RESPONSE TO INTERVENTION: IMPACT ON SPECIAL EDUCATION REFERRALS AND ELIGIBILITY

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ABSTRACT

Melissa C. Parnell: Response to Intervention: Impact on Special Education Referral and Identification Rates
(Under the direction of Rune J. Simeonsson, Ph.D.)

The Responsiveness to Instruction (RtI) model was originally intended as a means of data-driven intervention, not disability identification (Gersten & Dimino, 2006; Ikeda, 2012); however, under intense scrutiny and a realization that students' needs were not being met, the federal government, in 2004, introduced the RtI model (IDEIA, 2004) as an alternate means for learning disabilities identification (Education Evolving, 2005). While research has been conducted regarding the essential components of the RtI model and the importance of implementation fidelity, limited research has examined the impact of the RtI model on the referral and identification of children suspected of having a disability. To that end, the present study compared the impact of the RtI model with that of a standard model on the proportion of children referred for special education, the number of children found eligible for special education, and the incidence of learning disabilities.

Two school districts in the southeastern region of the United States provided extant data sets, and proportions were calculated for referrals to special education, eligibility for special education, and the incidence of learning disabilities. Results supported the hypothesized increase of referral proportions during the second year of RtI implementation with a leveling off during subsequent implementation years; however, results regarding

overall reduction in referrals were inconclusive. Higher overall eligibility proportions were found when the RtI model was employed, but there was no difference in the proportion of students found eligible under the category of learning disability between schools implementing the RtI model and those using the standard model. These findings have implications for special education policy and practice, including resource conservation, earlier student intervention, and the conceptualization of disabilities identification and data collection.

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CHAPTER I: INTRODUCTION

Anecdotal observations support the presence of learning disabilities as far back as the 1800s, when, in 1822, Franz Joseph Gall detailed his theory of an association between brain injury and cognitive dysfunction (Hallahan & Mercer, 2002). Other early theories and etiological explanations included brain impairment, perceptual irregularities, and psycholinguistic deficits, all of which have contributed to our present understanding of this construct. While the heritage of advocacy and research with regards to learning disabilities is quite substantial, the learning disabilities construct continues to elude professionals across both research and applied settings. Acknowledgement of learning deficits in the context of intact sensory capacities and average to above cognition is real and undisputed. However, the underlying etiological factors contributing to those behavioral manifestations and the corresponding methods of assessment are no better defined and operationalized today than they were 44 years ago when the federal government first included learning disabilities as an area of educational classification.

Prior to the passage of PL 94-142 in 1975, all students with educational delays, regardless of etiology or differences in presentation, were subsumed under the auspices of mental retardation or mental defectiveness within American educational settings (Binet & Simon, 1914; Kirk & Johnson, 1951; Hallahan & Cruickshank, 1973). Included within this category were children with global developmental delays who may, by today's standards, be considered cognitively delayed, as well as those with specific academic delays, those with

sensory impairments, and those whose variation in functioning would today constitute a learning disability.

Despite an early awareness of heterogeneity of students served in the early American educational systems, it was not until the early 1960s, in the context of significant parental advocacy, that professionals began the task of differentiating among the various academic, cognitive, sensory, and developmental profiles that were included in the mentally deficient category (Hallahan & Cruickshank, 1973). A growing body of research documented what parents had been saying for some time, that there were, in fact, children who manifested significant delays in specific areas, who were, in terms of functioning, qualitatively different from those with significant global delays. Two primary schools of thought regarding those children emerged, with one focused on the role of perceptual, perceptual-motor, and attentional problems in the expression of learning disabilities, while the other focused on the psycholinguistic nature of learning disabilities.

Samuel Kirk first coined the term learning disabilities at a parent conference in 1963 (Hallahan & Cruickshank, 1973), defining the construct as "disorders in development, in language, speech, reading, and associated communication skills needed for social interaction" (Kirk, 1975, p. 9). It was not until 1975, with significant pressure from parent advocates and in the context of a lack of pedagogical knowledge in how to best instruct children with learning disabilities, that the federal government recognized learning disabilities as an independent disability for which special education services might be appropriate with the passage of the 1975 Education for All Handicapped Children Act that learning disabilities were formally recognized by the American educational system (Colker, 2011; Hallahan & Cruickshank, 1973). With the formal recognition of this construct and the establishment of

learning disability as area of special education eligibility came the need for an operational definition and diagnostic criteria.

