade teachers in considering options for RTI in their students. RTI effectiveness varies based on several factors including grade level, socioeconomic status, and severity of the deficiency, among others (Nelson et al., 2018; Suggate, 2016). Hall and Burns (2018) collected data revealing small-group settings are more effective in elementary school than middle or high school. It is important to consider evidence-based intervention for struggling readers because individual students require individualized and targeted interventions (Lyster, Lervag, & Hulme, 2016). Swart et al. (2017) furthered that interventions are more effective when specific literacy

skills are targeted for struggling readers. More effective interventions consider the special needs of struggling readers (Bennett, Gardner, Cartledge, Ramnath, & Council, 2017).

The major sections of Chapter 2 include literature review strategies, theoretical foundation, and literature review. Numerous themes were investigated while comparing, contrasting, and synthesizing articles for my literature review. Major themes were categorized into different sections, starting with an analysis of RTI models, proceeding to predictability, early intervention, long-term effects, the achievement gap, literacy components, and concluding with training and instruction. RTI models were considered from multiple viewpoints: validity, effectiveness, fidelity, placement, duration, specific interventions, and augmentation strategies. The section on predictability contains data on predicting RTI outcomes and considers the effectiveness of demographic compared to targeted predictors. Evidence supporting early intervention and evidence-based approaches were included. A discussion of the long-term effects of reading intervention was reviewed, including benefits from intervention in preschoolers to first graders and specific interventions with evidence of long-term effectiveness. The achievement gap was analyzed considering perpetuating factors, causes, and evidence for approaches. The importance of comprehension and other literacy components, specifically vocabulary, fluency, and writing, to reading intervention was also considered. The literature review concluded with a discussion on training and instruction. This chapter's review of the literature closes with a summary and conclusion with a transition to Chapter 3.

Literature Search Strategy

I examined scholarly-written, peer-reviewed articles in English from 2014 to 2020 for my literature review. The peer-reviewed articles included meta-analyses, quantitative, qualitative, and mixed-method studies. Seminal papers from Harvard University Press, Psychological Review, and National Assessment of Education Progress were also reviewed. The databases I used to collect articles included Education Resource Information Center (ERIC), SAGE Journals, Google Scholar, Taylor & Francis, PsychINFO, Academic Search Complete, ProQuest, PEERJ, Thoreau, and Education Source. Key phrases and words included: Response to Intervention (RTI), reading development, comprehension, learning disabilities, longitudinal reading scores, early reading intervention, at-risk, intervention, second grade, third grade, elementary, poor comprehension, long-term, decoding, phonics, phonemic awareness, fluency, literacy components, responsiveness, Tier one, Tier two, Tier three, writing, training, reading skills, effects, predictors, disabilities, achievement gap, impacts, instruction, language skills, identification, early identification, comprehension, socioeconomic status, data-based decision making, struggling reader, intensive instruction, data-based individualization, disabilities, meta-analysis, evidence-based, low income, literacy, responsiveness, relation, relationship, small group reading, quality, reading problems, first grade, kindergarten, progress monitoring, and self-esteem. Some older theoretical and peer-reviewed articles were included to support research.

Theoretical Foundation

Vygotsky's Social Constructivist Theory

The first theoretical framework for this study is Vygotsky's (1978) social constructivist theory. Constructivist theory is concerned with the idea that learning is guided by the active participation of the learner (Antlová et al., 2015). Learners' abilities to further develop knowledge is shaped by their previous experiences and attained level of knowledge (Jenkins, 2006). Vygotsky (1978) explained that ideal cognitive development in children occurs in the ZPD. This zone is defined as the area between where a child performs with and without assistance (Vygotsky, 1978). Bakhoda and Shabani (2019) applied ZPD to reading intervention by using a computer-assisted program to identify potential targets for modifications based on assessment results. Improvements in reading comprehension resulted from applying differentiated intervention that matched students with their appropriate level of need (Bakhoda & Shabani, 2019). My research questions included RTI which similarly incorporates assessment to identify struggling readers and their specific levels of need (Cakiroglu, 2015).

Several components of the social constructivist theory relate to my study and research questions. My research questions were designed to analyze the effectiveness of an intervention which incorporated several elements of social constructivist theory. These components include that active participation of learners is a benefit of small-group instruction, intervention is necessary when background knowledge is deficient, and ideal instruction targets learners in their unique ZPD (Vygotsky, 1978). My study analyzed

reading interventions that remove students from the general classroom and placed them in smaller groups, allowing for more interaction with the educator. These reading interventions ensured an increase in active participation necessary for learning as outlined in the social constructivist theory (see Vygotsky, 1978). In addition, my study focused on struggling readers identified by standardized testing to be below benchmarks for their grade level. It is important to consider these benchmarks are used to select appropriate levels of classroom education which is important for cognitive development (Vygotsky, 1978). In contrast to classroom education designed for students reading at grade level, the reading interventions are tailored to levels appropriate for struggling readers' cognitive abilities. The social constructivist theory supports targeted intervention as necessary for ideal cognitive development and effective learning for struggling readers (Vygotsky, 1978).

Maslow's Hierarchy of Needs

The second theoretical framework I used to support my study was Maslow's hierarchy of needs (1943). This theory is marked by a hierarchy of basic human needs that must be satisfied in a specific order to motivate behavior (Maslow, 1943). The hierarchy of needs is a tiered system with the most critical needs forming foundational elements to the less critical needs. The most critical needs are physiological needs, including food, water, and sleep. Next is safety and security, followed by love and belonging, then self-esteem, and finally self-actualization (Maslow, 1943). Persons will focus their available capacity, defined as their conscious effort, on unmet needs. The cognitive need to know and understand is a precondition to even the basic needs, and a

threat to our cognitive needs is tantamount to a threat to our basic needs (Maslow, 1943). Struggling readers in the general classroom are not achieving their cognitive needs and may lose the desire for the search for knowledge.

Maslow's (1943) theory was applied to my study as it emphasizes the role of intervention in helping students fulfill needs for the sake of their development. One important human need is self-esteem (Maslow, 1943). Maslow recognized the importance of self-esteem in avoiding inferiority, helplessness, and discouragements. These states limit students' capacity to focus on their cognitive development (Maslow, 1943). Students with low self-esteem are likely to feel discouraged and are less likely to strive (Maslow, 1943). These students will focus their available capacity on their self-esteem, taking their focus away from their need to know and understand (Maslow, 1943). Kellerman (2014) supported this idea in showing that young children unable to meet their basic human needs often have trouble in their academic careers. Struggling readers are likely to have reduced self-esteem with associated feelings of helplessness in the standardized classroom (Kellerman, 2014). Reading interventions can be an opportunity to promote self-esteem in struggling readers not available to them otherwise.

Current researchers have studied the relationship between self-esteem and intervention in improving academic scores (Unrau et al., 2018; Yang et al., 2019). A positive correlation between self-esteem and reading performance is well-established (Unrau et al., 2018). Consider poor self-esteem of struggling readers may distract them from the drive to know and understand (Maslow, 1943). Improving self-esteem would thus improve their capacity to consciously focus on becoming capable readers (Yang et

al., 2019). Yang et al. (2019) revealed that reading intervention can support an increase in students' self-esteem with an implied movement toward their full academic potentials. This concept was applied to my study as the reading intervention will move students toward improved reading scores without isolating self-esteem in the intervention approach.

Yang et al. (2019) questioned if targeting self-esteem would improve scores without the need for removal from the classroom and placement into reading intervention. Maslow (1943) considered this perspective and believed that a necessary element of self-esteem was to be in a reinforcing environment. McArthur, Castles, Kohnen, and Banales (2016) supported this point in revealing that self-esteem in itself does not lead to further success. Self-esteem has proven to lead to improved scores only in the context of a reinforcing environment (Yang et al., 2019). Reading intervention provides this reinforcing environment (Schiefele, Stutz, & Schaffner, 2016). Students who were previously below the baseline and struggling in the classroom become able to focus on improvement as a marker of success, reinforcing rather than neglecting their self-esteem (Yang et al., 2019). Incorporating Maslow's hierarchy suggests reading intervention is a necessary component of building students' self-esteem with the hope of allowing conscious focus on their reading performance.

Lack of a reinforcing environment is a problem for readers failing to meet grade-level reading requirements. Struggling readers in the regular classroom are at risk of continuing a cycle of poor performance leading to low self-esteem and continued poor performance. The reading intervention in my study, RTI, was an opportunity for

struggling readers to return to a reinforcing environment. Data were collected for struggling readers who were taken out of the regular classroom where they were not succeeding in meeting baseline requirements. Their intervention instructors provided intervention at an appropriate level. The tier system for RTI is designed to allow for targeted interventions at the appropriate level (Cakiroglu, 2015). This allows students to be reinforced for an appropriate level of education and focus on their cognitive development.

Literature Review Related to Key Concepts and Variable

RTI Models: Application and Augmentation

RTI models are an "organized approach to monitoring student progress" to make instructional decisions such as intensity or focus of content (Cakiroglu, 2015, p. 171). RTI programs occur in small groups, are time-limited, and will continually monitor for response to intervention (Fuchs & Fuchs, 2017). Students are moved among tiers of intervention to provide appropriate levels of intervention (Cakiroglu, 2015; Fuchs & Fuchs, 2017). Struggling students are more likely to maximize their success when placed in the RTI process (Cakiroglu, 2015). Tier 1 students commonly receive services within the classroom, while Tier 2 students often focus on foundational skills in the small group setting, requiring monitoring for decisions on placement or exiting from the RTI process (Amendum & Liebfreund, 2019). Students with an adequate response to Tier 2 are usually considered for resuming Tier 1 full-time, while students with a poor response may need a higher level of intervention (Fuchs & Fuchs, 2017). The RTI model provides

extra support to struggling readers in the hope of improving performance to grade level (Amendum & Liebfreund, 2019).

Amendum and Liebfreund (2019) considered the need to remove struggling readers from the classroom for intervention. They provided 4 weeks of classroom-based intervention in the general classroom to grade level and struggling readers alike. The researchers compared passage comprehension after the intervention between struggling readers and non-struggling readers. Struggling readers benefited significantly more than grade-level readers. Amendum and Liebfreund's findings support the RTI ideology of removing struggling readers from the classroom which has been demonstrated in the research (see Cakiroglu, 2015; Miciak et al., 2018; Partanen & Siegel, 2014; Solheim et al., 2018). These findings support the RTI approach of removing struggling readers from the general classroom with further researchers able to target specific approaches.

Cakiroglu (2015) provided a framework for categorizing RTI models, including the problem-solving model, standard treatment model, and mixed model. The problem-solving model uses assessments and screeners to identify students' needs and provide them with individualized interventions targeting their specific literary deficits. The standard treatment model follows a standard protocol without identifying and adjusting for specific student needs, and the mixed model incorporates elements of both. There are advantages and disadvantages to these models with some student populations benefitting from individualized interventions, while some programs have improved fidelity (noncompliance with policy or research-supported programs) and control utilizing the standard treatment protocol (Cakiroglu, 2015). Brinchmann, Hjetland, and Lyster (2016)

analyzed the effectiveness of a problem-solving model directed at reading intervention in third and fourth graders. One-hundred eighteen students were given a pretest and posttest with 10 different reading components. The intervention group was given a targeted intervention over 10 weeks with significant growth in reading comprehension. Data analysis revealed focusing on vocabulary and sentence formation having the most significant benefits for overall reading comprehension. Brinchmann et al. (2016) explained one limitation of the study is fidelity of the intervention program due to difficulty in the assessment process. Problem-solving model interventions often have reduced fidelity compared to the standard treatment model due to a relatively higher level of complexity (Cakiroglu, 2015). It appears either standardized or individualized approaches to RTI may be effective with the question becoming which populations benefit the most from either approach.

Al Otaiba et al. (2014a) examined the effectiveness of a standard treatment model applied to the first-grade classroom. Students were assigned to two different RTI strategies: typical RTI or dynamic RTI. Typical RTI required placement of all students into Tier 1 at the initiation of treatment, while dynamic RTI required consideration for the severity of the students' needs before to placement, allowing the program to fast-track some students into Tier 2 or 3 (Al Otaiba et al., 2014a). They determined students who were placed directly into Tier 2 and Tier 3 using the standard protocol approach made significantly more growth than those who had to wait for interventions to begin. The researchers suggested further research be conducted in older grades. Al Otaiba et al. noted the standard protocol model allowed for easier ease of implementation which likely

resulted in the observed high degree of fidelity. Fuchs and Fuchs (2017) repeated Al Otaiba et al.'s study and examined the impact of screening first graders from 146 schools for more intensive Tier 2 and Tier 3 interventions. Fuchs and Fuchs found worse outcomes in first graders identified for more intensive Tier 1 instruction in direct contrast to previous findings (e.g. Al Otaiba et al., 2014a). Fuchs and Fuchs concluded poor fidelity likely explained the lack of improvement from first graders provided intensive therapy. Fuchs and Fuchs' use of the problem-solving model to design their reading intervention should have resulted in improved fidelity (see Cakiroglu, 2015). The implication is reading interventions in practice must be applied with fidelity to benefit struggling readers, a consideration for schools in applying intervention design.

Program designs such as the standard treatment model allow for improved program fidelity (Cakiroglu, 2015), but another consideration in the effectiveness of RTI interventions is study group participation. Roberts et al. (2018) conducted research involving struggling readers in third, fourth, and fifth grades. They examined whether or not students would make significant reading growth after receiving an afterschool reading intervention. The researchers found students who participated in afterschool reading intervention did not outperform students in the control group. Roberts et al. noted that this finding is likely due to a high degree of absenteeism where students attended relatively fewer sessions of intervention. The effectiveness of the RTI model depends on the framework (Cakiroglu, 2015), fidelity (Al Otaiba et al., 2014a), and student participation (Roberts et al., 2018), while augmentation of the RTI model must be considered to improve student outcomes (Gustafson et al., 2014).

Gustafson et al. (2014) performed a literature review to consider the effectiveness of dynamic assessment (DA), a screener designed to identify students' reading levels for intervention placement. They examined the simultaneous use of RTI and DA in addressing fundamental reading skills. RTI and DA were found to have additive value in improving reading outcomes. DA is a successful screener for Tier 1 and helped to individualize interventions for students in Tier 2 and Tier 3. Gustafson et al. furthered the benefits of DA extend to allowing teachers to focus on the source of students' reading struggles. DA supports a problem-solving model of RTI (Gustafson et al., 2014) with the potential to improve effectiveness through individualized treatment (Cakiroglu, 2015). Assessing struggling readers for placement into the correct level of intervention is valuable, although students can also be evaluated during intervention for considerations of treatment alterations.

Augmentation techniques for ongoing intervention are commonly applied when students are experiencing intervention failure (Filderman, Toste, Didion, Peng, & Clemens, 2018; Lemons, Kearns, & Davidson, 2014). Lemons et al. (2014) examined the possibility of using the data-based individualization (DBI) approach to support a struggling, fourth-grade reader. They suggested DBI can be successful for students with persistent reading difficulties who are making little progress in the RTI process. The DBI approach informed several adjustments to the reading intervention in the study. Lemons et al. noted a significant improvement in several components of reading comprehension credited to the intervention adjustments. Filderman et al. (2018) expanded on Lemons et al.'s study with a meta-analysis of 15 studies analyzing the effectiveness of database-

based decision making in guiding individualized instruction in K-12 students with an inadequate response (failure to return to grade-level benchmarks) to reading intervention. Filderman et al. found significant improvements with individualized treatment approaches in inadequate responders, confirming observations by Lemons et al. Struggling readers benefit from assessment for individualized interventions before and after intervention initiation.

RTI Models: Intensity and Duration

Different approaches to reading intervention, such as scheduling parameters, must be researched considering the complexity of reading interventions and a range of student needs (Miciak et al., 2018). Reading interventions may require long-term participation for progress to prove significant, sometimes even years (Miciak et al., 2018). Interventions in different settings with different populations also require a wide variety of time and resources (Nelson et al., 2018; Ross & Begeny, 2014). A common parameter for Tier 2 intervention is 30 minutes of tutoring, 3 to 5 times per week for 9 weeks or more, although parameters vary significantly from school to school (Nelson et al., 2018). Studies with more intense (higher frequency, duration, and/or dosage) reading interventions may be necessary to find effective interventions for difficult cases (Miciak et al., 2018; Ross & Begeny, 2014). Longer, more intense, and targeted interventions have been associated with improved results (Nelson et al., 2018; Ross & Begeny, 2014).

Review of research over the past 50 years revealed sparse data on the technical adequacy of monitoring measures, leaving teachers with little support in making evidenced-based decisions on intervention parameters (Thornblad & Christ, 2014). They

examined whether or not 6 weeks of daily progress monitoring is enough for measures to accurately assess if students are making adequate growth in reading. The researchers used simulation studies to analyze the effectiveness of 6 weeks of progress monitoring using curriculum-based measurements (CBM-R) in 40 second-grade students. Six weeks of daily CBM-R progress monitoring was found to provide insufficient data to guide instructional decisions due to low validity and reliability. Thornblad and Christ (2014) recommended policies that improve teachers' awareness of the limitations of measurements and data, indorsing 8-14 weeks of weekly progress monitoring as the simplest evidence-based approach. More attention can be given to understanding the ideal duration of intervention knowing at least 6 weeks of data is needed for efficacy.

Oostdam et al. (2015) monitored progress for 12 weeks to determine the effectiveness of a repeat read program. Second-, third-, and fourth-grade students participated in repeat reading 4 times per week for 20-minute sessions. They measured fluency, reading comprehension, vocabulary, and reading attitude, and found repeat reading is effective for struggling readers in improving fluency and reading attitude, although reading comprehension and vocabulary had insignificant support. Oostdam et al. noted reading comprehension and vocabulary may require longer durations of intervention to become demonstratable on progress measures. Reading areas may require variable duration, but more information is needed on the underlying factors.

Miciak et al. (2018) measured reading comprehension outcomes with an increased duration of time after the intervention compared to the Oostdam et al. (2015) study. Four-hundred eighty-four fourth graders were provided a reading intervention with data

collected at the 1- and 2-year markers (Miciak et al., 2018). The one-on-one reading intervention was presented 5 times per week for 16 weeks with 30- to 40-minute per session (Miciak et al., 2018). The students were divided into three groups: 1 year of intervention, 2 years of intervention, and business-as-usual (BAU) (Miciak et al., 2018). Miciak et al. echoed Oostdam et al.'s findings in showing significant improvement in fluency at the 1- and 2-year mark, although again finding no significant growth in comprehension. Miciak et al. noted several possible explanations, including unforeseen variables in the intervention methods, artificially reduced intervention hours, and a coinciding reading intervention presented to all students in the general classroom, reducing the comparative effectiveness of the researched intervention.

Bastug and Demirtas (2016) built upon the findings of Miciak et al. (2018) and Oostdam et al. (2015) and found improvement not only in fluency but also in reading comprehension. Bastug and Demirtas conducted a single-subject case study with a fourth-grade student to research the effectiveness of a child-centered reading intervention in one-on-one, 30-minute reading intervention for 35 sessions. They found the students' fluency scores increased from 72.6% to 93.75% accuracy and comprehension scores from 8.33% to 91.66%. Fluency is commonly believed to be a foundational element in building reading comprehension skills (Bastug & Demirtas, 2016). Fluency was improved for this student using the study's intervention schedule but applying interventions in practice requires considering other factors such as group size.

Ross and Begeny (2014) evaluated a reading intervention for effects from changing daily sessions duration and group size. Four second-grade students with

reading difficulties were placed into four groups: small-group setting for 14 minutes, one-on-one for 14 minutes, small-group setting for 7 minutes, and one-on-one for 7 minutes. The intervention measured reading fluency with a standardized assessment used to analyze fluency outcomes. They determined students made significantly more growth in fluency with the longer session times, but the group size was insignificant. Ross and Begeny concluded that increased session length allows for more tutor-student interactions and time repeating passages, recommending studies with larger sample sizes to reduce the effect of confounds in determining the effectiveness of group size.