One of the most well-known models for identifying learning disabilities, and one that is perpetuated today, is the discrepancy model. First introduced by Marion Monroe in the 1930s and later reintroduced by Bateman in 1965, the discrepancy model posits that a learning disability is manifested when there is an appreciative difference between cognitive aptitude and academic performance (Bateman, 1965). Though Bateman (1965) cautioned that the model was both tentative and premature, the federal government swiftly incorporated it into the law as the primary means of identification. The model was a temporary means to provide diagnostic clarity amidst definitional ambiguity. The federal government expressed no intention of maintaining the model long-term, and government agencies were charged with pursuing research that might augment understanding of the learning disabilities construct, as well as the most appropriate methods of assessment and diagnosis (Colker, 2011). Research has since revealed significant and inherent flaws with this model, including a wait-to-fail perspective, reactivity, and a lack of specificity with regards to the underlying construct (i.e., learning disabilities) the manifested discrepancy was presumed to represent (Connecticut, 2010; Fletcher et al., 1994; Vellutino, Scanlon, & Lyon, 2000).

Criticisms of the discrepancy model, research demonstrating the beneficial role of early intervention, and the rise of prevention initiatives resulted in an educational climate that was ready for change and focused on the importance of early problem identification and resolution (Lyon & Fletcher, 2001; Griffin, 2009). Another model was simultaneously gaining popularity due to its documented success at improving student learning. The Responsiveness to Instruction (RtI) model originated as an intervention model that was data-

driven and focused on multiple levels of intervention that varied in intensity from systems to classroom to small group and to individual student levels (Education Evolving, 2005). Data collection and analysis is an integral part of the model, and one aspect of data collection relates to individual student performance in the context of tailored interventions. Students who are not meeting established goals are deemed to need more intensive levels of intervention (Tilly, 2008).

The RtI model was originally intended as a means of data-driven intervention, not disability identification (Gersten & Dimino, 2006; Ikeda, 2012); however, under intense scrutiny and a realization that students' needs were not being met, the federal government, in 2004, introduced the Responsiveness to Instruction (RtI) model (IDEIA, 2004) as an alternate means to learning disabilities identification (Education Evolving, 2005). The model's data-driven decision-making process regarding when a child's rate of learning was insufficient held promise for more accurately identifying students with learning disabilities. An added benefit was the capacity of the model to both provide intervention to the students who needed it sooner than traditional wait-to-fail approaches and to reduce the burgeoning rates of learning disabilities identification (Fuchs and Vaughn, 2012).

Though alluring, the aforementioned early claims are yet to be substantiated. Much research to date has focused on the essential components of a successful RtI model, the importance of implementation fidelity, and stakeholder perceptions of the model (Fuchs & Vaughn, 2012; Harlacher & Silere, 2011; Reschly, 2005). The model was touted as a less ambiguous, and therefore, more accurate, means of identifying students with learning disabilities who were in need of special education services. It stands to reason, then, that if the field of learning disabilities were to become more stringently defined, then decreases in

the proportion of students referred to and found eligible for special education would decrease, as was suggested by Fuchs & Vaughn (2012). However, to date, there has been little scientific inquiry regarding the model's impact on the proportion of students referred to and found eligible for special education.

CHAPTER II: LITERATURE REVIEW

Any consideration of the current state of learning disabilities would be incomplete without an overview and appreciation for the evolution of this construct. Such an overview must take into account historical underpinnings and theoretical foundations, but would be grossly incomplete without delving into the definitional changes that have been central to the conceptual development of the term. In tandem with definitional differences are the corresponding differences and concerns regarding the ways in which learning disabilities have been evaluated and identified.