RTI Models: Specific Interventions

The RTI model provides a framework that applies to any of the numerous specific intervention approaches (Cakiroglu, 2015). The flexibility of the RTI model framework allows teachers to match programs with students' academic needs, but research on specific interventions and assessment is needed to ensure well-designed, useful, and effective interventions for improving student outcomes (Young, Durham, & Rosenbaum-Martinez, 2018). Beneficial interventions provide high-quality instruction that improves student learning as demonstrated by scientific research (Cakiroglu, 2015). Well-defined programs should be matched with specific populations for purposes of evidence-based intervention (Bennett et al., 2017). Numerous researchers have supported the use of computer-based intervention (CBI) as an effective methodology for use within the RTI model (Bennett et al., 2017; Council, Cartledge, Green, Barber, & Ralph, 2016; Keyes, Cartledge, Gibson, & Robinson-Ervin, 2016; Messer & Nash, 2018).

RTI models using CBI have shown improvements in general reading and behavior outcomes (Council et al., 2016), as well as in some specific reading components, such as fluency and comprehension (Bennett et al., 2017; Keyes et al., 2016). Council et al. (2016) used single-subject data collection to evaluate CBI effectiveness in three, second- and third-grade students identified with academic and behavioral risk. The computer software targeted fluency through repeat passage (Council et al., 2016). The three students showed improvements in reading achievement and social behavior after 1 to 3 months of intervention (Council et al., 2016). Bennett et al. (2017) followed a similar approach collecting data on seven, at-risk second-grade students, and three control students. The at-risk students surpassed the control group in fluency through repeat reading interventions presented with computer-assisted technology (Bennett et al., 2017). Keyes et al. (2016) analyzed the effect of CBI with repeat reading on reading fluency, similar to Bennett et al. and Council et al., as well as analyzing the effect of CBI intervention on comprehension. Six, second-grade students received reading intervention 3 to 4 times a week for 7-12 weeks from a program called Read Naturally (Keyes et al., 2016). Keyes et al. (2016) determined five of the six students made growth in oral reading fluency. Further analysis revealed only two students made growth on comprehension. One teacher in the study reported one student had increased confidence after the intervention (Keyes et al., 2016). CBI was effective for struggling readers in a range of elementary grades and for a variety of reading areas.

Messer and Nash (2018) chose to evaluate the effectiveness of a CBI by investigating the effect of delaying intervention for students below grade level. They

divided 78 seven-year-old struggling readers into two groups, experimental and waitlist, and provided reading intervention for 2 to 3 times per week for 10-15 minutes per session. The experimental group received intervention for 16 months and the waitlisted group received the intervention after 10 months. The reading intervention was a CBI program composed of interactive games with multifaceted targets such as decoding, fluency, and memory. The experimental group had significantly higher scores for decoding, phonological awareness, short-term memory, working memory, and name speed than those in the waitlist group, supporting the need for immediate interventions (Messer & Nash, 2018).

RTI models are presented outside of the general classroom, but researchers have reported improved reading outcomes with various intervention sizes and settings (Boudah, 2018; Cakiroglu, 2015; Lovett et al., 2017; Young et al., 2018). Young et al. (2018) researched the Read Two Impress (R2I) intervention composed of one-on-one interventions 3 days per week for 6 weeks. Fifty elementary students were split into an experimental group (receiving the reading intervention) and a controlled group (received regular classroom instruction) (Young et al., 2018). Young et al. concluded that reading intervention had a moderate effect on independent reading levels and reading fluency. Young et al. noted limitations in the results due to the shorter duration of the study since it was started later in the year, repeating Messer and Nash's (2018) concern for delayed interventions. Larger effect sizes are possible if intervention began in the fall and concluded in the spring (Young et al., 2018). Lovett et al. (2017) analyzed a 1:4 ratio compared to the one-on-one ratio in Young et al.'s study. Lovett et al. provided a reading

intervention to primary elementary students focusing on phonologic skills, word identification, and text comprehension. The 1:4 Triple-Focus Reading program was provided for 1 hour daily for 70 days. Students receiving the intervention outscored the control group on all 14 of the reading outcomes. They used the longitudinal data and quasi-experimental analysis for further analysis of the data. The Triple-Focus Reading program was effective for all primary grade levels, but earlier age groups revealed even more significant growth (Lovett et al., 2017). Struggling readers can make improvements in the one-on-one or small group setting.

Small-group settings are a key component of RTI models, but effectiveness is likely due to the pull-out strategy (removing children from the general classroom) (Boudah, 2018; Cakiroglu, 2015). Boudah (2018) studied the effectiveness of Xtreme Reading in improving reading skills in 237 struggling readers with and without disabilities. Xtreme Reading provided intervention for several reading components (Boudah, 2018) similar to the Triple-Focus Reading program (Lovett et al., 2017). Boudah provided instruction outside of the general classroom to struggling readers for 1 year with data measured before and after the intervention. Boudah presented the reading intervention in a classroom of only struggling readers, in contrast to Lovett et al.'s (2017) and Messer and Nash's (2018) studies using 1:4 and one-on-one respectively. Boudah duplicated Lovett et al.'s results and found significant improvement in reading performance and fluency. The key strategy in RTI approaches is the pull-out strategy (Cakiroglu, 2015) with researchers proving effectiveness for reading interventions with

various sizes, settings, and approaches (Boudah, 2018; Lovett et al., 2017; Young et al., 2018).

RTI Models: Data-Based Individualization

DBI is an evidence-based approach to guide educators in customizing intervention based on student data (Hammerschmidt-Snidarich, et al., 2019). The benefit of DBI is related to the process of monitoring student data to make thoughtful decisions (Lindstrom, Gesel, & Lemons, 2019). DBI is in contrast to standard protocol where students receive similar intervention (Lindstrom et al., 2019). Tier 3 students in RTI require individualized intervention while Tier 1 and Tier 2 students improve with standard instruction (Field, Begeny, & Kim, 2019). Struggling readers in Tier 1 and Tier 2 work on fundamental skills appropriate to their grade level in the classroom or small group setting before proceeding to the more intensive and resources demanding Tier 3 (Cakiroglu, 2015). Studying the effectiveness of standardized approaches is foundational to developing and understanding individualized approaches (Memisevic, Malec, Biscevic, & Pasalic, 2019). Third grade is a unique stage of reading development as decoding skills that began in second grade are transitioned into fluency and comprehension skills (Cartwright, Marshall, Huemer, & Payne, 2019; Field et al., 2019). DBI is often guided by the developmental needs of the population (Willis, 2019). Understanding components of reading skills can help to guide the development of effective individualized reading programs (Memisevic et al., 2019). Literacy components are a natural focus of individualized intervention due to their close relationship to foundational reading skills (Hammerschmidt-Snidarich et al., 2019). DBI focused on

foundational elements, such as literacy components, which have the largest potential for impact with demographical characteristics having a comparatively smaller role (Scammacca, Fall, Capin, Roberts, & Swanson, 2020). Focusing on the standard approach to RTI and literacy components is appropriate as research is lacking for all tier levels of instruction for third graders (Wanzek et al., 2018).

Scammacca et al. (2020) found struggling readers in third grade improved the least compared to other elementary grades with recommendations to improve standard protocols compared to individualized interventions. They analyzed data from 5,900 students in first through fifth grade with longitudinal techniques to follow reading achievement and correlate with demographical factors including gender, ethnicity, and socioeconomic status. Socioeconomic status (SES) had a small correlation to lower early elementary scores, although the rate of growth was higher than other groups as grade level progressed. Ethnicity proved to have an insignificant role after controlling for SES. Male and female reading scores had a minimal difference in initial scores and rate of growth without any notable pattern between grades (Scammacca et al., 2020). A much greater predictor of reading scores was historical reading scores, for example, lower performers continued to perform poorly and high performers continued to excel. Third graders performed worse than other grades for the rate of growth for the bottom quartile of students. Scammacca et al. recommended universal screening and evidence-based standardized approaches as a practical focus, while individualization for demographics would provide minimal benefit at this time. Focusing on standardized approaches could

prove beneficial for helping improve the deficits in effectiveness of third-grade reading intervention, but little direction for specific reading areas was provided.

Memisevic et al. (2019) and Field et al. (2019) investigated the factors related to fluency, a standard marker for reading comprehension, to better understand the reading needs of second and third graders. Memisevic et al. provided 140 second and third graders with an assessment to measure variables with a theoretical relationship to fluency, including, selective attention, semantic fluency, inhibitory control, and rapid naming. The results were divided among second and third graders. The second graders' fluency scores had a significant correlation to rapid naming only. The third graders' fluency scores revealed no relationship to rapid naming but a significant relationship in all other categories. Memisevic et al. noted this as an unexpected finding, as rapid naming has been theorized as a foundational element to fluency for each early elementary school grade. Further analysis revealed females outperformed males in reading fluency in both grades. This difference was not significantly related to any of the theoretical components of fluency with little direction in developing individualized approaches. Standardized intervention approaches for third graders may be focused on the positively correlated variables of selective attention, semantic fluency, inhibitory control, although further research is needed (Memisevic et al., 2019).

Field et al. (2019) were also interested in clarifying the role of fluency in standardized approaches for third graders. They studied 18 struggling readers in second and third grade receiving Tier 3 intervention. The students were removed from their usual RTI and placed into a 10-week program focused on improving fluency. Student

data were collected on cognitive factors (verbal comprehension, visual matching, digit span, inhibition subtest, phonological awareness, rapid naming, and receptive coding) and fluency outcomes as measured by word correct per minute (WCPM). Phonological awareness was the only cognitive factor associated with fluency improvement and significant differences were not found in gender (Field et al., 2019). They also discussed the need for more oral fluency programs targeted at second- and third-grade fluency needs as only two of 18 students improved satisfactorily. The literacy component of phonological awareness was supported in this study as the only component correlated with improved fluency outcomes. Field et al. did not find a significant difference in the second- and third-grade variables related to fluency, unlike Memisevic et al.'s (2019) study which found a complete separation of factors based on grade level. Field et al. indicated results were complicated by a small sample size where only 18 students required Tier 3 intervention compared to the original 600 students screened. A combination of variables may prove to correlate more highly to fluency proficiency in the second- and third-grade students compared to any single variable (Field et al., 2019).

Standardized approaches are often applied to newly identified struggling readers and only escalating to DBI after nonresponse (Cakiroglu, 2015). Mariage, Englert, and Mariage (2020) and Cartwright et al. (2019) were interested in the effectiveness of standardized interventions for struggling readers in third grade. Mariage et al. provided scaffolding intervention within an RTI framework for five elementary students with reading deficiencies. The struggling readers received 15 weeks of intervention that emphasized dialog after a close reading session. Dialog is theorized to be a method of

engaging students to incorporate multiple cognitive skills of fluency (Mariage et al., 2020). Four of the five students were able to return to a lower level of intervention. Mariage et al. concluded that educators need more studies on well-developed and evidence-based reading programs to support practice with struggling readers. Cartwright et al. studied a standardized program targeting reading-specific fluency to improve overall fluency in struggling readers, paralleling Mariage et al.'s scaffolding intervention to target overall fluency. Cartwright et al. provided a 5-week intervention to 33, third-grade students identified as low-achieving based on grade-level benchmarks. The intervention was designed to target reading-specific fluency that combines semantic and phonological components. The low-achieving students improved in their measures of fluency with no significant differences among males or females, similar to Mariage et al.'s study. The cognitive factors of reading-specific flexibility may modulate the well-established contribution of automatic decoding to fluency in typical early elementary students (Cartwright et al., 2019). Cartwright et al. concluded that low-achieving students may benefit from individualized interventions focusing on their relatively low reading-specific flexibility. These researchers found support for standardized approaches targeting children with specific deficits but did not analyze individualization during these interventions.

Hammerschmidt-Snidarich et al. (2019) studied a data-based intervention approach for readers with significant deficiencies in improving fluency as measured by WCPM. Nine, fourth- and fifth-grade students were identified as struggling readers and were at least 3 years below grade level expectations. The students received goal-setting

intervention following DBI protocols where students who reach their goal of 10% above their estimated WCPM for two to three sessions would reevaluate their goal with an instructor. This augmentation was added to their ongoing intervention of peer-mediated repeat reading. Four of the nine students improved to grade level after a couple of months, three improved modestly with further individualization (passage preview and oral reading fluency graphing), and two were not included due to poor attendance. Hammerschmidt-Snidarich et al. and Lindstrom et al. (2019) agreed that most of the benefit of DBI is directly related to tracking data. Hammerschmidt-Snidarich et al. added that DBI is best reserved for children with extreme reading deficiencies since individualization is unlikely to be any more effective than standard protocol in reaching more children.

Reading interventions such as RTI often use standard protocols before individualization due to limited resources (Hammerschmidt-Snidarich et al., 2019; Memisevic et al., 2019), but Sutter, Campbell, and Lambie (2019) reported optimism that computer-based models may provide a method to provide individualized approaches to all readers. Sutter et al. studied 22,962 early elementary students receiving reading education for an academic year using a computer-adaptive reading program (CARP) that adapted and reported five early reading components: phonemic awareness, alphabetic knowledge, vocabulary, comprehension, and fluency. Struggling readers below the 20th percentile made the greatest improvement in reading achievement scores but remained below their peers above the 20th percentile, paralleling Scammacca et al.'s (2020) findings. Sutter et al. and Scammacca et al. found no difference in reading growth for

socioeconomic students after controlling for other factors and no difference in reading scores based on gender by the end of the year. The largest predictor of poor reading outcomes and the population with the greatest need for individualized intervention are those with a history of poor reading outcomes (Hammerschmidt-Snidarich et al., 2019; Sutter et al., 2019).

Gilmour et al. (2019) supported Sutter et al.'s (2019) finding that individualized approaches properly matched to a target population may be more effective than standard protocol. Gilmour et al.'s meta-analysis of 23 studies analyzed the trajectories of struggling readers from kindergarten to Grade 12, including analysis of Tier 2 standard-protocol compared to Tier 3 individualized intervention. They agreed with Sutter et al. in finding an improved rate of growth for individualized therapy compared to standard-protocol approaches. The researchers in both studies also found the difference between the lowest and highest achieving readers remained significant through future grade levels, although Gilmour et al. stated this was less clear after fifth grade. Gilmour et al. expressed that evidence-based practice must be implemented to support the lowest achievers. Individualized intervention targeting literacy components and foundational reading skills are often the most effective but not always implemented with fidelity in practice. One difficulty is children's cognitive difficulties range from mild language impairments to intellectual disabilities with evidence for interventions targeting a variety of literacy components available in the research. The challenge for schools is to find evidence-based standard-protocol interventions to support struggling readers in the

classroom with effective individualized interventions to prepare children to return to the least restrictive environment (Gilmour et al., 2019).

Bayless et al. (2018) studied an after-school program (ASP) and found high adherence to a standard-protocol intervention is an opportunity for struggling readers to improve at a faster rate than their peers. The participants included 542 kindergarten through third-grade students from six public housing neighborhoods who participated in several literacy programs (Read Well, GR8 Readers, and one-on-one intervention) that focused on social and literacy skills (Bayless et al., 2018). The control group also consisted of public housing students in neighborhoods without ASPs. Bayless et al. found a significant increase in fluency and comprehension as measured by yearly standardized exams for the intervention group, noting the control group declined in reading proficiency from baseline over the same time period. Bayless et al. repeated Gilmour et al.'s (2019) conclusion that interventions that target literacy components are effective but not always provided with high fidelity in practice. Bayless et al. contributed to the effectiveness of the ASP in their study to highly a standardized protocol and a strict structure assisted by a manualized approach. Standard protocols must be instructed with fidelity and reading interventions should be tailored to specific reading deficits, but other variables in RTI implementation must be considered.

Willis (2019) provided a historical review of RTI implementation with concerns for relatively ineffective individualization for students based on economic, cultural, or linguistic factors. RTI is a commonly recommended intervention approach by law, research, and education for its strength in addressing inequality, but the author expressed

concern for inappropriate placement, under-identification, and poor individualization for diverse students due to educators' lack of cultural competence and poor program fidelity (Willis, 2019). Sutter et al. (2019) and Scammacca et al. (2020) found socioeconomic status to be correlated with poor reading proficiencies but no difference in growth for diverse populations. Low initial reading proficiency strongly predicted low reading proficiency in the future with comparatively little to no effect from demographic factors (Scammacca et al., 2020; Sutter et al., 2019). Myrberg et al. (2019) agreed teachers must have education on cultural competence to provide competent individualized instruction, but research is lacking. The benefit of teachers' education on behavior management skills in improving outcomes for low academic performers is well-documented in comparison (Marchand-Martella, Martella, & Lambert, 2015). Willis believes standardized progress monitors used for individualization, such as MAP, are biased toward White students. This conflicts with MAP's validity measures which showed less than one percent of questions had variability among ethnic classifications (European, Hispanic, African American, Asian, and Native American) with comparable variability among the groups (NWEA, 2011).

Reading interventions that focus on training literacy components for specific cognitive deficits have the greatest potential for assisting most struggling readers (Scammacca et al., 2020; Sutter et al., 2019); however, other factors may need to be addressed through individualized approaches to fully meet the needs of struggling readers (Dolean et al., 2019; Huang et al., 2020). Dolean et al. (2019) studied the relationship of poverty to reading outcomes. They monitored 322 first-grade students facing severe

poverty and 178 control students over a 7- to 9-year period. Students facing poverty had lower baseline reading skills and a slower rate of growth. The disparity remained after controlling for cognitive and linguistic variables, implying inherent elements of living in poverty are associated with reading difficulties. The researchers explained issues beyond students' academic performances must be considered including the broader aspects of their lives, such as absenteeism, decreased reading, and less focus on letters and phonological skills at home. The literacy component of letter knowledge is commonly found in poverty. School interventions are successful at improving students' cognitive and linguistic skills related to this literacy component, but home factors may continue to perpetuate the underlying deficiency. Dolean et al. suggested family-school collaborative education plans that will assist parents in improving home literacy environments. The home environment is another factor which deserves focus for struggling readers.

Huang et al. (2020) agreed with Dolean et al. (2019) in the need to address components of home life to fully address reading deficiencies for struggling readers. Huang et al. studied behavior and life quality factors as possible contributors to poor reading outcomes in 60 struggling readers (at least 1.5 standard deviations below grade level) with dyslexia and a control group in Grade 2 to Grade 5. Children with dyslexia benefit from reading interventions focused on the literacy component of linguistic-literacy (the ability to understand language based on different contexts) to meet their cognitive needs, but they remain below their peers in reading outcomes after the intervention. Huang et al. investigated the association of life quality (household income, parental education level, poor child-parent relationship, satisfaction with life quality, and

parental white-collar job status) and behavioral (psychoticism, neuroticism, extroversion, dissimulation, conduct, learning) factors for this population with poor reading outcomes. Nearly all quality of life and behavioral factors were correlated with poor outcomes for the struggling readers with dyslexia. Huang et al. recommended intervention for struggling students requires support in the home environment to improve reading outcomes, but the researchers did not offer a specific intervention.

Borre et al. (2019) researched a reading intervention program that followed Huang et al.'s (2020) recommendation to address factors within the home environment. Borre et al. studied the effectiveness of the Early Author Program (EAP) in improving literacy scores in low-income students. They collected archived information from a school district database and identified 115 low-income (on free or reduced lunch) Black (57%) and Latino (43%) kindergarten students placed into the EAP at various schools. The EAP is supportive of the social and cultural aspects of literacy by engaging students with their parents and teachers in culturally sensitive writing activities that are friendly to their native language. The researchers found improved academic grades and literacy skills compared to a control group (Borre et al., 2019). They noted the value and moderate effectiveness of culturally engaging kindergarten students but warned the utilization of home strategies must continue from grade to grade to maintain improvement. This study supported cultural engagement and encouraging pride as a potential individualization strategy to further improve reading outcomes (Borre et al., 2019).

Predicting Response to Reading Intervention

Predictors (factors used to predict an outcome or need) are used in developing screeners to identify children who will need reading intervention (Lam & McMaster, 2014). Predictors may help determine the level of intervention, such as placement in the RTI model's tier system (Miciak, Cirino, Ahmed, Reid, & Vaughn, 2019). Two basic mechanisms for predicting student response to intervention are final status and slope discrepancy (Cho, Capin, Roberts, & Vaughn, 2018). Teachers monitoring with slope discrepancy evaluate students with progress monitoring at predetermined points in time and calculate the rate of growth to compare to normative data (Cho et al., 2018). Teachers can calculate the final status by comparing students' intervention scores with benchmark measures (Cho et al., 2018). Evidence-based predictors inform effective data-based decision making by incorporating research from demographics and student-specific literacy components (Sharp, Sanders, Noltemeyer, Hoffman, & Boone, 2016).

Sharp et al. (2016) collected surveys from 64 principals and school psychologists in 43 rural, urban, and suburban elementary schools to examine the value of several factors in predicting RTI. They requested information on RTI placement, data-based decision making, disciplinary referrals, and access to reading achievement scores. Statistical analysis of the data was used to evaluate the contribution of several factors to variance as a method to identify predictive value with the following results: data-based decision making focused on student-specific literacy components (7.2% of variance), combination of economically disadvantaged (27.8% of variance), and disciplinary referrals (8.1% of variance). Sharp et al. explained demographic factors may be more

significant in predicting RTI outcomes due to these students having more time and resources, but interpretation must also consider poor reliability of survey-collected data.

Lam and McMaster (2014) contradicted Sharp et al.'s (2016) claim that demographic factors are more significant than student-specific literacy components. Lam and McMaster composed a 10-year update on a literature review of 14 articles predicting RTI in kindergarten through third grades. The students were screened for a variety of student-specific literacy components (word identification, fluency, phonemic awareness, and vocabulary) and demographics (special education status, free or reduced lunch, ethnicity, and ELL status). Demographics were predictive of RTI in only two of the studies compared to phonological awareness, a literacy component, which was predictive in over ten studies. Further analysis of the literacy components revealed clear benefit from word identification, fluency, and phonemic awareness, while vocabulary and intelligence were less beneficial (Lam & McMaster, 2014). Intelligence is a predictive factor that depends on cognitive processing and is classically identified as a minimally beneficial in predicting RTI (Miciak et al., 2019). Other factors related to cognitive processing instead of intelligence may have a more significant role.

Miciak et al. (2019) investigated another predictive factor depending on cognitive processing, executive functioning (ability to complete goal-directed behavior). They used various measures to evaluate executive function in 697 fourth graders from 17 schools. Students attended 16 weeks of their usual school-based reading interventions and post-intervention scores were correlated with executive functioning. Miciak et al. concluded there was a small association in the predictive value of measures on executive

functioning and is likely a predictor with minimal practical value. Miciak et al. repeated Lam and McMaster's (2014) finding that cognitive processing has revealed little association with response to reading intervention.

Catts, Nielsen, Bridges, and Liu (2016) and Cho et al. (2018) focused on the effectiveness of interventions targeting fluency as predictors for reading comprehension. Catts et al. screened 236 kindergarteners from a school district for poor reading fluency at the beginning of the school year. The kindergarteners completed 26 weeks of a small-group intervention targeting poor fluency and were evaluated in third grade for reading comprehension (Catts et al., 2016). Catts et al. found students who completed the reading intervention predicted improved reading comprehension and vocabulary outcomes compared to a control group. Cho et al. reexamined fluency in progress monitoring as a possible predictor to response to an ongoing intervention. They followed 102 struggling readers in fifth grade receiving 16-week intervention on vocabulary, fluency, and comprehension, measuring fluency at regular intervals. Statistical methods were used to calculate the slope of fluency (the rate of performance change on fluency outcomes) and its value in predicting performance on a reading comprehension assessment. Oral reading fluency (ORF) was significantly predictive for sentence-level fluency and comprehension, although only helpful for the upper quartile of students for paragraph-level comprehension (Cho et al., 2018). Cho et al. noted the discrepancy and agreed with Milburn et al.'s (2017) recommendation to use final benchmark assessments to make exiting decisions instead of the rate of growth. These studies reinforced previous

findings that fluency is a valuable predictor of students' reading comprehension skills (Catts et al., 2016; Cho et al., 2018).

Beach and O'Connor (2015) and Lonigan, Burgess, and Schatschneider (2018) investigated the value of combinations of student-specific literacy components as predictors for RTI. Beach and O'Connor evaluated 387 first-grade students for baseline word reading, text fluency, and comprehension. Students were then evaluated in third grade for reading disabilities and statistical analysis was used to investigate for predictive relationships (Beach & O'Connor, 2015). The combination of word reading and text fluency proved highly predictive with computer models, revealing 85% accuracy in identifying first graders who would eventually be identified as reading disabled by the end of third grade (Beach & O'Connor, 2015). Lonigan et al. repeated the investigation into possible combinations of literacy components in predicting RTI. They evaluated 757 third, fourth, and fifth graders for decoding skills (creating mental images of text), linguistic skills (understanding oral language), and reading comprehension. Linguistic skills were measured through oral language skills, such as vocabulary, oral reasoning, and listening comprehension, while decoding was measured through word reading, nonword accuracy, and fluency. Statistical analysis revealed linguistic and decoding skills accounted for most of the variance (spread of a data set) in reading comprehension. The findings support SVR where reading comprehension is predicted by a combination of linguistic and decoding skills (Lonigan et al., 2018). Lonigan et al. also noted age-related differences where decoding skills (e.g. fluency) are foundational to linguistic skills (e.g.

vocabulary), supporting the previous researchers' approaches to targeting fluency in struggling readers (Beach & O'Connor, 2015; Catts et al., 2016; Cho et al., 2018).

Early Childhood Intervention

Early childhood reading struggles are likely to continue without intervention and are predictive of performance in future grades (Milburn et al., 2017; Solheim et al., 2018). Early reading deficits are likely to worsen in struggling readers compared to grade-level peers without intervention (Solheim et al., 2018). Early reading intervention is an opportunity to reduce the occurrence of multiple deficits, including reading, cognitive, and behavioral measures (Partanen & Siegel, 2014). Suboptimal interventions or ineffective teaching may frustrate young children, and they may become averse to growth (Miciak et al., 2019). Effective reading interventions are those that will reduce the number of children with literacy struggles and increase the number of students above grade level over time (Milburn et al., 2017). Early reading intervention designs have the most effectiveness when matching intervention approaches with child needs (Sutter et al., 2019). Student-specific approaches are often the only effective option for intensifying intervention when struggling readers do not respond to standardized intervention (Filderman et al., 2018).

Wanzek et al. (2018) compiled a meta-analysis of 25 studies to examine the effectiveness of early reading interventions in kindergarten to third graders in improving reading outcomes. They determined a significant effect size of 0.28 after accounting for publication bias, meaning there was a significant association comparing the reading intervention to outcomes. Further analysis of the data failed to show differences in

comparing small-group intervention to one-on-one intervention or a correlation of family income to reading outcomes. Wanzek et al. noted a complete lack of articles since 2005 with over 100 days of reading intervention (a requisite for inclusion in the study) in second and third graders, recommending further research.

Partanen and Siegel (2014) sought to build upon evidence of student response to early RTI models (Wanzek et al., 2018) by investigating the long-term outcomes for early reading intervention in struggling readers. They examined longitudinal reading and cognitive measures in 650 students, following their progress from kindergarten to seventh grade. Twenty-two percent of kindergarteners were identified as at risk for reading deficits compared to six percent of seventh graders. Only a small percentage of struggling readers in seventh grade were not identified as struggling readers in kindergarten. Findings were consistent with previous research showing less than eight percent of students with the early reading intervention will not respond to intervention by fourth grade (Partanen & Siegel, 2014). Hall and Burns (2018) further supported the need for early reading intervention by comparing to interventions given beyond the critical elementary years. They conducted a meta-analysis of 26 articles on the effects of small-group intervention for elementary, middle, and high school students. Data on interventions also compared standard compared to targeted approaches and found targeted interventions produced larger effect sizes. Elementary students revealed improved response to intervention compared to middle and high schoolers, although additional studies are needed to clarify the significance of these findings (Hall & Burns, 2018).

Researchers have investigated effectiveness of different approaches to early reading interventions (Bingham, Culatta, & Hall-Kenyon, 2016; Milburn et al., 2017; Solheim et al., 2018) to expand knowledge that early reading interventions are effective in short and long term (Partanen & Siegel, 2014; Wanzek et al., 2018). Solheim et al. (2018) compared the effectiveness of standard computer-based reading intervention to computer-based reading intervention providing individualized instruction. One-hundred forty at-risk first graders were placed in the intervention groups and participated in 25 weeks of teacher-led intervention supplemented with the two computer-based reading interventions. Both intervention groups revealed significant improvement in reading outcomes (word reading, sentence reading, and spelling), although there was no difference found when comparing the intervention approaches. Solheim et al. (2018) concluded the insignificant difference in intervention groups was likely due to teacher-led intervention presented to both groups, reducing the significance of the individualized computer-based intervention. This could explain why Solheim et al. was unable to repeat Bingham et al.'s (2016) and Milburn et al.'s (2017) findings that individualized early intervention improves reading outcomes. Bingham et al. provided up to 8 months of intervention to 100 kindergarteners, 3 times per week, focused on phonics and phonological awareness skills to target weaknesses revealed from an early literacy assessment. Children with underdeveloped phonological awareness made greater gains with intervention than those who were more advanced, although there was no significant difference in multiple other reading skills assessed (Bingham et al., 2016). Bingham et al. concluded kindergarteners with deficiencies in phonological awareness need targeted

intervention to most effectively improve toward grade-level reading outcomes. Milburn et al. applied targeted interventions to struggling readers identified as non-responders (unable to meet grade-level with standard intervention). One-hundred eighty-one preschoolers identified as non-responders to Tier 1 were provided interventions targeted at early literacy skills (phonologic awareness, print knowledge, or language) specific to the student's needs. Results were difficult to clarify considering the different measures used to evaluate intervention effectiveness, but students overall made improvements from the targeted interventions. Milburn et al. concluded any progress is significant for students who do not respond to standard interventions and modifying with intensity or targeted intervention is their best chance or improvement.

Serry and Oberklaid (2015) agreed with Milburn et al. (2017) that early and targeted interventions have proven helpful and furthered with a review of the literature the fidelity of programs in applying evidence-based interventions. Serry and Oberklaid developed a model for effective RTI focused on evidence-based interventions with studied target populations and formal training for teachers when required as part of intervention design. Review of literature revealed examples of tutors providing interventions, such as Reading Recovery, without formal training required for evidence-based practice (Serry & Oberklaid, 2015). Serry and Oberklaid also noted schools strictly adhering to one-on-one tutoring, preventing allocation of resources to reach more students through small-group intervention. Wanzek et al. (2018) concurred with a recommendation for small-group intervention as opposed to one-on-one intervention after considering their similar efficacies in a reflection of one-on-one intervention's significant

increase in resource demands. There are also examples of schools providing a strict duration of intervention without adjusting for students' responses to targeted needs (Serry & Oberklaid, 2015). Serry and Oberklaid shared a concern that poor early reading interventions decrease the likelihood that schools can close the gap. Poor outcomes are preventable if schools apply evidence-based practice to early intervention programs, incorporating targeted approaches when appropriate (Partanen & Siegel, 2014).

Long-term Effects in Response to Reading Intervention

Most studies have investigated the short-term benefits of reading intervention with a relative lack of studies focusing on long-term interventions (Suggate, 2016). Reading difficulties have long-term consequences such as increased high school dropout rate, rates of unemployment, worsening health and psychiatric outcomes, which supports the need for reading interventions with long-term effectiveness (Blachman et al., 2014). Student specific data is continuously collected during reading interventions where decisions must be made on whether to maintain, modify, or remove the intervention (Nelson et al., 2018). RTI models generally consider students for placement into lower levels of intervention when they show a response to intervention (Cakiroglu, 2015). The post-intervention response is often assumed in practice to be full and complete (Nelson et al., 2018). Removing students from reading intervention and returning them to the classroom allows for other readers to have an opportunity for intervention (Nelson et al., 2018), but these decisions are made based on short-term data (Suggate, 2016). Predicting students' long-term reading outcomes can be difficult considering the multifactorial

nature of reading development, including socioeconomic status, genetics, instruction quality, and family background (Jerrim, Vignoles, Lingam, & Friend, 2015).

Reading development is debated in the research as a mostly social or heritable phenomenon (Jerrim et al., 2015; Soden et al., 2015). They recruited 14,541 pregnant women and collected data through their children's ages of seven and eight, including genotyping, family history, and diagnostic tests, such as general intelligence and reading skills assessments. The researchers concluded there is little evidence to associate reading skills with genetic risk, estimating that genetics accounts for 2-3% of the socioeconomic achievement gap. Jerrim et al. (2015) argued socioeconomic status and other social factors have a more significant role than heritable factors in reading development. Soden et al. (2015) agreed that reading development is a learned skill with undeniable relation to environmental factors. They furthered genetic influences are undeniable in reading comprehension as children progress from first to sixth grade. The researchers conducted longitudinal research using independent twin samples (n= 1,682) analyzing the role genetics and environmental influences have on comprehension for students in first through sixth grade. They found the environment does not contribute to levels of reading comprehension after second grade. Cognitive traits for decoding and listening comprehension were theorized to be more innate than teachable and to play a larger role in reading to learn or comprehend which have increased emphasis as children age (Soden et al., 2015). Jerrim et al. and Soden et al. agreed that the environment plays a major role in early reading development as children acquire fundamental reading skills, but Soden et al.'s research found the strength of genetic factors in continued elementary development.

It is likely that a combination of environment and genetics is required for struggling readers to maintain long-term outcomes after an intervention response.

Researchers have analyzed the role of early childhood intervention in maintaining long-term reading outcomes and found responses maintained at 1-year, 4-year, and 11-year time frames (Blachman et al., 2014; Han, Vukelich, Buell, & Meacham, 2014; Nelson et al., 2018). Nelson et al. (2018) studied 6,828 K-2 students requiring support with Tier 2 interventions and analyzed how the response to intervention predicted continued reading performance over the next year. Longitudinal models were used to predict the odds that students who met exit criteria (scoring above grade level on two benchmark exams) would be able to have future success based on fall benchmark assessments. The percentage of kindergarten, first-grade, and second-grade students who met exit criteria and were able to maintain grade level on benchmark exams the following year were 31%, 32%, and 22% respectively (Nelson et al., 2018, p. 147). This is compared to 53% of the general student body that was at or above grade level. Nelson et al. noted this result is in support of effectiveness considering the students who met qualifications to exit intervention maintained higher scores on average than their peers who were unable to meet exit criteria. Han et al. (2014) pointed out studies beyond 1 year are important to evaluate reading intervention exit strategies since certain reading skills, such as oral reading skills, take years to develop. They conducted a longitudinal study to explore literacy and language development of preschoolers from low-income families to determine the impacts of early intervention in later grades. Participants in the study included 62 dual- and monolingual students who received the Early Reading First

intervention during their Head Start preschool year. The researchers analyzed data over 4 years, through the students' second-grade year, and found they were able to make significant improvements in multiple reading measures with an ever-increasing proportion of students meeting age-appropriate expectations. Han et al. furthered that low-income or dual-language learners had significantly more improvement compared to their peers. Nelson et al.'s and Han et al.'s studies help to support RTI model guidelines of monitoring students' response to intervention to make placement decisions (Cakiroglu, 2015). Blachman et al. (2014) stated their study was the first to investigate if benefits from early reading remediation were maintained into adolescence and young adulthood. They followed 58 second and third graders who completed 8 months of reading intervention. Reading intervention was provided outside of the classroom in addition to general classroom instruction and consisted of one-on-one tutoring on word recognition, fluency, and text-based reading. Data were collected before and after the intervention, as well as at 1- and 11-year follow up. Students were able to maintain significantly improved reading skills over a comparison group not receiving the intervention. Blachman et al. furthered that struggling readers benefited from the direct time they spent in intervention, but they were unable to build on this intervention and further close the gap with their non-struggling peers. Solheim et al. (2018) shared similar results in a study where teacher-led instruction in two groups concealed any possible effects in the group receiving a computer-based intervention. Long-term studies rarely show benefits in closing reading disparities after the initial intervention is discontinued (Suggate, 2016).

The long-term effects of reading intervention have proven to have lasting effects (Blachman et al., 2014), and researchers have identified RTI models with improved outcomes (Al Otaiba, Kim, Wanzek, Petscher, & Wagner, 2014b) with further improvements from individualized the intervention (Lyster et al., 2016; Suggate, 2016). Al Otaiba et al. (2014b) examined the long-term effects on reading performance for students in second and third grade using two different RTI models, dynamic and typical RTI. Typical RTI initiates all struggling readers at Tier 1 while dynamic RTI allows students to fast-track to Tier 2 or 3. They used a screener to classify first graders as at-risk or no risk and followed 278 of them through third grade. The first graders were also classified based on their intervention response as easy to remediate (students who responded to intervention) or requiring sustained or more intensive intervention throughout the year. The researchers found first-grade students in the dynamic RTI group had higher reading comprehension scores by the end of third grade. Easy to remediate students in the typical RTI group did not show as much growth by the end of second grade compared to those in the dynamic RTI group. Al Otaiba et al. explained future research is needed to clarify easy to remediate response in third graders since there were no students in this group. The specific RTI approach is a factor in considering overall comprehension outcomes but differences in component reading areas were not considered in the previous studies.

Further research was conducted to determine the long-term effects of reading intervention for four specific reading skills based on previous literature (Lyster et al., 2016; Suggate, 2016). Suggate's (2016) meta-analysis included 75 studies on reading

intervention coded for four literacy components: phonemic awareness, phonics, fluency, and reading comprehension. Data were analyzed an average of 11 months after completion of the intervention to investigate the long-term effects. Intervention effectiveness was apparent after 11 months in all four component categories. Interventions targeting fluency, phonemic awareness, phonics were noted significantly more effective for first and second grade, while those targeting comprehension was significantly more effective for third grade and onward. Interventions including phonemic awareness (sounds within words) were as effective as those targeting phonics (the link between sounds and letters or words) in post-tests. Interventions utilizing phonics proved significantly more effective at an 11-month follow-up. Suggate theorized that phonics helps students in overall reading comprehension with long-term benefits. Lyster et al. (2016) also examined the effectiveness of different types of reading intervention but extended Suggate's research duration from 11 months to 6 years. Lyster et al. followed 269 preschoolers and assigned them to one of three groups: phonological awareness (components of speech), morphological awareness (meaning constructs of words), and a control group. Analysis of the data for the morphological group after a first-grade intervention revealed significant positive effect in reading comprehension with the longitudinal analysis revealing continued effects in improving students' sixth-grade scores (Lyster et al., 2016). The phonological awareness group, by comparison, did not make substantial growth in either the short-term or long-term (Lyster et al., 2016). Lack of growth with phonological awareness is not only in contrast to the results for morphological awareness but also in contrast to growth in all four literacy components

targeted by intervention in Suggate's study. Lyster et al. revealed the school's vision to targets phonological awareness among all students, including those in the control group, may have distorted the results. While long-term benefits of interventions focused on specific components having proven beneficial (Lyster et al., 2016; Suggate, 2016), other factors such as socioeconomic status are not significant (Nelson et al., 2018).

Reading Comprehension

Reading comprehension is composed of word decoding (ability to understand an isolated word) and linguistic skills (ability to process oral information) (Swart et al., 2017). Components of word decoding include isolated word reading, nonword accuracy, and fluency (Lonigan et al., 2018), and components of linguistic skills include vocabulary and listening comprehension (Cho, Capin, Roberts, Roberts, & Vaughn, 2019). The SVR provides a research-based framework for understanding reading comprehension where word decoding and linguistic skills are required in conjunction for students to understand written texts (Cho et al., 2019; Swart et al., 2017). Evidence-based insights into reading comprehension allow for more thoughtful designs of reading intervention that can consider ideal interventions for specific reading deficits and special populations (Swart et al., 2017).