European Developments

Franz Joseph Gall, credited as the father of phrenology, documented what is likely the earliest acknowledged case of learning disabilities in the early 1800s. While Gall did not use the term learning disability, he identified an association between soldiers' frontal lobe brain injuries with their later development of what today would be called Broca's aphasia. In his published work, entitled *Sur les Fonctions* (1822), Gall detailed his theory of the association between brain injury and cognitive dysfunction, identifying three major neurological divisions with specific functions, including movement and sensation, the soul, and intellect (as cited in Hallahan & Mercer, 2002). Though Gall's notion of phrenology was misguided and later disproved, his notion of the localization of brain function that was associated with behavioral manifestations was a view that continued throughout the eighteen and early nineteen hundreds.

Several other European physicians noted observations of behavioral dysfunction that were thought to correspond to brain localization, including Paul Broca and Carl Wernicke. Broca was a French surgeon, with expertise regarding the brain (Turkington & Harris, 2006). In 1861 Broca published a paper documenting his findings with a patient referred to as "Tan" due to his ability to produce only this word (Benjamin, 2009). Though Tan lacked any ability to produce language, he demonstrated intact intellect and language comprehension. That is, he could understand both spoken words and written material. Based upon his observations of patients with manifestations similar to Tan, as well as numerous post-mortem autopsies on individuals who demonstrated expressive aphasia while alive, Broca asserted that the left frontal regions of the brain were the center for speech. This area of the brain is referred to as Broca's area in recognition of his contribution to identifying the localization of this area (Benjamin, 2009; Turkington & Harris, 2006).

In a similar vein, Wernicke, a Polish physician, identified the left temporal portion of the brain that is associated with receptive aphasia (Turkington & Harris, 2006). In 1874 Wernicke published a book documenting his observation of ten patients with documented brain injury and resulting language difficulties. While Wernicke's patients were similar to Broca's in terms of brain injury and linguistic dysfunction, Wernicke's patients differed from those of Broca in two key ways. First, Wernicke's patients suffered lesions and brain injury in the left temporal lobes of the brain, whereas Broca's patients suffered injury to the frontal lobe. Wernicke's patients could both read and produce language; however, they demonstrated difficulties in comprehension, or understanding the meaning of words and utterances (Bradley, Danielson, & Hallahan, 2013).

In 1877 Adolph Kassmaul, a German physician, introduced the concept of acquired word blindness in adults with otherwise normal intelligence who had lost the ability to read (as cited in Hallahan & Mercer, 2002). Almost twenty years later, in 1896, John Hinshelwood and W. Pringle Morgan expanded this line of thought to include congenital word blindness with children. Despite their implication of brain differences, the belief of visual processing deficiencies as playing a causative role in learning difficulties became dominant until disproved by later research that supported verbal deficits as the etiological foundation of reading difficulties (as cited in Hallahan & Mercer, 2002).

American Emergence

The United States demonstrated an interest in the conceptualization and measurement of their European colleagues' brain-based observations beginning in the early 1900s, and investigations were primarily conducted with persons with mental retardation. The American concept of learning disabilities stemmed from the research of German immigrants Alfred Strauss and Heinz Werner with patients with mental retardation, as well as the work of Samuel Orton and Samuel Kirk. From such research emerged differentiation of exogenous and endogenous brain dysfunction (Strauss & Lehtinen, 1947), as well as an understanding of the differences between mental retardation and an inability to learn in the absence of either sensory deficits or mental retardation. Multiple theories of learning disabilities have arisen (Binet & Simon, 1914; Kirk & Johnson, 1951; Hallahan & Cruickshank, 1973), with the two primary schools of thought either focusing on a theoretical orientation toward perceptual, perceptual-motor, and attention difficulties (Goldstein, 1936; Strauss & Werner, 1938, 1942; Strauss & Lehtinen, 1947) or the behavioral manifestations of psycholinguistic differences (Fernald, 1943; Fernald & Keller, 1921; Kirk, McCarthy, & Kirk 1968; Monroe, 1932; Orton,

1925, 1937). Despite differences between the two schools of thought, the history of learning disabilities, particularly within the United States, has had a predominantly neuropsychological slant, though behavioral underpinnings are interspersed throughout.