Researchers have confirmed SVR while finding further associations, such as to cognitive factors (Swart et al., 2017) and diverse populations (Cho et al., 2019). Swart et al. (2017) conducted a longitudinal study to analyze the relationship of cognitive precursors (such as short-term memory and working memory) to lexical quality (such as decoding and vocabulary) to further understand components of reading comprehension.

Significant positive correlations were found between short-term memory and decoding, working memory and reasoning, and reading comprehension and vocabulary, respectively (Swart et al., 2017). Swart et al. concluded cognitive precursors have significant correlates to lexical components of SVR, word decoding and vocabulary, and emphasized the importance of reading comprehension development. Cho et al. (2019) analyzed components of SVR (word decoding and linguistic skills) in relation to reading comprehension difficulties in English learners (EL) and non-English learners (non-EL). They reviewed pretest data from a previous study including 446 struggling readers in fourth graders, using statistical analysis to compare English learners to non-English learners in several domains of reading comprehension. The researchers found word reading was associated with poor reading comprehension in non-EL students and linguistic comprehension was associated with greater difficulty in EL students. Cho et al. explained EL students have less difficulty in word reading and may benefit from focusing efforts on oral processing (a linguistic comprehension skill), although further studies are needed. Swart et al. and Cho et al. confirmed the elements of word decoding and linguistic skills are necessary for reading development, but other elements and factors must be considered in designing interventions.

Researchers have also found intrinsic factors, such as motivation and self-regulation, are effective targets for improving reading comprehension (Sanders et al., 2019; Schiefele et al., 2016). Schiefele et al. (2016) conducted a longitudinal study of 1,051 second- and third-grade students, providing assessments over the year for intrinsic motivation and reading comprehension. Results included a positive relationship between

intrinsic reading motivation and reading comprehension in word and sentence levels, but not passage level (Schiefele et al., 2016). Schiefele et al. concluded a benefit of their study compared to previous studies was in further dividing the definition of intrinsic motivation into involvement (enjoying the imagery associated with reading) or curiosity (pursuing one's own interests). The involvement-based motivation was associated with improved reading comprehension development compared to curiosity-based motivation (Schiefele et al., 2016). Sanders et al. (2019) furthered Schiefele et al.'s focus on motivation by analyzing a process that helps students become aware of their intrinsic factors. Sanders et al. composed a meta-analysis of 11 articles investigating the effectiveness of self-regulated strategy development (SRSD) reading interventions for students with disabilities. SRSD is a model using direct instruction to guide students in building self-regulation skills. Self-regulation skills allow students to monitor their own progress in a task, which can motivate and provide students the ability to reduce their own off-task behavior. The review included 199 children age 10 to 15 years old with various disabilities, including emotional or behavioral disorders, intellectual disability, and speech or language impairment, among others. Students with reading difficulties who participated in SRSD were able to make growth in reading comprehension. The researchers concluded the evidence for SRSD did no fulfill quality for standards as set by the Council for Exceptional Children (CEC), an organization that sets research-design standards for special education. Sanders et al. furthered 80% of their studies did not include a baseline or control group, supporting the need for further research to meet the CEC's quality standards. Intrinsic motivation may prove an effective target for

improving reading outcomes for many students, but other components of reading should be considered for populations with specific deficits.

Reading comprehension's major components, word decoding, and linguistic skills can be categorized into subcategories of literacy components, such as morphologic and syntactic awareness (both linguistic skills), providing researchers and tutors targets for reading intervention (Gottardo, Mirza, Koh, Ferreira, & Javier, 2018; Tong, Deacon, & Cain, 2014). Tong et al. (2014) analyzed data from 30 fourth graders identified to have reading deficits isolated to linguistic skills with normal word decoding abilities. They were interested in comparing the effectiveness of targeting two components of linguistic skills, morphologic awareness (ability to understand word components) and syntactic awareness (ability to manipulate word-order), in improving reading comprehension. The interventions targeting morphologic and syntactic awareness both provided significant improvement in reading comprehension, associated with prominent gains in linguistic skills. Data were analyzed between students with poor compared to below-average reading comprehension and revealed students with poor comprehension struggled more with morphological awareness than syntactic awareness. Tong et al. recommended further research to investigate this unexpected finding. Gottardo et al. (2018) were also interested in the linguistic components or morphology, syntax, and vocabulary in relation to reading comprehension. Fifty-two, nine- to 13-year-old children were recruited from community centers and churches and evaluated for reading comprehension and several literacy components (vocabulary, morphological and syntactic awareness, and word reading) (Gottardo et al., 2018). Gottardo et al. (2018) confirmed SVR supported in other

research in which linguistic skills and word decoding are required for reading comprehension and are not mutually exclusive (Cho et al., 2019; Swart et al., 2017). Gottardo et al. furthered the subcomponents of morphologic awareness, syntactic awareness, and word reading have a direct correlation to reading comprehension and are viable targets for intervention. Tong et al. confirmed morphologic and syntactic awareness are effective targets for intervention in children with poor linguistic skills in producing positive reading comprehension outcomes.

Literacy Components

Students must grow in numerous literacy components to successfully develop reading comprehension skills (Cho et al., 2019; Gottardo et al., 2018; Swart et al., 2017). Literacy components are also important outside of the context of reading comprehension for day-to-day functioning (Graham et al., 2018). The literacy component of writing is important to function in a world with digital communication (Graham et al., 2018). Students who learn cursive reveal superior performance in spelling and syntax (Semeraro, Coppola, Cassibba, & Lucangeli, 2019). Vocabulary is considered the most important linguistic component of reading comprehension (Swart et al., 2017) and is needed to extract meaning from complex academic text in high school for example (Stanley, Petscher, & Catts, 2018). Vocabulary also has a strong relationship with fluency (Stanley et al., 2018). A confluence of reading skills is thought to form fluency around third grade and is required for students to understand and compare abstract and complex material (Stanley et al., 2018). The literacy components of vocabulary, fluency, and writing will be considered.

Stanley et al. (2018) found building third-grade vocabulary improves reading comprehension years after the intervention, and Connor et al. (2018) offered evidence supporting strategies for improving third-grade vocabulary. Stanley et al. examined longitudinal data from 3,180 students as they progressed from kindergarten to 10th grade, collecting data in kindergarten (measures on phoneme segmentation and nonsense word fluency), third (measures on oral reading fluency and vocabulary), and 10th grade (measures on reading comprehension). Early fluency and vocabulary had strong positive correlations to 10th-grade reading comprehension. Early vocabulary and fluency development supported text-processing abilities, which is a prerequisite to reading comprehension in later academic years. Stanley et al. suggested early evaluating children for vocabulary deficits to allow for appropriate intervention and prevention of future reading struggles.

Connor et al. (2018) realized the value of improving literacy components, such as vocabulary, in elementary students and researched four different intervention efficacies in improving specific literacy deficits. Six-hundred forty-five third- and fourth-grade struggling readers were provided one of four interventions (Compass, Language in Motion, Enacted, and TEXTS) identified to target different combinations of literacy components (vocabulary, listening comprehension, comprehension of literate language, academic knowledge, and comprehension monitoring) for 4 days per week lasting 10-12 weeks. They found the interventions were not effective in improving the targeted skills in general, although students with particularly low skills revealed some improvement. The intervention in the study targeted numerous components that likely diluted the results

for children with specific deficits. The researchers suggested using interventions that target children's specific deficits in isolation instead of the programs in their study that focused on multiple literacy components. Further analysis of data revealed sensorimotor simulation of text (consciously enacting text) improved cognitive appreciation of abstract ideas in children with weaker vocabulary skills (Connor et al., 2018). Sensorimotor simulation of text improved vocabulary in third and fourth graders struggling with reading (Connor et al., 2018) where improving vocabulary has lasting effects in reading comprehension for years to come (Stanley et al., 2018).

Researchers have revealed targeting fluency can improve reading comprehension scores (Rasinski et al., 2017) and offer evidence for specific interventions, repeat reading for example, in improving fluency outcomes (Lee & Yoon, 2017; Noltemeyer, Joseph, & Watson, 2014). Rasinski et al. (2017) sought to observe the impact of fluency intervention in improving reading comprehension scores, noting the research-supported relation of fluency and reading comprehension. Thirty-seven struggling readers in third grade participated in a 7-week summer reading clinic including 25, 20-minutes sessions. The reading intervention, Fluency Development Lesson, focused on expressive texts to elicit student reading confidence. Data were collected using pretest and posttest measures for fluency and reading comprehension which was evaluated through word recognition, automaticity, and accuracy. Participants made significant progress in fluency and reading comprehension throughout summer clinic. Rasinski et al. emphasized the significance of effective summer interventions as many readers regress over summer with struggling readers regressing the most. Repeat reading has been

shown in other studies to improve reading fluency (Lee & Yoon, 2017; Noltemeyer et al., 2014).

Noltemeyer et al. (2014) investigated the effectiveness of three different passage repeat interventions in improving oral retell fluency in four, seven- to eight-year-old students with below grade-level reading achievement scores. The interventions were repeated reading X3 (three attempted reads evaluating performance), repeated reading plus listening passage preview (passage modeled before reading), repeated reading plus phase drill (repeated words as errors were made) and was presented in a single-subject design where students received a total of 15-weeks of each intervention (Noltemeyer et al., 2014). Noltemeyer et al. found reading plus listening passage preview was the most effective intervention type, which is consistent with previous studies emphasizing the enhancing effects of modeling. Listening passage preview helped to enhance understanding and reduce anxiety (Lee & Yoon, 2017). Lee and Yoon (2017) extended Noltemeyer et al.'s evidence for repeat reading to students with reading disabilities. Lee and Yoon conducted a meta-analysis of 34 studies including kindergarteners through Grade 12, finding significant improvement in reading fluency with repeat reading. Lee and Yoon noted elementary students had the greatest response, building on Noltemeyer et al.'s findings. Lee and Yoon reflected students with reading disabilities often have reduced fluency due to poor phonological skills and oral language processing. Repeat reading was effective in these studies but understanding the role of writing in reading instruction and the effectiveness for improving components of reading may prove beneficial.

Reading instruction can be presented with writing instruction (balanced literacy programs) or separate from writing instruction (unbalanced literacy programs) with both showing efficacies in the literature (Graham et al., 2018; Semeraro et al., 2019). Graham et al. (2018) performed a meta-analysis of 47 studies analyzing the effectiveness of balanced literacy programs (at least 40% of literacy instruction combining reading and writing) compared to unbalanced literacy programs. Preschoolers to Grader 12 were evaluated in reading comprehension, decoding, and vocabulary, and revealed significant improvements when balanced literacy programs are utilized. Graham et al. noted reading and writing require similar cognitive skills and basic knowledge as a plausible explanation for the benefits of balanced literacy programs. Future research is needed to determine which balanced literacy programs are most effective for students' reading development (Graham et al., 2018). Semeraro et al. (2019) investigated an unbalanced literacy program in improving students' reading skills. One-hundred forty-one first graders were provided 9 months of cursive training and evaluated with pretest, posttest, and follow-up evaluation of reading skills (comprehension, fluency, and accuracy) and writing skills. They used the program Write in Cursive which focused on phases of cursive training (typical cursive movements, letter formation, and letter connections) but did not focus on reading components. Semeraro et al. found reading comprehension and fluency increased with cursive training, which they stated is consistent with previous studies showing improvement in text comprehension and word reading with writing training. Graham et al. and Semeraro et al. agreed unbalanced programs, such as Writing to Cursive, would likely increase effectiveness with the incorporation of a balanced

approach. Understanding grade level and individual needs in literacy components are needed for effective application of reading intervention as described throughout the previous section.

Training and Instruction

Teachers' training requirements vary widely across states and includes several factors such as degrees, duration of experience, certifications, and professional development (Myrberg et al., 2019; Palacios, 2017; Vernon-Feagans, Bratsch-Hines, Varghese, Cutrer, & Garwood, 2018). Instruction quality varies from classroom to classroom and is composed of various elements: classroom structure, classroom planning, time management, understanding children's needs, assessing climate, developing culture, and emotional sensitivity (Hu, Wu, Curby, Wu, & Zhang, 2018; Myrberg et al., 2019; Palacios, 2017). Teacher training may lead to improved instruction quality if knowledge can be applied to practice (Myrberg et al., 2019). Researchers debate the causal relationships of teacher training, instruction quality, and student outcomes without a clear consensus in the literature (Myrberg et al., 2019; Palacios, 2017; Vernon-Feagans et al., 2018).

Myrberg et al. (2019) believed higher teacher quality, especially training and certification, is associated with improved reading outcomes. They studied 218 fourth-grade teachers with 4,622 students to investigate the association between teacher quality and student reading achievement. Data for reading achievement and teacher quality (highest degree, major, experience, professional development, and sense of preparedness) was collected from standardized exam scores for reading achievement, teacher surveys,

and parent questionnaires. The researchers found a significant positive correlation between teacher quality and fourth-grade reading achievement with even greater effects for low-performing students. Myrberg et al. reinforced the importance of teacher education and certification, recommending teachers achieve full certification, and school districts hire teachers with training appropriate for their position. Teacher quality can alternatively be developed during a career, such as professional development, another potential target for research.

Vernon-Feagans et al. (2018) performed a randomized control trial investigating the impact of professional development on student reading performance. One-hundred nineteen kindergarten and first-grade teachers were provided 2 years of professional development training with the Targeted Reading Intervention (TRI) program. TRI instruction includes weekly webcam coaching sessions with live feedback while teachers provide one-on-one tutoring for struggling readers. Students made significant growth in decoding and comprehension compared to the control group. Teachers did not have an improvement in their second year of training compared to their first year, implying there was a lack of summative effects from additional coaching. Vernon-Feagans et al. defended poor teacher attrition masked additional benefits from the second year of coaching but pointed out evidence of increased teacher fidelity to program guidelines after the second year of training. Vernon-Feagans et al. repeated Myrberg et al.'s (2019) viewpoint that teacher training is likely to lead directly to improved student reading outcomes. These researchers did not investigate the possibility of other mediating factors.

Researchers have found teacher qualities such as emotional support, organization, and instruction quality are important predictors of reading outcomes for elementary students (Hu et al., 2018; Marchand-Martella et al., 2015). Hu et al. (2018) investigated how teacher quality related to student attitudes and reading outcomes. Data were collected from 29 classrooms with 567 kindergarteners to test the mediation model stating teacher-student interaction predicts reading outcomes through improved student attitudes. They supported the mediation model with statistical analysis revealing quality teacher-child interaction predicted improved student attitudes which predicted improved reading outcomes. Three-domains of teacher-child interaction were studied, including emotional support, classroom organization, and instructional support, with all three functioning as predictive factors in the model. Hu et al. recommended professional development for preschool teachers to improve teacher-child interactions. Marchand-Martella et al. (2015) supported using teacher education to improve the quality of instruction for struggling readers in elementary school. They studied the relevance of teacher training to improve instruction quality in struggling readers who did not respond to Tier 2 reading intervention. Teachers received training for guided reading that targeted management strategies such as preview, review, and error correction, resulting in higher levels of academic achievement and engagement. Marchand-Martella et al. reflected this specialized training assists meeting the needs of nonresponding students not available to them otherwise. Hu et al. and Marchand-Martella et al. noted that teacher education has a significant role in improving teacher instruction quality, providing examples of improved

reading outcomes. The relationship between teacher characteristics and reading outcomes is not always so clear.

Researchers have investigated the interplay between teacher competence and teacher quality in supporting student reading outcomes (Fauth et al., 2019; Palacios, 2017). Palacios (2017) collected longitudinal data on teacher and classroom characteristics over 2 years from over 4,000 teachers and 10,000 students in first, third, and fifth grade. Teacher characteristics (advanced degree, elementary education certification, level of certification, and teaching experience) and classroom characteristics (number of gifted children, free lunch eligibility, learning disability, and limited English proficiency) revealed a small association with reading achievement. She reflected the small result does not prove the causal relationship between teacher qualities and reading outcomes. Another possible explanation is students benefitted from consistent teacher instruction more than teacher quality (Palacios, 2017).

Fauth et al. (2019) confirmed Palacios' (2017) correlation of teacher quality to student outcomes with more confidence in the data. Fauth et al. extended Palacios' study and investigated the relationship of teacher quality to teacher competence in predicting outcomes in elementary students. Data for teacher competence (content knowledge, self-efficacy, and teaching enthusiasm), teacher quality (cognitive activation, supportive climate, and classroom management), and student outcomes (achievement and interest) were collected before and after 9 weeks of instruction in 52 classrooms with 1,070 third-grade students (Fauth et al., 2019). They found teacher content knowledge, a domain of teacher competence was most strongly related to student interest and conceptual

understanding but had no direct association with student achievement. The domains of teacher quality revealed a significant relationship to teacher competence and student achievement, identifying it as a mediating factor. The researchers explained teacher competence and student achievement only have a significant relationship with each other through teacher quality. Fauth et al.'s findings modified Vernon-Feagans et al.'s (2018) and Myrberg et al.'s (2019) agreement that teacher training leads directly to improved reading outcomes by noticing teacher quality as a necessary mediating factor. Fauth et al. suggested policies to support teacher competence and teacher quality through personal development programs.

Summary and Conclusions

Reading is a skill necessary for multiple facets of life including supporting academic success, improving self-esteem, and preventing unemployment (Jones et al., 2017; Partanen & Siegel, 2014). Students with reading difficulties are unlikely to improve relative to their classmates without intervention (Solheim et al., 2018). RTI models remove struggling readers from the classroom for evidence-based reading interventions (Cakiroglu, 2015). RTI using small-group settings with longer durations and focusing on repeat reading have proven to be effective in primary grades (Hammerschmidt-Snidarich et al., 2019; Ross & Begeny, 2014). Further research on RTI models is needed to support use in all grade levels and special populations (Cakiroglu, 2015).

The RTI model is well supported in the research and is widely used in elementary schools due to flexibility in implementation (Cakiroglu, 2015). The RTI model has

proven effective with the input of various programs: CBI, R2I, Triple-Focus Reading program, and Xtreme Reading, among others (Bennett et al., 2017; Boudah, 2018; Lovett et al., 2017; Young et al., 2018). Serry and Oberklaid (2015) explained program effectiveness is likely to be related to program fidelity. Fidelity is often related to ease of implementation in practice (Serry & Oberklaid, 2015). Researchers agreed program designs based on standard treatment model (the standardized protocol used for all students) are often easier to implement with improved effectiveness compared to programs based on the problem-solving model (individualized instruction based on student needs) (Cakiroglu, 2015; Lam & McMaster, 2014).

A central feature of the RTI model is removing struggling readers from the classroom as they benefit more from small-group instruction than their peers (Amendum & Liebfreund, 2019). RTI instruction is commonly provided for at least 9 weeks, 3 to 5 times per week with 30 minutes sessions (Nelson et al., 2018). Nelson et al. (2018) found longer and more intensive interventions were associated with improved outcomes, but Gilmour et al. (2019) opposed more intensive interventions that can limit student access to the curriculum. Serry and Oberklaid (2015) recommended using the evidence-driven strategy to alter therapy based on student response. Serry and Oberklaid noted concern due to instances of schools using programs that adhere to strict intervention times. The use of either one-on-one or small-group interventions fits within RTI guidelines with both supported in the research (Cakiroglu, 2015; Lovett et al., 2017; Young et al., 2018). Serry and Oberklaid and Wanzek et al. (2018) recommended selecting small-group

approaches over one-on-one due to the efficient use of resources allowing for more access to struggling readers.

Researchers offer various recommendations in applying assessments to reading intervention. Screening for differential initiation into the RTI tier system is well supported (Al Otaiba et al., 2014b; Cakiroglu, 2015; Gustafson et al., 2014). Researchers have also supported the use of RTI models incorporating individualized treatment for students lacking significant improvement from the initial stage of intervention (Filderman et al., 2018; Lemons et al., 2014). A review of the literature revealed more disagreement in screening for deficits and possible intervention approaches before initiation of RTI models. Lam and McMaster's (2014) review of 14 articles found significant benefit from screening students for various literacy competencies (word identification, fluency, phonemic awareness, and vocabulary) and then providing targeted interventions. Fuchs and Fuchs (2017) countered with findings revealing that the implementation of standardized individualization before initiation of RTI resulted in poor implementation and worse reading outcomes compared to the standard approach. Fuchs and Fuchs found actual practices often vary from research-based classroom conditions. Bennett et al. (2017) reported improvement with automatically individualized computer-based therapy with proven effectiveness over the standard approach while also avoiding the need for additional resources such as assessment time and therapy modification.

The literature review revealed a relative abundance of data on the effectiveness of RTI implementation for kindergarteners and first graders compared to third graders. Researchers have supported cursive education in reading, more intensive reading

interventions for severe deficiencies, and the use of computer-based reading interventions in first graders (Al Otaiba et al., 2014b; Council et al., 2016; Semeraro et al., 2019). Wanzek et al. (2018) completed a meta-analysis of 25 articles investigating the effectiveness of RTI models in kindergarten through third grade and found RTI models to be well supported. There were notably no studies since 2005 focusing on second- or third-grade students (Wanzek et al., 2018). RTI models are a mainstay of intervention for struggling readers in third grade regardless of the sparse evidence (Cakiroglu, 2015). The achievement gap worsens as students advance toward third grade where most students are below grade level by fourth grade (Gilmour et al., 2019; U.S. Department of Education, 2020). Further research can provide policymakers, school administrators, and teachers with an evidence-based intervention approach to improve reading outcomes for third graders (Schugar & Dreher, 2017).

My study addressed the need revealed in my literature review for more data on the effectiveness of RTI in third graders struggling with reading. My study compared proficiency scores at the beginning to the end of the year in third graders receiving RTI. The outcome supports the use of RTI with third-grade students who are now beyond their primary grade years. Foundational studies supporting the use of RTI models in third graders struggling with reading will support future research on guiding targeted approaches, such as on the severity of the deficiency, individualized deficits, demographics, or teacher qualities, among others (Memisevic et al., 2019; Nelson et al., 2018; Suggate, 2016). The next chapter outlines the methodology of this study.

Chapter 3: Research Method

The purpose of this quantitative, one-group pretest-posttest study was to investigate if participating in RTI is successful for third-grade students in improving reading outcomes from the beginning to the end of the school year. The rationale for this study design is discussed in the next section. My study determined if there was a significant difference between reading outcomes from the beginning and end of the school year for student RTI data as described in the following section. RTI has already proven effective for improving reading outcomes in kindergarten and first graders (Wanzek et al., 2018), and my study expanded data to include third graders.

The major sections of this chapter include research design and rationale, methodology, threats to validity, and ethical procedures. The research design and rationale section include a discussion of design and variables based on my purpose and research questions. The methodology section of this chapter includes the target population and sampling procedures with a detailed description of how samples and sample sizes were determined, then I included details on archival data. This chapter further covered the operationalization of each variable and a plan for data analysis. Possible threats to validity and ethical issues concerning my study were also included. Chapter 3 concludes with a transition to Chapter 4 with an analysis of the results.

Research Design and Rationale

Quantitative research is defined as a systematic approach to examining a phenomenon in literature by collecting quantifiable data and analyzing numbers with statistics (Creswell, 2012). Researchers use quantitative research designs to understand

the relationship between independent and dependent variables (Allen, 2017). An advantage of quantitative research is it allows the researcher to collect and analyze numerical data which tends to be more reliable (Creswell, 2012). Personal biases in quantitative studies are a reduced factor mostly due to clear inclusion and exclusion criteria for data (Creswell, 2012). Creswell (2012) explained that quasi-experimental designs are a type of quantitative research used when groups are nonrandomly assigned. Quasi-experimental designs are frequently applied to research on education due to group selection through typical education models as opposed to randomization (Johnson & Christensen, 2020). Researchers analyzing data from quasi-experimental design can investigate interventions without disrupting school methodologies and approaches, more representative of the typical classroom setting (Allen, 2017).

A quantitative, ex-post facto quasi-experimental design was applied to my study. My study was quantitative because archival data were statically analyzed using numerical scores from a standardized assessment. A quasi-experimental design was necessary since the study group was composed of a nonrandomized convenience sample of student data for students previously identified to need intervention. An ex-post facto design was applied to my study because archival data on reading outcomes were collected after an intervention has already occurred. The quasi-experimental approach in my study is further categorized as a one-group pretest-posttest design.

Creswell (2012) explained that a one-group pretest-posttest is used to determine the effect of an intervention on a single sample. The one-group pretest-posttest design applied to my research questions because data were analyzed before and after struggling

readers receive RTI. A pretest-posttest design is beneficial in analyzing the significance of an intervention (Creswell, 2012). Individual performance skills before receiving RTI and potential improvements made after receiving RTI can be evaluated using a pretest-posttest design (Liu & Maxwell, 2019). Pretest-posttest designs are helpful in education because data show whether or not students can return to the regular education classroom or if they need to remain in the small group setting (Cakiroglu, 2015; Liu & Maxwell, 2019). The MAP data in my study was collected for testing before and after RTI, which occur at the beginning and end of the school year at the study school. This design assists in determining if RTI has a significant influence on reading outcomes as measured by standardized assessments. The research design included a clearly defined quasi-independent variable and dependent variables.

The quasi-independent variable in my study is the RTI instruction and was provided at the study school to all struggling readers. This is a quasi-independent variable because it is not manipulated due to the lack of a control group (see Johnson & Christensen, 2020). Struggling readers were identified as those who scored below the 30th percentile in overall reading scores on MAP (WCSD, 2019). RTI was selected for struggling readers in third grade, because it is used for struggling readers throughout the study school district. Students requiring RTI are provided with reading instruction which aligns with the CCSS. RTI is instructed in small groups at the study school using a research-based intervention that targeted phonics and phonological awareness development, vocabulary, fluency, comprehension, and decoding skills (WCSD, 2019). Students are progress monitored throughout RTI to determine the next steps for each

student (WCSD, 2019). Progress is measured by tutors using an online or paper-and-pencil screener aligned to the CCSS called aimswebPlus (WCSD, 2019). RTI provides information on individual improvements over time often through pretest and posttest strategies (Cakiroglu, 2015). RTI allows educators to adjust to students' needs and target particular weaknesses (Cakiroglu, 2015). The study's school district believes in targeting the specific needs of children to close the achievement gap as stated by their core beliefs (WCSD, 2019).

The dependent variables were the overall reading scores and reading areas as evaluated by a standardized assessment. The overall percentile reading scores and reading area scores on MAP were used for this study. MAP measures students' reading abilities in different reading areas (Burns & Young, 2019). Students who test below the 30th percentile on MAP were selected to receive RTI at the study school. The archival data for their pretest and posttest outcomes were readily available at the study school and served to form the study group data. Archival data can be efficiently collected at one point in time after the intervention (Allen, 2017). Time and resource constraints were not a limitation in my study because archival data were used.

True experimental designs require participants to be randomly assigned to the experimental variable by the researcher (Creswell, 2012). A convenience sample, in contrast, includes nonrandomized groups where the researcher has limited control over group variables (Creswell, 2012). The presence of nonrandomized groups implies additional variables will not be controlled (Creswell, 2012), such as baseline reading scores. My study is not considered a true experimental design due to the use of archival

data for students who already received an intervention. The study group data were from nonrandomized students selected by the study school before data collection.

A qualitative research design was not used in my study because students' MAP standardized assessment scores are numerical data rather than observational. Creswell (2012) explained that qualitative research designs are appropriate for exploring and understanding the central phenomenon by asking broad questions. Qualitative researchers often collect variables during the process of implementing or evaluating the data (Creswell, 2012). Quantitative researchers, in contrast, identify variables before the implementation with the purpose of investigating specific research questions (Creswell, 2012). Researchers commonly use quantitative research by collecting numerical data on reading outcomes to evaluate a reading intervention (Boudah, 2018; Messer & Nash, 2018; Young et al., 2018). The clear research questions used in quantitative research focused on evaluating interventions allow for specific recommendations on whether to use intervention approaches (Liu & Maxwell, 2019). My study had clearly defined variables (RTI instruction and MAP scores) with a narrow purpose of investigating the effectiveness of reading interventions more applicable to quantitative than qualitative approaches.

My study did not incorporate a mixed methods design where data is collected and analyzed using qualitative and quantitative methods (see Creswell, 2012). The strength of the mixed-method design is to get a deeper understanding of the research problem (Creswell, 2012). A mixed-methods design is helpful to answer research questions when one study approach is not enough (Creswell, 2012). Additional information could have

been collected in my study on topics such as the dynamics of the teacher-child interaction, factors related to intervention satisfaction, teacher or child narratives through collecting additional data using interviews, observational data, or open-ended questionnaires. The focused purpose of my study did not necessitate this approach. The paired *t* test used to answer my research questions correlated reading outcomes and intervention without the need for the addition of qualitative data.

Methodology

Population Selection

The population of my study included third-grade students at one elementary school in the Western United States. There was a total of 893 students at the study school including PreK through sixth grade. The ethnic and gender demographics at the study school for 2016-2019 school years are represented in Table 1.

Table 1

Study School Demographics by Year and Percent

	White	Hispanic	Asian	Black	Two or More Races	American India/Alaskan Native	Pacific Islander	Male	Female
2016-2017	70.51	14.3	3.39	2.01	9.16	-	-	56.21	43.79
2017-2018	67.9	15.45	3.95	2.63	9.46	-	-	55.33	44.6
2018-2019	66.74	16.46	3.14	2.69	0.97	0.67	0.34	53.53	46.47

Note. From WCSD (2019).

I did not have full access to grade-level specific data until after Walden University's IRB granted approval. There were five third-grade classrooms with 22 to 24 students per classroom with a total of 110 to 120 third-grade students annually. About 30% of these students required RTI based on standardized assessment scores (NWEA,

2019b). Archival data were collected from 3 previous years accumulating to 93 students in RTI. Considering exclusion and inclusion criteria for student data, 91 students participated in RTI over the full 3 years. The study school provided sufficient study size and limited the covariates (tutors, group size, duration, and student demographics) and potential ethical constraints. Students receiving RTI were typically provided services by one tutor at a time. There were two tutors at the study school who specialized in providing reading services schoolwide.

Struggling readers were identified at the study school by their performance on state standardized assessments in reading. Students' reading abilities were assessed 3 times a year when they participated in MAP testing. MAP was administered in the fall, winter, and spring of every school year. Students are placed in RTI when they score below the 30th percentile. Students' progress was assessed after 6-8 weeks of intervention to determine whether RTI is continued or if the student can exit from RTI and return to the classroom full-time. Struggling readers were eligible to return to the classroom if they score above the 30th percentile on overall MAP readings scores.

Procedures for Recruitment, Participation, and Data Collection

The principal of the study school met with me to discuss my study. Discussion included my study's purpose and research questions and the principal was offered an opportunity to review my working dissertation. The discussion proceeded to the data required to evaluate my research questions and the required procedures for collecting the archival data. The principal assisted in submitting a letter of request for schoolwide access (Appendix A) to the school district. The school district provided a letter of

approval for schoolwide access (Appendix B). A copy of the letter was provided to the principal of the study school, placed in my proposal, and a personal copy was stored. No further permissions were needed according to school district policies. The Walden University's IRB approval (06-24-20-0191556) was obtained, and I only then moved onto the data collection phase.

I collected data from the MAP website and Infinite Campus website for RTI scores. The approximate time required to collect data were 2 school days. Data were collected and coded as described in the ethical procedures section. The data were reviewed using the cleaning and screening procedures detailed in the section on data analysis. Data were then transferred into a software program called SPSS for the purpose of analysis. There was no need to extend my study to other schools because there was enough student data at the planned study school. Students were not direct participants in my study due to the use of archival data discussed in the next section.

The principal of the study school was debriefed and given an opportunity to review all data that was collected for the purpose of this study. Study leadership should have an opportunity to review documentation for accuracy (Triola, 2012). The principal will be provided a summary of my results once my dissertation is complete. There will be no need for further follow-up, although the principal has my contact information available if concerns arise.

Archival Data

The principal of the study school was contacted to share my plan to collect archival data for MAP testing and RTI status. A letter of approval for schoolwide access

(Appendix B) was obtained from the school district in the study. This document granted me access to the archival data which I only retrieved after Walden University's IRB approval. The principal ensured I had appropriate login information for access to the MAP website and Infinite Campus website for collection of the student data. The procedures for gaining access to archival data is described in the previous section.

Instrumentation and Operationalization of Constructs

My study used a standardized assessment called MAP to measure reading outcomes. MAP was published by the NWEA in 2015 (NWEA, 2019a). Data provided by MAP testing is valuable in monitoring student growth and guidance in their instructional needs (NWEA, 2019a). The assessment not only targets specific grade levels standards but also adjusts the difficulty of MAP testing based on student performance in real-time (NWEA, 2019a). Permission from the publisher was not needed for this study because the use of archival data did not require me to implement this assessment myself for data collection. Archival data were collected from the study school; therefore, permission was received from the school district.

MAP measures students' abilities in specific reading areas (NWEA, 2019a). MAP scores are organized into different test sessions (fall, winter, and spring at the study school) and are available from kindergarten to Grade 12 depending on the specific school and district utilization. Student data is reported with a Rasch Unit (RIT) score described below. The percentiles calculated from the RIT scores were available for overall reading scores and each of the reading areas appropriate to my study.

RIT is a form of measurement used to measure each student's instructional level and is sometimes referred to as a RIT ruler (NWEA, 2019b). The RIT scale has scores that range from 100 to 300 for overall reading and reading area scores. They are also divided into four different categories: does not meet expectations, approaches expectations, meets expectations, and exceeds expectations (NWEA, 2018). RIT scores allow schools to track and monitor individual growth for each student from year to year. They are adjusted for grade level to remain within the overall range, but significant variation exists among grade levels. A second-grade student, for example, scoring between the 26th to 62nd percentile has a RIT range of 179 to 193 and a third grader with the same percentile range has a RIT range of 189 to 203 (NWEA, 2018). The increased score variability in RIT scores is significant as one deviates from the mean and is not ideal for statistical analysis (NWEA, 2011).

The reliability (consistency of results) and validity (relevance of data being measured) of a study's assessment are valuable in interpreting the significance of the study's results (Triola, 2012). MAP's measures are reliable and valid and provide an adequate screener for identifying struggling readers and predicting poor future reading outcomes (January & Ardoin, 2015; NWEA, 2019a). NWEA (2011) studied 1,179,313 second graders through 11th graders from various states to assess the validity and reliability of MAP reading scores. Study samples of at least 500 students from each state were required to qualify for the study (NWEA, 2011).

Reliability was established by collecting and analyzing data from repeat testing of students using item pools (collection of questions) of MAP questions matched by content

to follow-up item pools (NWEA, 2011). This process is defined as an alternate form of the test-retest reliability where different versions of the same test are presented to participants over time (Creswell, 2012). The matching process using the same instrumentation allowed for more accurate ranges of standard error than multiple forms of instrumentation (Creswell, 2012; NWEA, 2011). The Pearson coefficient was used to establish the strength of the test-retest relationship (NWEA, 2011) with the strength of the relationship strongest toward a value of 1 or -1 (Triola, 2012).

Students' scores were compared from the end of spring to the beginning of fall, notably outside the standard school year education time frame (NWEA, 2011). The alternate test-retest reliability for MAP proved strong for reading with scores of 0.949, 0.969, 0.963 and 0.945 in kindergarten, first grade, second grade, and third grade, respectively. NWEA (2011) further investigated the reliability of classification accuracy (correlation of student placement and MAP scores) revealing values for third grade (0.955), fourth grade (0.962), and fifth grade (0.955) in the study state with comparable values in other grades and states.

The purpose of MAP is to assign accurate reading ability and identify potential areas of improvement (NWEA, 2011). Reading ability is further divided into foundational skills, language and writing, vocabulary use and functions, and literature and informational text with the idea of meeting specific student's needs and targeting school district standards (January & Ardoin, 2015). The validity of MAP for these uses among others must be considered due to its wide usage (over 8 million children take the exam annually) as a universal screener for reading needs (January & Ardoin, 2015).

MAP's validity is based on measures including design content, correlation to other validated state measures or assessments, students' school performance, students' future performance, and students' achievement in state standards (NWEA, 2011).

Many types of validity were studied to confirm the validity of MAP scores including content, concurrent, predictive, and criterion-related validity (NWEA, 2011). Validity was evaluated similarly to reliability using Pearson's coefficient. Content validity of MAP is important to understand how well the content of the assessment fits with established content standards. Third-grader content validity ranged between 0.656 to 0.808 among a multistate analysis (NWEA, 2011). Concurrent validity was established by comparing MAP RIT scores to other valid assessments with results from 0.57 to 0.79 in second grade through third grade (January & Ardoin, 2015). Predictive validity was evaluated similarly by comparing MAP scores to other established assessments, although they were given at a later time. Third-grade predictive validity included values ranging from 0.672 to 0.775 among the states (NWEA, 2011). The criterion-related validity was evaluated by comparing students' MAP scores to their status as proficient or not proficient, revealing a range of 0.512 to 0.663 for third graders among different states. The precision of RIT scores was found to reduce at the extreme ends of the bell-shaped curve (NWEA, 2011).

NWEA (2011) also investigated the impact of ethnic status on variance on specific MAP question performance and overall score. The 1,179,313 students evaluated in reading included 55.8% European, 20.4% Hispanic, 18.4% African American, 3.6% Asian, and 1.8% Native American. The researchers found a small number of questions,

much less than one percent, with significant variability associated with a particular ethnic classification. They noted equal numbers of these questions for each ethnic group with overall equilibration of final assessment scores. NWEA Content Specialists reviewed the data to ensure fairness by removing and altering particularly biased questions. Male and female gender identification was also about equal in the study with very similar levels of low question variability and overall equilibration of final assessment outcomes (NWEA, 2011).

The study school used MAP scores to monitor student learning and progress (WCSD, 2019). Administration and teachers collected grade-level specific reports showing individual student percentile scores ranked from highest to lowest. Students were flagged for RTI when their percentiles were below the 30th percentile. The identified students' MAP reports are analyzed for potential intervention targets based on specifics of their reading scores. The RTI teachers and tutors will then focus on literacy components that need the most attention. Administrators and classroom teachers use historical percentiles as the focal point for continuing or exiting RTI. Classroom observations and data are also considered, but the current MAP percentile and historical responses to RTI or classroom education are typically most valued. MAP provides chronological data for students throughout their academic careers at predictable and repeatable times in the year, showing trends in their RTI and instructional levels.

The archival MAP data provided my study with a validated, standardized assessment to quantify reading outcomes. My study used the MAP RIT scores for reading as an overall measure of reading outcomes. Scores from the reading areas were

also analyzed. Correlating the reading score with placement into RTI was also an inclusion criterion as described in sampling procedures. Considering the reliability and validity of the specific reading areas and demographics as discussed above assisted in the interpretation of the results of my study with possible considerations for practice, although demographics were not statistically analyzed.

The MAP standardized assessment helps establish reading ability and determining reading outcomes in the study school and will be valuable in manipulating my study variables. My study included a quasi-independent variable and dependent variables. The RTI status was the quasi-independent variable. The study school determined RTI status by placing students below the 30th percentile into RTI. Overall and reading area RIT scores based on MAP testing in reading was the dependent variable for my study. Students receive RIT reading scores following MAP assessment which is then converted to percentile scores on a scale from 0 to 100 (NWEA, 2019a). Percentiles are used to determine whether students are performing at grade level. The percentile score provides intuitive data for descriptive statistics, clear identification of the study group, and the ability to perform statistical analysis with a paired *t* test. Percentile MAP scores were also used at the study school when examining data and determining RTI status.

Data Analysis Plan

Statistical Package for Social Sciences (SPSS) is a computer software program that was used for data analysis in my study. Kusumah (2018) found SPSS users are likely to find the program easy to input data and report satisfaction with the range of accurate data including basic descriptive statistics. Descriptive statistics help present

information on data that provides overarching understanding (Creswell, 2012). SPSS was utilized in my study to analyze archival data reflecting third-grade reading outcomes and their RTI status over the previous 3 school years. Descriptive data such as average RIT scores for each group provided a meaningful organization of data for the hundreds of students that will be in my study. SPSS was used to check for completeness and eliminated any outliers following a visual inspection of the data. The *t* test analyses assisted in answering the hypothesis and research questions.

Data cleaning is necessary to detect and remove inaccuracies in the data (Creswell, 2012). My study included a data cleaning process after archival data were collected, which included examining data from the previous 3 school years. The data collected from MAP was inspected manually for completeness. Then SPSS was used to check for data completeness that was within acceptable ranges, specifically looking for inclusion and exclusion criteria further detailed in the section on sampling procedures. Any identified irregularities were removed to ensure the accuracy and precision of the recorded data.

Research Questions and Hypotheses:

RQ1: Does participating in RTI have a significant influence on third-grade students' overall reading outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0$1: Participating in RTI has no statistically significant influence on third-grade students' overall reading outcomes.

H_a1: Participating in RTI has statistically significant influences on third-grade students' overall reading outcomes.

RQ2: Does participating in RTI have a significant influence on third-grade students' foundational skills outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0 2$: Participating in RTI has no statistically significant influence on third-grade students' foundational skills outcomes.

$H_a 2$: Participating in RTI has statistically significant influences on third-grade students' foundational skills outcomes.

RQ3: Does participating in RTI have a significant influence on third-grade students' language and writing outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0 3$: Participating in RTI has no statistically significant influence on third-grade students' language and writing outcomes.

$H_a 3$: Participating in RTI has statistically significant influences on third-grade students' language and writing outcomes.

RQ4: Does participating in RTI have a significant influence on third-grade students' vocabulary use and functions outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0 4$: Participating in RTI has no statistically significant influence on third-grade students' vocabulary use and functions outcomes.

H_a4: Participating in RTI has statistically significant influences on third-grade students' vocabulary use and functions outcomes.

RQ5: Does participating in RTI have a significant influence on third-grade students' literature and informational text outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

H_05: Participating in RTI has no statistically significant influence on third-grade students' literature and informational text outcomes.

H_a5: Participating in RTI has statistically significant influences on third-grade students' literature and informational text outcomes.

Data were reviewed with the cleaning process described above for finalization before entering into SPSS for data analysis. MAP scores from the fall assessment were used for the pretest and MAP scores from the spring assessment were used for the posttest and input as numerical data. Initial analysis included descriptive statistics to show mean and standard deviations of the spring and fall study groups. The data collected from the previous 3 years was analyzed to establish whether there were statistically significant differences in reading outcomes from the beginning to the end of the school year.

My study's purpose and research questions were evaluated with paired *t* tests. Paired *t* tests are used when the same subjects are measured at two different points such as before and after an intervention (Liu & Maxwell, 2019). A paired *t* test was conducted to determine if there is a statistically significant difference in reading outcomes from the beginning to the end of the school year for third-grade students' in RTI. Paired *t* tests

were conducted similarly for each of the reading areas. The paired *t* tests' input values of alpha of 0.05, power of 0.8, and Cohen *d*'s effect sizes (small 0.2, moderate 0.5, and large 0.8) were selected.

My data were evaluated on the required assumptions before conducting the paired *t* tests to support use (Statistics, 2019). The assumptions are as follows:

Assumption 1: The dependent variable's scale of measurement must be a continuous scale at the interval or ratio level.

Assumption 2: Two groups are categorized by one nominal variable.

Assumption 3: Relevant observations are made of matched groups.

Assumption 4: Observations are independently made.

Assumption 5: The data plots to a normal distribution.

Assumption 6: There is a homogenous variance as established by the standard deviation between the study groups.

The first four assumptions were met by understanding the type of data, while the fifth and sixth assumptions required formalized assessments. The interval data for MAP reading scores met Assumption 1 because it is continuous data with possible percentile values from 0 to 100. Assumption 2 was met because student data is divided into two distinct groups, fall and spring, and does not allow for overlap. The groups for fall and spring were matched for before and after duration of RTI which supports Assumption 3. Independent observations for Assumption 4 were met because student data were recorded at the study school for individual students following standardized protocols. A Shapiro-Wilk test was used to evaluate whether or not each group is from a normally distributed

population for Assumption 5. Levene's test was used to evaluate the equality of variance between the study's pretest and posttest groups to assess Assumption 6. Levene's test is often used to evaluate whether or not groups have equivocal population variability, a prerequisite for a dependent *t* test (Mara & Cribbie, 2018). SPSS was used to formulate the Levene's test to determine that the groups have significant variance similarity with a 95% confidence interval and p-value <0.05. The Wilcoxon test was used in place of the paired *t* test since the groups had heterogeneous variability (Mara & Cribbie, 2018). The analyses required for Assumptions 5 and 6 were performed using SPSS.

Threats to Validity

Triola (2012) described the validity of the data as the effectiveness in which the data measures the intended purpose. Validity is important for potential users of the data, as a lack of validity may lead to unsound recommendations for practice whether direct or implied. The presence of hidden variables, for example, may lead researchers and their readers to false conclusions (Creswell, 2012). Validity can best be analyzed by focusing on its components including external, internal, and construct validity. Creswell (2012) described internal validity as how confidently conclusions can be drawn from the causality of the relationship from the independent variable to the dependent variable. My study required internal validity to investigate the impact RTI instruction has on MAP scores. External validity is the degree to which the findings of a study can be applied beyond the study population (Creswell, 2012). Construct validity refers to the soundness of interpretations of the variables measured in the study (Creswell, 2012). These forms of validity were extremely important in making accurate conclusions regarding my study

and must be considered when conducting research. Creswell (2012) stated a test must measure what it proposes to measure in order to be valid. The threats to validity are described below.

Internal Validity

Internal validity is needed to infer a causal relationship between an independent and dependent variable and is determined by the study's design (Creswell, 2012). Creswell (2012) separated internal validity into three broad categories: threats related to participants, threats related to treatments, and threats related to procedures. These elements are relevant to ensuring an uncompromised study (Creswell, 2012). Threats related to participants are further subdivided into history, maturation, regression, selection, mortality, and interactions with selection.

The first threat is history and can occur because there may be additional unaccounted variables during the period of time between the pretest and posttest (Creswell, 2012). History was certainly a factor in my study for the experimental group but represents reading intervention in its natural environment. Another threat to internal validity includes maturation, which can happen as individuals develop over the time of the study with potential impacts on differences between pretest and posttest outcomes. The third graders at the study school developed in many ways from the pretest to the posttest, but this is also a natural aspect of education. Regression is another threat that can occur when extreme participant scores are selected which may have a disproportionate tendency to change (Creswell, 2012). The study group data were

selected for low scores, as is common practice in the classroom environment and does not harm the interpretation of my results.

Creswell (2012) explained mortality as being a threat to internal validity when participants do not complete the experiment in its entirety. Student data missing either the pretest or posttest or with incomplete RTI data were not included in the study to address this threat. Interactions with selection may occur when unforeseen variability in participant selection may be predicted due to nonrandomization in group selection (Creswell, 2012). The study data were from a typical American, public-school classroom in a single sample. Conclusions and inferences from the study must be cautiously applied to other subsets of the population to maintain validity.

Threats related to treatments, another category of internal validity, include diffusion of treatment, compensatory equalization, compensatory rivalry, and resentful demoralization (Creswell, 2012). Diffusion of treatment may happen when either the control group or experimental group is affected by the other. This is prevented in experimental design studies by maintaining separation between the groups (Creswell, 2012). This particular threat was beyond my control due to the use of archival data without a control group but represents the natural classroom environment. Compensatory equalization can occur if only the experimental group receives explicit instruction (Creswell, 2012). This was not a threat because all students at the study school receive instruction and those who had not received RTI were not included in the study. The compensatory rivalry may occur when rivalries develop between the control and experimental groups due to awareness of inequality (Creswell, 2012). Participants in a

control group may similarly develop resentful demoralization if they believe the experimental group is being treated better (Creswell, 2012). The use of archival data without a control group prevented addressing these threats but can be present in typical elementary education.

Study concerns for threats related to procedures, the final major category for internal validity, can be addressed through two broad categories of testing and instrumentation (Creswell, 2012). Creswell (2012) explained testing threats occur when participants remember answers on assessments or become familiar with measurable outcomes. This threat was limited in my study as students were given MAP assessments with different questions pools at limited times during the school year. Threats to instrumentation may occur if there is a change in testing procedures or the instrument itself between the pretest and posttest (Creswell, 212). The archival data in my study was collected over 3 years with the school using the same standardized assessments including controlled implementation procedures.

External Validity

Considering the threats to external validity in my study was needed to assess the ability to generalize the data to other students, schools, or interventions (Creswell, 2012). Creswell (2012) delineated external validity into three main threats: interaction of selection and treatment, the interaction of setting and treatment, and interaction of history and treatment. Interaction of selection and treatment is a threat to external validity that may occur when generalizations cannot be made beyond participants in the study group (Creswell, 2012). The study school population included moderate variability in ethnicity,

mostly middle class, mixed gender, with third-grade students nonrandomized to RTI based on standardized scores. My study is generalizable to classrooms with these typical demographics, but caution must be used for more specific sub-populations.

Creswell (2012) explained the interaction of setting and treatment is a threat to external validity when generalizations cannot be made from the study setting to other settings. The setting of my study was limited to one rural public school. The study school is generalizable to public elementary schools with multiple grade-level classrooms. Common characteristics included providing education aligned to the Common Core State Standards and providing extracurricular activities, music, and physical education. There are differences between the study school and private schools, for example, reducing generalizability to this and other settings. Interaction of history and treatment, another threat to external validity, may occur when researchers try to make generalizations from their study to past and future situations (Creswell, 2012). The archival data used for my study included MAP scores from specific timeframes. Students participated in MAP testing in the fall and spring of each school year and were administered over the 3 years prior to data collection. This is generalizable to classrooms that use this common approach to the timing of assessment and placement.

Construct Validity

Construct validity is necessary to confirm the appropriateness of the inferences made by the author of a study (Creswell, 2012). Construct validity depends on appropriate rationale applied to the use of tests and interpretation of data (Messick, 1995). MAP testing has been validated on multiple measures (reading, language,

mathematics, and science) including subcategories for reading (NWEA, 2011). MAP scores are strongly associated with student reading performance and ability (NWEA, 2011). My study benefited from the use of MAP testing to investigate changes in reading outcomes with RTI. Readers of my study, potentially including administrators and teachers, will be able to understand the effect of RTI on reading outcomes. This provides the opportunity to support the current practice or potential changes for the RTI process. Convenience sampling is an ideal framework to select student data in my study because it mirrors the selection process in actual practice. Students' MAP outcomes were selected for RTI by classroom teachers, tutors, and administration in common education settings. I utilized the same framework when selecting student data for my study. The quasi-experimental approach for utilizing archival data was ideal. This prevented hypothesis guessing where students change behaviors because they know they are being studied (Messick, 1995), as students have already taken the MAP assessments and participated in RTI at the time of data collection. This also prevents potential changes or adjustments in researcher behaviors during intervention implementation which would also skew results.

Ethical Procedures

My study was completed focusing on the ethical requirements of Walden University's IRB as well as the requirements of the study school and school district. I had a face-to-face meeting with the principal of the study school to discuss my study. Permission to access archival data for MAP scores and the RTI status of third-grade students from the previous 3 school years was discussed. I was provided a letter granting schoolwide access (Appendix B) by the school district. Walden University's IRB granted

approval of my proposal and then I was allowed to move onto data collection. The school in the study received a copy of the approval from the IRB. The principal and school district will be offered a summary of my results at the conclusion of my study.

The ethical procedures in my study were discussed including clarification that my study meets ethical standards for community-based data collection. Maintaining the privacy of student data is essential when conducting research. The two major categories of data that were collected in my study as part of the sampling procedures included RTI status and MAP scores. Data for my study were collected over a couple of days and reflected study school data from the previous 3 years. This archival data were organized, categorized, and coded on a password-protected Excel spreadsheet and computer. I alpha-numerically coded all students' names with their RTI statuses and MAP scores deidentified to maintain confidentiality of student data. Reading RTI status data were coded categorically as RTI or classroom. Infinite Campus provides student placement data and was correlated with their corresponding MAP scores. Data collected for MAP testing included numerical and categorical data. Students' RIT scores were coded numerically and labeled categorically with the fall or spring of their respective years. The principal had an opportunity to review the data to check that it is deidentified and in accordance with school district standards. Data is stored in password-protected documents on a USB flash drive in a locked file cabinet at my house upon completion of data processing. I am the only person who knows the passwords and has access to the locked file cabinet. All data will be permanently erased from the USB drive 5 years after my study is completed.

It is important to remain unbiased when collecting and analyzing data. I was employed by the study school district and taught at the study school during the study. My role did not include working directly with the study population. My position had no influence on the students, administration, teachers, or scores as they relate to my study. I was not in a supervisory position at the study school. Archival data collected included information before my employment with the study school and study school district. Proper student data management was employed to ensure confidentiality and protect harm to students, school district employees (principal, administrators, etc.), and the school district with the interpretation of findings for academic purposes only.

Summary

Chapter 3 outlined the methodology of my study to explain and support the study design concerning the stated purpose. The quantitative, ex-post facto quasi-experimental study design was ideal to investigate the effectiveness of third-grade RTI in improving MAP reading outcomes. My study used archival data from pretest and posttest scores from MAP and the RTI status of third-grade students from a local, public elementary school. The use of archival data produced in the natural RTI and classroom environment paralleled actual practice and supported the research design. The database of information from the study included third-grade students from five classrooms over the 3 school years before the time of data collection. Students with incomplete data were not included in the study to improve validity. The setting of my study was at a public, rural elementary school with third graders that can be generalized to third graders at similar school sites. Evidence from my study may help professionals in the field of education understand the

effect of RTI on reading outcomes. Wanzek et al. (2018) supported the need for more evidence supporting RTI for reading in third graders. The study may provide an opportunity for adjustments to the RTI process for educators or support current practice. Generalizability to other third-grade classrooms must be considered with caution if demographics differing from the public education of middle-class students, representative of the study school. Chapter 4 includes the findings and analysis from the study data. Chapter 5 includes discussion and interpretation of the findings, limitations, implications, and recommendations.

Chapter 4: Reflections and Conclusions

The purpose of this quantitative, one-group pretest-posttest study was to investigate if participating in RTI is successful for third-grade students in improving reading outcomes from the beginning to the end of the school year. Five research questions guided data collection and analysis.

RQ1: Does participating in RTI have a significant influence on third-grade students' overall reading outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0$1: Participating in RTI has no statistically significant influence on third-grade students' overall reading outcomes.

H_a1: Participating in RTI has statistically significant influences on third-grade students' overall reading outcomes.

RQ2: Does participating in RTI have a significant influence on third-grade students' foundational skills outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0$2: Participating in RTI has no statistically significant influence on third-grade students' foundational skills outcomes.

H_a2: Participating in RTI has statistically significant influences on third-grade students' foundational skills outcomes.

RQ3: Does participating in RTI have a significant influence on third-grade students' language and writing outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0$3: Participating in RTI has no statistically significant influence on third-grade students' language and writing outcomes.

H_a3: Participating in RTI has statistically significant influences on third-grade students' language and writing outcomes.

RQ4: Does participating in RTI have a significant influence on third-grade students' vocabulary use and functions outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0$4: Participating in RTI has no statistically significant influence on third-grade students' vocabulary use and functions outcomes.

H_a4: Participating in RTI has statistically significant influences on third-grade students' vocabulary use and functions outcomes.

RQ5: Does participating in RTI have a significant influence on third-grade students' literature and informational text outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0$5: Participating in RTI has no statistically significant influence on third-grade students' literature and informational text outcomes.

H_a5: Participating in RTI has statistically significant influences on third-grade students' literature and informational text outcomes.

The major sections of this chapter include a detailed description of the data collection, results, and summary. Data collection will include the time frame, discrepancies in data collection from Chapter 3, and demographics. The results section will report descriptive statistics and statistical findings organized by research questions

and hypotheses. Results will be illustrated through tables as appropriate. This chapter will conclude with a summary of the research questions and a transition to Chapter 5.

Data Collection

The data collection process began after approval from Walden University's IRB was received on June 25, 2020 (06-24-20-0191556). The school district granted schoolwide access to archival data on April 6, 2020. Archival data were collected from one school in the district and included data from 93 struggling readers in third grade. The time frame for data collection was 4 days. Exclusion criteria resulted in data from 91 students being included in the final analysis.

The need for modifications to data collection and analysis was evident after the initiation of data collection. Chapter 3 included reading areas students are assessed in MAP. Further review revealed MAP's basic reading areas are reported with unique categorization including changes every few years (NWEA, 2011, 2019a). Reporting of the foundational reading areas on MAP is updated for the purpose of pursuing practical applications to the classroom (NWEA, 2011). The reading areas in my study for the 2017-2018 and 2018-2019 school years included five different categories: vocabulary-acquisition and use; literary text- key ideas and details; literary text- language, craft, and structure; informational text- key ideas and details; and information text- language, craft, and structure. The reading areas for the 2016-2017 school year included three categories: vocabulary- acquisition and use; literature, and informational text. An additional year of data was collected for the 2015-2016 school year for analysis, as the 2016-2017 school year had matching categories. Chapter 3 also included a discussion of my intent to

collect available demographical data. Available demographical data included gender and ethnic identification. Data on ethnic identification was only available for the 2018-2019 school year. Data on gender identification was available for all years.

The study sample was collected from archival data from 93 third graders from 2015-2019 at one public elementary school in the Western United States. Student data needed to include a pretest and posttest score as well as participation in RTI to be included in this study. This resulted in archival data from a total of 91 students included in statistical analysis. Archival data were collected for overall reading scores and seven unique reading areas. Student data for 31.9% females (n= 31) and 68.1% males (n= 60) were analyzed. Data from males outnumbered data from females for every year collected. Predominately White (62.09%) and Hispanic (17.24%) student data were collected for the 2018-2019 school year. Ethnic and gender demographics for the data collected are outlined in Table 1, although ethnicity was only available for the 2018-2019 school year.

Determining external validity in my study required comparing the study sample to the population of interest. External validity is required for a study's results to be applied to other populations (Creswell, 2012). The population of interest for my study were third grade struggling readers in public schools in the United States. Struggling readers are students who score below a threshold value on universal screenings such as standardized exams (Cakiroglu, 2015). My study included data from struggling readers identified by scoring below the 30th percentile on overall MAP reading outcomes. This sampling procedure for student data was nonprobabilistic sampling. Nonprobabilistic sampling is

the collection of data based on convenience and availability (Creswell, 2012). Although the nonprobabilistic sampling approach is nonrandom, it can still represent the population of interest (Creswell, 2012). My study data were a convenience sample of struggling readers in one public elementary school in the Western United States. Convenience sampling is a subtype of nonprobabilistic sampling where the sample is available to be studied (Creswell, 2012). The student data in my study was collected by the study school prior to the data collection phase of my study. Descriptive data can help to support the application of data from convenience sampling to the larger population of interest (Creswell, 2012). G*Power analysis was also applied to ensure the study sample size was large enough to detect a medium effect size. Cohen's *d* effect size of at least 0.5, the minimum needed to qualify as a medium effect size, was considered valid to RTI intervention data in other studies (see Messer & Nash, 2018; Miciak et al., 2019).

Whether or not study data is representative of the larger study population of interest can be determined by comparing population characteristics such as demographics (Creswell, 2012). The available data for ethnicity for my study sample shared general trends with local and national data, as well as with prior studies of struggling readers in third grade. The three most common ethnicities in my study included White (62.09%), Hispanic (17.24%), and Black (6.89%). This was similar to study school demographics for all third graders regardless of reading outcomes with ethnicity percentages of 62.5% White, 18.33% Hispanic, and 3.33% Black. Scammacca et al. (2020) reported 852 third grade struggling readers from rural and urban settings with similar demographics: White (54.5%), and Hispanic (38.6%), Black (2.5%), Asian (1.2%), American-Indian/ Alaskan

Native (0.3%), Native Hawaiian/Pacific Islander (0.1%), and two or more races (2.7%). The U.S. Department of Education (2020) reported nationwide numbers for children in prekindergarten to eighth grade with most White (46.6%) followed by Hispanic (27.4%) and Black (15.2%). My study was skewed toward ethnic identification of White compared to Black. The U.S. Department of Education (2020) notes a trend toward fewer White children and more Hispanic and Black children in elementary classrooms over the past 2 decades.

The study data revealed more struggling readers in third grade who identify as male (68.13%) than females (31.87%). This pattern occurred for every year. There were proportionately more third-grade males identified as struggling readers (68.13%) than males in the entire third-grade classroom (54.16%). The U.S. Department of Education (2020) reported males to outnumber females in preschool to eighth-grade classrooms, 51.3% compared to 48.7%, but not to the same degree noted in the study. Relatively more third-grade males requiring intervention than females were observed in previous studies (Scammacca et al., 2020; Sutter et al., 2019). Sutter et al. (2019) found significantly more males than females in their study of 5,042 third-grade students below the 20th percentile in reading. This difference was much less significant at the end of the year as males improved in reading outcomes at a greater rate (Sutter et al., 2019), a finding repeated by Scammacca et al.'s (2020) study. Gender demographics are available in Table 2 and Table 3 for the study population, study school third graders, Scammacca et al.'s (2020) study, and the U.S. Department of Education's (2020) national statistics. The overall similarity of demographical student data compared to the population of interest

support's my study's external validity. The demographical data including ethnic and gender statistics can be seen in Table 2 and 3.

Table 2

Third-Grade Demographics by Year and Percent

	White	Hispanic	Asian	Black	Two or More Races	American India/Alaskan Native	Pacific Islander	Male	Female
2015-2016	-	-	-	-	-	-	-	73.68	26.32
2016-2017	-	-	-	-	-	-	-	57.14	42.86
2017-2018	-	-	-	-	-	-	-	65.21	34.79
2018-2019	62.09	17.24	0.00	6.89	13.7	0.00	0.00	65.51	34.44
Overall	-	-	-	-	-	-	-	68.13	31.87

Note. Hyphens represents that data were not available.

Table 3

Third-Grade Student Demographics by Percent

	White	Hispanic	Asian	Black	Two or More Races	American India/Alaskan Native	Pacific Islander	Male	Female
Study[a]	62.09	17.24	0.00	6.89	13.7	0.00	0.00	68.13	31.87
Study School[b]	62.5	18.33	2.5	3.33	13.33	0.00	0.00	54.16	45.84
Scammacca[c]	54.5	38.6	1.2	2.5	2.7	0.3	0.1	50.5	49.5
US DOE[d]	46.6	27.4	5.3	15.1	4.2	1.0	0.4	51.3	48.7

Note. US DOE = United States Department of Education.

[a]Study data from third-grade students below the 30th percentile on overall MAP reading scores for the 2018-2019 school year. [b]School data from all third-grade students during the 2018-2019 school year. [c]Scammacca et al.'s (2020) study from third-grade students (n = 852) during the 2015-2017 period. [d]Third-grade student enrollment for 2019 school year (U.S. Department of Education, 2020).

Results

Descriptive statistics provide researchers with overall trends from the data to answer their research questions (Creswell, 2012). Descriptive statistics were calculated for the beginning and end of the year in eight different reading outcomes during 2015-2019. The descriptive statistics provided in my study include the minimum, maximum, mean, standard error, and standard deviation from MAP scores. Summaries for the reading outcomes for 2015-2019 are available in Table 4, 2017-2019 summaries are available in Table 5, and 2015-2017 summaries are available in Table 6.

Overall reading outcomes and vocabulary- acquisition and use outcomes statistics were available for the 2015-2019 school years. The fall mean scores for 2015-2019 for overall reading outcomes (167.7) and vocabulary- acquisition and use outcomes (167.7) were lower than spring mean scores for overall reading outcomes (184.7) and vocabulary- acquisition and use outcomes (185.9). This is a difference of 17 for overall reading outcomes and 18.2 for vocabulary- acquisition and use outcomes. Data from 91 students were used for the 2015-2019 period. The standard error of the mean and standard deviation statistics for 2015-2019 are available in Table 4.

Table 4

2015-2019 Descriptive Statistics for Beginning and End of School Year MAP Scores

	Reading Outcome	*n*=	Minimum	Maximum	Mean	Std. Error Mean	Std. Deviation
Fall	Overall	91	149	182	167.7253	.88676	8.45914
Spring	Overall	91	147	212	184.7473	1.49158	14.22876
Fall	Vocabulary Use and Function	91	138	190	167.7143	1.24264	11.85401
Spring	Vocabulary Use and Function	91	148	216	185.8681	1.51317	14.43469

Note. Fall = Beginning of Year. Spring = End of Year.

Literary text- key ideas and details outcomes, literary text- language, craft, and structure outcomes, informational text- key ideas and details outcomes, and informational text- language, craft, and structure outcomes statistics were available for the 2017-2019 school years. The fall mean scores for 2017-2019 for literary text- key ideas and details outcomes (167.9), literary text- language, craft, and structure outcomes (167.4), informational text- key ideas and details outcomes (167), and informational text- language, craft, and structure outcomes (167.3) were lower than spring mean scores for literary text- key ideas and details outcomes (184.2), literary text- language, craft, and structure outcomes (181.3), informational text- key ideas and details outcomes (182.5), and informational text- language, craft, and structure outcomes (185.8). This is a difference of 16.3 for literary text- key ideas and details outcomes, 13.9 for literary text- language, craft, and structure outcomes, 15.5 for informational text- key ideas and details outcomes, and 18.5 for informational text- language, craft, and structure outcomes. Data

from 51 students were used for the 2017-2019 period. The standard error of the mean and standard deviation statistics for 2017-2019 are available in Table 5.

Table 5

2017-2019 Descriptive Statistics for Beginning and End of School Year MAP Scores

	Reading Outcome	*n*=	Minimum	Maximum	Mean	Std. Error Mean	Std. Deviation
Fall	LT: Key Ideas and Details	51	138	199	167.9020	1.91613	13.68394
Spring	LT: Key Ideas and Details	51	130	211	184.2157	2.13308	15.23327
Fall	LT: Language, Craft, and Structure	51	141	185	167.4314	1.51003	10.78379
Spring	LT: Language, Craft, and Structure	51	135	224	181.3333	2.61439	18.67048
Fall	IT: Key Ideas and Details	51	145	187	167.0392	1.41614	10.11328
Spring	IT: Key Ideas and Details	51	150	217	182.5490	2.39121	17.07667
Fall	IT: Language, Craft, and Structure	51	135	193	167.2941	1.69712	12.11989
Spring	IT: Language, Craft, and Structure	51	144	218	185.7647	2.25642	16.11408

Note. Fall = Beginning of Year. Spring = End of Year. LT = Literary Text. IT = Informational Text.

Literature outcomes and informational text outcomes statistics were available for the 2015-2017 school years. The fall mean scores for 2015-2017 for literature outcomes (166.9) and informational text outcomes (167.6) were lower than spring mean scores for literature outcomes (184.1) and informational text outcomes (186.1). This is a difference of 17.2 for literature outcomes and 18.5 for informational text outcomes. Data from 40 students were used for the 2015-2017 period. The standard error of the mean and standard deviation statistics for 2015-2017 are available in Table 6.

Table 6

2015-2017 Descriptive Statistics for Beginning and End of School Year MAP Scores

	Reading Outcome	*n*=	Minimum	Maximum	Mean	Std. Error Mean	Std. Deviation
Fall	Literature	40	149	183	166.8750	1.40520	8.88729
Spring	Literature	40	149	209	184.1250	2.21567	14.01316
Fall	Informational Text	40	151	192	167.6250	1.47226	9.31139
Spring	Informational Text	40	152	213	186.0750	2.56390	16.21552

Note. Fall = Beginning of Year. Spring = End of Year.

I originally intended to analyze the data with a paired *t* test and the first four assumptions were met as described in my proposal. Assumption 5 was evaluated through a Shapiro-Wilk test (Table 7) after data collection. This assumption failed due to lack of normality in the fall overall reading outcomes group, and I was not able to conduct a paired *t* tests to answer my research questions. A Wilcoxon signed-rank test is used as an alternative to a paired *t* test when groups prove heterogenous (Mara & Cribbie, 2018). The Wilcoxon signed-rank test is a nonparametric test that does not require the need for the assumptions of normality (Statistics, 2019). The test is still able to compare sets of

mean scores from the same participants and is analogous to the parametric paired *t* test (Statistics, 2019; Triola, 2012). The assumptions for a Wilcoxon signed-rank test were considered.

Assumption 1: The dependent variable's scale of measurement must be a continuous scale at the interval or ratio level.

Assumption 2: Two groups are categorized by one nominal variable.

The interval data for MAP reading scores met Assumption 1 because it is continuous data with possible RIT values from 151 to 234 (NWEA, 2011). Assumption 2 was met because student data is divided into two distinct groups, fall and spring, and does not allow for overlap.

Table 7

2015-2019 Shapiro-Wilk for Normality

	Reading Outcome	Statistic	*df*	Sig
Fall	Overall	.948	91	.001
Spring	Overall	.983	91	.281

Note. Fall = Beginning of Year. Spring = End of Year.

The Wilcoxon signed-rank test's *z*-scores, confidence intervals, and effect size statistics were used to evaluate significant difference of fall and spring mean scores. The Wilcoxon statistic (*z*-score) includes a minimum critical value of 1.96 to have 95% confidence ($\alpha > 0.05$) of significant difference between matched groups (Triola, 2012). Data for 95% confidence intervals from the Wilcoxon signed-rank tests were also included where a minimum difference of zero is required to reject the null hypothesis. Cohen's *d* effect sizes (Table 8) have practical implications for reading outcomes (Messer

& Nash, 2018; Miciak et al., 2019) and were used to evaluate the Wilcoxon signed-rank test effect size statistic. The effect size is a strength of relationship for statistical test results (Creswell, 2012).

Table 8

Cohen's d *Effect Sizes*

Small	Medium	Large
0.2-0.5	0.5-0.8	>0.8

RQ1: Does participating in RTI have a significant influence on third-grade students' overall reading outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0$1: Participating in RTI has no statistically significant influence on third-grade students' overall reading outcomes.

H_a1: Participating in RTI has statistically significant influences on third-grade students' overall reading outcomes.

A Wilcoxon signed-rank test (Table 9) was used to evaluate for a significant difference in fall and spring mean scores for overall reading outcomes. A significant difference was found with a *z*-score of 8.022. The estimated difference was 16.5 with a minimum difference of 14.5 and a maximum difference of 19.0. The 95% confidence interval did not include zero and the alternative hypothesis was accepted. The significant influence of scores from fall to spring for overall reading outcomes was found to be of a medium effect size (0.595) according to Cohen's *d* effect sizes.

RQ2: Does participating in RTI have a significant influence on third-grade students' vocabulary- acquisition and use outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0$2: Participating in RTI has no statistically significant influence on third-grade students' vocabulary- acquisition and use outcomes.

H_a2: Participating in RTI has statistically significant influences on third-grade students' vocabulary- acquisition and use outcomes.

A Wilcoxon signed-rank test (Table 9 and 10) was used to evaluate for a significant difference in fall and spring mean scores for vocabulary- acquisition and use. A significant difference was found with a *z*-score of 8.084. The estimated difference was 17.5 with a minimum difference of 14.5 and a maximum difference of 20.5. The 95% confidence interval did not include zero and the alternative hypothesis was accepted. The significant influence of scores from fall to spring for vocabulary- acquisition and use was found to be of a medium effect size (0.599) according to Cohen's *d* effect sizes.

Table 9

2015-2019 Wilcoxon Signed-rank Test Results for Beginning and End of School Year MAP Scores

Reading Outcome	*Z*	Asymptotic Sig.	Positive Differences	Negative Differences	Number of Ties	Effect Size
Overall	8.022	.000	85	6	0	0.595
Vocabulary Acquisition and Use	8.084	.000	85	4	2	0.599

Note. Z = Standard Test Statistic. Asymptotic Sig. for 2-sided test.

Table 10

2015-2019 Wilcoxon Signed-rank Test Confidence Interval

Reading Outcome	*n*=	Estimated Difference	95% Confidence Lower	Upper
Overall	91	16.500	14.500	19.000
Vocabulary Acquisition and Use	91	17.500	14.500	20.500

Note. Confidence calculated for Hodges-Lehmann Confidence Interval.

RQ3: Does participating in RTI have a significant influence on third-grade students' literary text- key ideas and details outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0$3: Participating in RTI has no statistically significant influence on third-grade students' literary text- key ideas and details outcomes.

H_a3: Participating in RTI has statistically significant influences on third-grade students' literary text- key ideas and details outcomes.

A Wilcoxon signed-rank test (Table 10 and 11) was used to evaluate for a significant difference in fall and spring mean scores for literary text- key ideas and details outcomes. A significant difference was found with a *z*-score of 5.143. The estimated difference was 17.0 with a minimum difference of 12.5 and a maximum difference of 21.5. The 95% confidence interval did not include zero and the alternative hypothesis was accepted. The significant influence of scores from fall to spring for literary text- key ideas and details outcomes was found to be of a medium effect size (0.509) according to Cohen's *d* effect sizes.

RQ4: Does participating in RTI have a significant influence on third-grade students' literary text- language, craft, and structure outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0$4: Participating in RTI has no statistically significant influence on third-grade students' literary text- language, craft, and structure outcomes.

H_a4: Participating in RTI has statistically significant influences on third-grade students' literary text- language, craft, and structure outcomes.

A Wilcoxon signed-rank test (Table 11 and 12) was used to evaluate for a significant difference in fall and spring mean scores for literary text- language, craft, and structure outcomes. A significant difference was found with a *z*-score of 4.505. The estimated difference was 14.0 with a minimum difference of 9.0 and a maximum difference of 19.0. The 95% confidence interval did not include zero and the alternative hypothesis was accepted. The significant influence of scores from fall to spring for literary text- language, craft, and structure outcomes was found to be of a small effect size (0.446) according to Cohen's *d* effect sizes.

RQ5: Does participating in RTI have a significant influence on third-grade students' informational text- key ideas and details outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0$5: Participating in RTI has no statistically significant influence on third-grade students' informational text- key ideas and details outcomes.

H_a5: Participating in RTI has statistically significant influences on third-grade students' informational text- key ideas and details outcomes.

A Wilcoxon signed-rank test (Table 11 and 12) was used to evaluate for a significant difference in fall and spring mean scores for informational text- key ideas and details outcomes. A significant difference was found with a *z*-score of 5.138. The estimated difference was 15.0 with a minimum difference of 10.5 and a maximum difference of 20.0. The 95% confidence interval did not include zero and the alternative hypothesis was accepted. The significant influence of scores from fall to spring for informational text- key ideas and details outcomes was found to be of a medium effect size (0.509) according to Cohen's *d* effect sizes.

RQ6: Does participating in RTI have a significant influence on third-grade students' informational text- language, craft, and structure outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0$6: Participating in RTI has no statistically significant influence on third-grade students' informational text- language, craft, and structure outcomes.

H_a6: Participating in RTI has statistically significant influences on third-grade students' informational text- language, craft, and structure outcomes.

A Wilcoxon signed-rank test (Table 11 and 12) was used to evaluate for a significant difference in fall and spring mean scores for informational text- language, craft, and structure outcomes. A significant difference was found with a *z*-score of 5.428. The estimated difference was 19.0 with a minimum difference of 14.5 and a maximum difference of 23.5. The 95% confidence interval did not include zero and the alternative hypothesis was accepted. The significant influence of scores from fall to spring for

informational text- language, craft, and structure outcomes was found to be of a medium effect size (0.537) according to Cohen's *d* effect sizes.

Table 11

2017-2019 Wilcoxon Signed-rank Test Results for Beginning and End of School Year MAP Scores

Reading Outcome	*Z*	Asymptotic Sig.	Positive Differences	Negative Differences	Number of Ties	Effect Size
LT: Key Ideas and Details	5.143	.000	45	6	0	0.509
LT: Language, Craft, and Structure	4.505	.000	41	10	0	0.446
IT: Key Ideas and Details	5.138	.000	43	8	0	0.509
IT: Language, Craft, and Structure	5.428	.000	45	6	0	0.537

Note. LT = Literary Text. IT = Informational Text. Z = Standard Test Statistic. Asymptotic Sig. for 2-sided test.

Table 12

2017-2019 Wilcoxon Signed-rank Test Confidence Interval

Reading Outcome	*n*=	Estimated Difference	95% Confidence Lower	Upper
LT: Key Ideas and Details	51	17.000	12.500	21.500
LT: Language, Craft, and Structure	51	14.000	9.000	19.000
IT: Key Ideas and Details	51	15.000	10.500	20.000
IT: Language, Craft, and Structure	51	19.00	14.500	23.500

Note. LT = Literary Text. IT = Informational Text. Confidence calculated for Hodges-Lehmann Confidence Interval.

RQ7: Does participating in RTI have a significant influence on third-grade students' literature outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0$7: Participating in RTI has no statistically significant influence on third-grade students' literature outcomes.

H_a7: Participating in RTI has statistically significant influences on third-grade students' literature outcomes.

A Wilcoxon signed-rank test (Table 12 and 13) was used to evaluate for a significant difference in fall and spring mean scores for literature outcomes. A significant difference was found with a *z*-score of 5.099. The estimated difference was 16.5 with a minimum difference of 12.0 and a maximum difference of 21.0. The 95%

confidence interval did not include zero and the alternative hypothesis was accepted. The significant influence of scores from fall to spring for literature outcomes was found to be of a medium effect size (0.570) according to Cohen's *d* effect sizes.

RQ8: Does participating in RTI have a significant influence on third-grade students' informational text outcomes as measured by standardized assessments from the beginning compared to the end of the school year?

$H_0$8: Participating in RTI has no statistically significant influence on third-grade students' informational text outcomes.

H_a8: Participating in RTI has statistically significant influences on third-grade students' informational text outcomes.

A Wilcoxon signed-rank test (Table 13 and 14) was used to evaluate for a significant difference in fall and spring mean scores for informational text outcomes. A significant difference was found with a *z*-score of 5.324. The estimated difference was 18.0 with a minimum difference of 14.0 and a maximum difference of 22.0. The 95% confidence interval did not include zero and the alternative hypothesis was accepted. The significant influence of scores from fall to spring for informational text outcomes was found to be of a medium effect size (0.595) according to Cohen's *d* effect sizes. Application of post-hoc analyses were not applied to my study.

Table 13

2015-2017 Wilcoxon Signed-rank Test Results for Beginning and End of School Year MAP Scores

Reading Outcome	*Z*	Asymptotic Sig.	Positive Differences	Negative Differences	Number of Ties	Effect Size
Literature	5.099	.000	35	3	2	0.570
Informational Text	5.324	.000	36	4	0	0.595

Note. Z = Standard Test Statistic. Asymptotic Sig. for 2-sided test.

Table 14

2015-2017 Wilcoxon Signed-rank Test Confidence Interval

Reading Outcome	*n*=	Estimated Difference	95% Confidence Lower	Upper
Literature	40	16.500	12.000	21.000
Informational Text	40	18.000	14.000	22.000

Note. Confidence calculated for Hodges-Lehmann Confidence Interval.

Summary

The purpose of this quantitative, one-group pretest-posttest study was to investigate if participating in RTI is successful for third-grade students in improving reading outcomes from the beginning to the end of the school year. Data were analyzed using a Wilcoxon signed-rank test to answer each of the research questions to determine if there was a statistically significant difference between the beginning of the year and the end of the year reading MAP outcomes. The results of data analysis revealed the null hypotheses were rejected for each of the research questions for both overall reading outcomes and specific reading areas. RQ1 and RQ2 had a significant difference for third-grade, struggling readers in fall and spring for the 2015-2019 school years in overall

reading outcomes (Estimated Difference= 16.5, *z*-score = 8.022) and vocabulary-acquisition and use (Estimated Difference = 17.5, *z*-score 8.084). RQ3-RQ6 had a significant difference for third-grade struggling readers in fall and spring for the 2017-2019 school years in literary text- key idea and details (Estimated Difference= 17.0, *z*-score = 5.143), literary text- language, craft, and structure (Estimated Difference= 14.0, *z*-score = 4.505), informational text- key idea and details (Estimated Difference= 15.0, *z*-score = 5.138), and informational text- language, craft, and structure (Estimated Difference= 19.0, *z*-score = 5.428). RQ7 and RQ8 had a significant difference for third-grade struggling readers in fall and spring for the 2015-2017 school years in literature outcomes (Estimated Difference= 16.5, *z*-score = 5.099) and informational text outcomes (Estimated Difference = 18.0, *z*-score = 5.324). Literary text- language, craft, and structure was the only reading outcome to have a significant difference with a small effect size (0.446) while all other reading outcomes had a medium effect size (ranging from 0.509 to 0.599). Chapter 5 will include discussion and interpretation of the findings, limitations, implications, and recommendations.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this quantitative, one-group pretest-posttest study was to investigate if participating in RTI is successful for third-grade students in improving reading outcomes from the beginning to the end of the school year. My study is further described as an ex-post facto design using archival data from MAP testing for the 2015-2019 school years. Outcomes analyzed included overall reading outcomes and seven reading areas: vocabulary- acquisition and use; literary text- key ideas and details; literary text- language, craft, and structure; informational text- key ideas and details; information text- language, craft, and structure; literature; and informational text. Targeting specific reading areas for individualization is beneficial for struggling readers with persistent reading difficulties (Lyster et al., 2016) and different reading areas are more essential at different grades (Suggate, 2016). This study was important because little focus has been given on the effectiveness of RTI in helping students reach crucial reading benchmarks in third grade (Wanzek et al., 2018).

The results from this quantitative, ex-post facto, one-group pretest-posttest study indicated RTI has a significant influence on reading outcomes for struggling readers in third grade. A Wilcoxon signed-rank test for overall reading scores for the 2015-2019 school years showed significant improvement in mean scores for struggling readers in third grade who participated in RTI. The Wilcoxon signed-rank test also showed significant improvement in mean scores for each of the reading areas, accepting the alternative hypotheses ($\alpha > 0.05$). Only one reading area (literary text- language, craft, and structure) had a small Cohen's *d* effect size (0.2-0.5) while every other reading area

had a medium Cohen's *d* effect size (0.5-0.8). The key findings from this study indicate struggling readers in third grade who participated in RTI improved in reading outcomes from the beginning to the end of the school year. The significant difference in reading outcomes suggests RTI is an effective intervention for struggling readers in third grade.

Interpretation of the Findings

The first research question in my study investigated if participating in RTI has a significant influence on third-grade students' overall reading outcomes as measured by standardized assessments from the beginning compared to the end of the school year. The results indicate RTI has a statistically significant influence on third-grade students' overall reading scores, consistent with study findings for other elementary grades. Miciak et al. (2018) found significant improvements in overall reading comprehension after 1 year of reading interventions for 484 struggling readers in fourth grade. They found significant improvement for the BAU group including RTI instruction as well as the research-guided intervention focusing on vocabulary, word study, and text reading. Wanzek et al.'s (2018) meta-analysis of 25 studies and 3,646 elementary students found significant benefit from RTI. An analysis of my study's overall reading outcome's effect size varies in comparison to Miciak et al.'s (2018) and Wanzek et al.'s (2018) studies. The overall reading outcomes for my study had a medium effect size (0.595) for struggling readers in RTI. Miciak et al. (2018) found a large effect size (0.954) for the BAU group and similarly a large effect size (0.863) for the research-guided intervention. Wanzek et al.'s (2018) study, by comparison, found a small effect (0.39) for RTI. RTI is an evidence-based approach for struggling readers in kindergarten and first grade

(Wanzek et al., 2018) with support in fourth grade (Miciak et al., 2018). The results of my study extended support for the use of RTI in overall reading outcomes to struggling readers in third grade.

My study's RQ2-RQ8 investigated if participating in RTI had a significant influence on third-grade students' reading outcome in seven different reading areas: vocabulary- acquisition and use; literary text- key ideas and details; literary text- language, craft, and structure; informational text- key ideas and details; information text- language, craft, and structure; literature; and informational text as measured by standardized assessments from the beginning compared to the end of the school year. Each reading area had a medium Cohen's *d* effect size (0.5-0.8), except for literary text- language, craft, and structure, which had a small Cohen's *d* effect size (0.2-0.5). Findings indicate RTI has a statistically significant influence on outcomes for struggling readers in third grade among all seven reading areas.

Previous researchers have shown significant variability for the relative impact of specific reading areas among grade levels (see Messer & Nash, 2018; Miciak et al., 2018; Suggate, 2016). Suggate (2016) studied 8,161 preschoolers to sixth graders who provided reading intervention and analyzed several reading area effect sizes. The effect size for comprehension (0.38) was less than the effect sizes for fluency (0.47) or phonemic awareness (0.43). Suggate (2016) clarified effect sizes for specific reading areas changed based on grade level. Children in early elementary often improve more on decoding skills (Messer & Nash, 2018) while children in later elementary improve more in comprehension (Miciak et al., 2018). Messer and Nash (2018) studied 78 struggling

readers with an average age of seven provided 10 months of intervention compared to their peers. They found an effect size of 0.585 for overall reading outcomes but had significant variability in effect sizes for components reading areas ranging from spelling of 0.13 to decoding of 0.97. Decoding was the most important reading area for these first-grade children (Messer & Nash, 2018). Miciak et al. (2018) provided reading area data for fourth graders provided BAU intervention including RTI finding a range of effect sizes: 0.063 for spelling, 0.189 for letter word identification, and 0.23 for passage comprehension. Passage comprehension had the greatest effect size of these reading areas for fourth graders (Miciak et al., 2018).

Third grade beings a transition grade level where children begin to read to comprehend rather than to decode (Suggate, 2016) is supported by the lack of variability in my study findings among the reading areas. Six of the seven readings areas had medium effect sizes, matching the overall reading outcome's effect size. The effect sizes for reading areas evaluating decoding skills may be decreasing in third grade while the effect sizes for reading areas evaluating comprehension skills may be increasing. The small effect size for literary text- language, craft, and structure as the only deviating example is an unexpected result. The Common Core State Standards Initiative (CCSSI, 2020) defines craft and structure as the ability to interpret text and find meaning. The knowledge of language is similarly defined as the ability to interpret words and phrases for effect (CCSSI, 2020). Comprehension is similarly the reading skill of interpretation (Swart et al., 2017) and is the most common theme of reading intervention in third grade (Suggate, 2016). The lack of RTI research focusing on struggling readers in third grade

(Wanzek et al., 2018) means reading areas for RTI have also not been investigated, a gap in research on practice. Targeted intervention requires understanding components of reading comprehension to be effective (Filderman et al., 2018; Lemons et al., 2014; Memisevic et al., 2019). The results of my study extend support for understanding grade level variance in reading areas as components of the overall reading outcomes.

The theoretical framework for this quantitative, one-group pretest-posttest study design was based on Vygotsky's (1978) social constructivist theory and Maslow's hierarchy of needs (1943) theory. These theories can be applied to classroom education and intervention. Vygotsky explained that schools must match a child's developmental stage and level of instruction for education to be effective. Maslow believed children need a reinforcing environment to build their esteem needs and allow them to focus on cognitive growth. The significant difference in reading outcomes from the beginning to the end of the year suggests RTI is an effective intervention for struggling readers in third grade. The study results were analyzed in the context of Vygotsky's (1978) social constructivist theory and Maslow's hierarchy of needs (1943) theory.

Vygotsky's (1978) social constructivist theory states education must target skills children are near achieving, an area called the ZPD. Knowledgeable instructors can effectively guide children by focusing development on topics appropriate for their developmental stage but have not yet mastered (Vygotsky, 1978). RTI is provided in small groups by instructors attuned to children's individual needs, an instructional strategy beyond the scope of the general classroom (Cakiroglu, 2015). An individualized instructional strategy focused on children's development needs allows them to move

toward independence on the task or skill (Vygotsky, 1978). RTI is provided with individualized instruction with the goal to return to the general classroom (Cakiroglu, 2015). The significant difference in mean scores for struggling readers before and after intervention indicates RTI supports third-graders development toward grade level. This is consistent with other studies that have found individualized reading intervention effective for struggling readers resistant to standardized approaches (see Cartwright et al., 2019; Field et al., 2019; Hammerschmidt-Snidarich et al., 2019).

Maslow's hierarchy of needs (1943) placed self-esteem as a prerequisite to cognitive needs. Addressing self-esteem needs are required to allow focus on cognitive growth. Self-esteem is achieved through achievement and appreciation (Maslow, 1943). Readers who struggle in the general classroom often lack the motivation to work due to repeated failures (Kellerman, 2014). RTI is an opportunity for readers struggling in the general classroom to achieve by targeting developmentally appropriate needs through targeted intervention (Cakiroglu, 2015). The study results revealed children in RTI had significant improvement in reading outcomes indicating students were able to focus on their cognitive growth. This interpretation is consistent with Yang et al.'s (2019) study finding that self-esteem and a reinforcing environment are necessary for improved reading outcomes.

Limitations of the Study

The limitations of my study include concerns for generalizability based on my study's sampling strategy and gender demographics. One limitation of this one-group pretest-posttest study design is the lack of a control group. The lack of control variables

in this study were limited because of convenience sampling. This can cause limitations of cause and effect interpretation due to nonrandomization of the groups (Creswell, 2012). There is potential for selection bias to skew the study results. Selection bias occurs when a study sample is not randomized where purposeful sampling leads to uncontrolled population variables (Creswell, 2012). Examples of variables not controlled in my study were the quality of instruction, frequency and duration of intervention, student attendance, and RTI fidelity, reducing the reliability of the study results. Another limitation of the study population's generalizability is limited ethnicity data and gender disparity. Data on ethnic identification was only available for the 2018-2019 year. The incomplete study data restricts the generalizability of the ethnic groups due to low confidence in study demographics. Gender demographics of this study's archival data revealed 68.13% male and 31.87% female sources of data. The U.S. Department of Education (2020) reported 51.3% male students and 48.7% female students in third-grade general classroom in the United States. Previous researchers have identified more males than females as struggling readers at the beginning of third grade, although the difference reduces by the end of the year (Scammacca et al., 2020; Sutter et al., 2019). Memisevic et al. (2019) noted previous studies find similar reading abilities for elementary students regardless of gender with variance in reading outcomes linked to increased motivation of female readers.

Recommendations

The study results revealed potential areas for future research including study design. One recommendation would be to include analysis from a BAU group. A

sample of students who did not receive intervention are beneficial for comparison to the intervention group. The lack of a no-treatment group is a weakness of the one-group, pretest-posttest design due to reduced internal validity (Johnson & Christensen, 2020). Internal validity is required to have confidence in the relationship between the independent and dependent variables (Creswell, 2012). A BAU group could increase confidence that RTI is associated with improved reading outcomes. It would provide another opportunity to assess the influence of RTI on reading outcomes in third grade as a baseline for future research.

Further demographical analysis for ethnic and gender identities for struggling readers in third grade is also recommended. My study population had similar ethnic identification distributions compared to other studies and the United States general classroom. The reliability of this observation is low due to the availability of ethnic identifications for only 1 of the 4 years studied. The relationship between ethnic identification and reading outcomes is complicated and may be related to additional covariates (Scammacca et al., 2020). Studies with complete demographics would allow for increased confidence in generalizing to populations with similar ethnic identities. My research also found disparities in third-grade gender demographics with recommendations for further analysis. My study identified a disproportionate number of males to females requiring reading intervention compared to the general classroom of the study school district. Previous research has similarly indicted third-grade males to have lower reading scores than females, although the disparities dissipate by the end of third grade (Scammacca et al., 2020; Sutter et al., 2019). Further research can focus on the

role of reading areas as males' reading outcomes improve more than females during third grade.

Further research on reading areas is also recommended considering the results of my study. The lack of research on RTI in third-grade students (Wanzek et al., 2018) prevents analysis with specific reading areas. My study results found the reading area literary text- language, craft, and structure was the only of seven reading areas with a small effect size. This reading area measures the reader's ability to interpret text (CCSSI, 2020) as does comprehension (Swart et al., 2017). Suggate (2016) observed decoding is important in early elementary while comprehension is important in later elementary. Curriculum for reading intervention for third graders is often focused on comprehension due to its theoretical importance (Suggate, 2016). Effect sizes for overall reading outcomes have been altered by targeting different reading areas, but there is a need for more studies on specific populations (Connor et al., 2018; Swart et al., 2017). Further research could focus on interventions targeting comprehension in third-grade struggling readers.

Implications

The significant influence of RTI on reading outcomes for struggling readers in third grade was studied for the potential to foster social change. Most students are unable to read at grade level (Sanders et al., 2019) and the trend worsens as students advance through third grade (Gilmour et al., 2019; U.S. Department of Education, 2020). Children who struggle with reading are likely to struggle with other academic topics (Borre et al., 2019). Successful intervention for third graders has longer-lasting effects

than for earlier elementary years (Suggate, 2016). Consideration of multiple levels of society from national policy to individuals is undeniably valuable in fostering social change.

My study results provide primary paths for positive social change including evidence for RTI in practice and potential targets for future research on reading intervention for third graders. Effective third-grade interventions can promote positive social changes on numerous levels: national, organizational, instructional, and individual. RTI is widely used among all elementary grade levels (Cakiroglu, 2015) and has proven effective for various elementary populations (Miciak et al., 2018; Solheim et al., 2018; Wanzek et al., 2018). Educators who are providing RTI to third graders may be more confident in the efficacy of the intervention due to my study results. Those using interventions that are ineffective or not evidence-based may be supported in considering RTI. The potential impact of improving reading outcomes for third graders is clear. Literary outcomes for third graders have increased in relation to long-term outcomes for even early elementary grades (Suggate, 2016). Individuals and families would also benefit from improved reading outcomes as literacy is positively correlated with academic and personal life trajectories (Amendum & Liebfreund, 2019). My results also provide potential direction for future research needed to support reading intervention in practice. Positive social change is possible as more information is gained on the impact of reading areas for third graders' overall reading outcomes and the efficacy of interventions that target these reading outcomes. National and local policy can provide

the catalyst for implementing evidence-based interventions for widespread benefits to educators, families, and individuals to foster social change.

Conclusion

The results of this quantitative study analyzing archival data for struggling readers in third grade found RTI has a significant influence on reading outcomes from the beginning compared to the end of the school year. Data for reading outcomes were collected from MAP exams, a valid and reliable standardized test. The data were collected from one public elementary school in the Western United States with limited demographical data showing the study population to be similar to the overall preschool to eighth-grade population. Overall reading outcomes including those for the seven component reading areas had significant effect sizes.

The study design was guided by Maslow's hierarchy of needs (1943) theory, Vygotsky's (1978) social constructivist theory, previous RTI research, and lack of research for struggling readers in third grade. The RTI model is designed on the ideology that struggling readers should be removed from the general classroom to meet their specific needs (Cakiroglu, 2015). Maslow's hierarchy of needs (1943) theory furthers children's need for an environment that boosts self-esteem in order to allow focus on their cognitive needs. Vygotsky's (1978) social constructivist theory similarly supports providing children an environment in which their specific developmental stage is targeted by a knowledgeable professional. Numerous studies found removing struggling readers from the general, elementary classroom to provide RTI is effective in improving outcomes (Amendum & Liebfreund, 2019; Miciak et al., 2018; Partanen & Siegel, 2014;

Solheim et al., 2018). Focusing on the effectiveness of RTI in improving overall and specific reading area outcomes is appropriate as research is lacking in these areas for third graders (Wanzek et al., 2018).

The lack of RTI research for struggling readers in third grade is concerning due to the uniqueness of these students' development stage. Analysis of reading areas for students in early elementary finds greater effect sizes for decoding skills compared to greater effect sizes for comprehension skills in later elementary (Messer & Nash, 2018; Miciak et al., 2018; Suggate, 2016). Reading interventions for third graders commonly focuses on comprehension (Suggate, 2016), but support for RTI considering their theoretical comprehension needs is lacking (Wanzek et al., 2018). The results of my study have implications for guiding future research to support practice and positive social change. Finding RTI has a significant influence on overall reading outcomes supports the use of RTI for third-grade struggling readers. Finding a reading component with a variable effect size provides guidance for future research to elucidate the role of specific reading areas in third-grade intervention. Reading outcomes for elementary students have been improved by targeting different reading areas based on population needs (Connor et al., 2018; Swart et al., 2017). More research on RTI including components of overall reading outcomes could support school districts, teachers, and struggling readers in third grade and guide research in finding more effective reading interventions.

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Appendix A: Letter of request for schoolwide access

2019-2020
Request for Schoolwide Access
SchoolCity/MAP Assessment Management Systems

School District

Schoolwide access grants the user permission to view assessment and demographic data for all students included in the assigned school. **Schoolwide accounts will be deactivated at the end of the school year and must be reauthorized at the start of each school year.** Schoolwide access to online assessment management system/s is not intended for classroom teachers nor should it be granted to any ESP (classified) staff. ***Username/Passwords are NEVER to be shared***

Obtaining Schoolwide Access
Principals and assistant principals will automatically be granted schoolwide access. Requests for schoolwide access may be appropriate for deans, coaches, counselors, psychologists and other staff supporting classroom teachers throughout the school building and must be ***completed on a yearly basis.***

Type Print:
Employee: [redacted] Position: 1st Grade Teacher

Email: [redacted]

School: _____
(For multiple schools, complete one form per school. Principal may sign for their own school only)

I am requesting Schoolwide access to the following online assessment management system/s: *(please check **only** those that apply)*

☐ SchoolCity ☒ MAP

Check Purpose Below:

- ☐ Schoolwide Intervention
- ☐ Special Programs
- ☐ MTSS Support
- ☒ Data Analysis
- ☐ School Performance Plan
- ☐ Other (describe): _____

By signing below, I understand that I am responsible for maintaining the security of employee and student data. I will not disclose any employee or student information to anyone without direction from the principal and express authorization from Human Resources and/or the Office of Accountability. I will not provide information to any member of the public. If approached for information, I will refer the requestor to the WCSD Human Resources Department and/or WCSD Office of Accountability.

[redacted] 4/6/2020
EMPLOYEE Handwritten Signature or Electronic Signature ***Date***

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* **Principal Special Request:** Staff who are not in an administrator, coaching, or counseling role, yet are in a leadership position that demands frequent review and monitoring of schoolwide data from these systems, **require a signature from the school principal.**

[redacted] 4/6/2020
PRINCIPAL Handwritten Signature or Electronic Signature ***Date***

[redacted]

For Assessment Department use only:

Date Completed: _____

Return this form to the Assessment Support Team in the Assessment Department rev 7.2.2019

Appendix B: Letter of approval for schoolwide access

Schoolwide Access MAP - [redacted]

AssessmentSupport <AssessmentSupport[redacted]
Mon 4/6/2020 12:46 PM

[redacted]

Hello –

Your request for schoolwide access for MAP has been received and processed.

Please visit teach.mapnwea.org and log in as usual. It will take an overnight update in orde to see reports, so you should have report access tomorrow. If you have forgotten your password, please visit the site previously mentioned and type in your username (which is you complete district email address) and forgot password. NWEA will then send you an email with a temporary password (please check inbox, junk and clutter folders). You will have 48 hours in which to login and change it to one of your own.

Thank you, [redacted]

[redacted]
AssessmentSupport[redacted]
Phone [redacted]
Fax [redacted]