Mental retardation. In the late 1800s and early 1900s children with learning differences, regardless of the etiology or manifestation of those differences were collectively labeled as deficient or defective (Binet & Simon, 1914; Kirk & Johnson, 1951). In the words of Will Monroe (1897)

> An army of children – deaf, blind, mentally deficient, idiotic, epileptic, neglected, abandoned, incorrigible, and delinquent- for the want of a better, larger term are conveniently classed defectives. Most of them, burdened with the inherent sins of a vitiated ancestry, are what they are simply because they are what they were made. (p. 220)

Monroe (1897) went on to make the case that it was the job of society to educate "these helpless little misfits (p. 220)", so that a "defective child…may outgrow its defect (p. 220)". Monroe's (1897) insight was well ahead of his time, as he wrote and practiced during an era in which such children were often ostracized and shunned, in anticipation of Darwinian evolution ridding society of these less adapted individuals.

Great change occurred over the next fifteen years in the United States, and by 1912 there were 81 institutions for individuals with mental deficiency and 150 special education classes in New York City (Cornell, 1915). Eugenics laws limiting the rights of "feeble-minded (p. 422)" individuals, such as those sanctioning their sterilization and involuntary commitment to institutional or custodial care, had been found unconstitutional, with the exception of the prohibition of marriage (Cornell, 1915). In another 15 years, the work of

Alfred Strauss, Heinz Werner, and Samuel Orton, amidst a climate of societal change and professional growth brought on by the end of World War I and the beginning of World War II (Benjamin, 2009), would begin to demonstrate that certain subgroups of children with mental deficiencies possessed capacities that separated them from those that were "mentally dull".

Perceptual, perceptual-motor, and attention functions. The role of perceptual abilities in learning disabilities was founded upon the work of Kurt Goldstein, a physician who documented a number of problem behaviors, including hyperactivity, meticulousness, background confusion, and concrete thinking, among World War I veterans who had suffered a brain injury (Goldstein, 1936, 1939). Goldstein viewed the brain through a gestalt approach, rather than in terms of localization, and his documentation illuminated the resilient capacity of a brain-injured person to autonomously compensate for dysfunction (Goldstein, 1936). Goldstein's observations were influential in the later works of Heinz Werner, Alfred Strauss, and William Cruickshank, all of whom utilized Goldstein's work as the foundation for their inquiries into the mitigating role of perceptual abilities in the manifestation of learning differences.

Alfred Strauss and Heinz Werner, two German scientists, immigrated to the United States, seeking refuge from the results of Hitler's rise to power in Germany. Strauss and Werner were both offered positions at the Wayne County Training School in Northville, Michigan, where they sought to investigate the existence of Goldstein's observations of adult patients in pediatric patients with similar neurological backgrounds. Although Strauss's earlier work focused on children with profound mental retardation, the work of Strauss and

Werner focused on "children who exhibited less profound intellectual impairment (Hallahan & Cruickshank, 1973, p. 60)" classified into two groups, exogenous and endogenous.

Exogenous subtypes were thought to result from neurological impact, whereas endogenous subtypes were from biological and familial origins (Hallahan & Cruickshank, 1973). A child was considered to manifest symptoms of exogenous mental retardation in one of two scenarios, either there was no family history of mental retardation in the context of a positive history of prenatal, perinatal, or postnatal disease resulting in brain damage or based upon behavioral characteristics that Goldstein's previous research had found to be associated with brain injury, including hyperactivity, impulsivity, and distractibility (Bradley, Danielson, & Hallahan, 2013).

Despite criticism regarding the "possible circularity of forming their groups on the basis of symptoms that were very similar to the ones on which they were then attempting to differentiate the children" (Bradley, Danielson, & Hallahan, 2013), the work of Strauss and Werner changed the nature of services for children with mental retardation. In the words of Hallahan and Kauffman (1976):

> It is important to point out here that up until this time mental retardation was perceived as a relatively homogenous state. Consequently no differential or individual educational or psychological programming was initiated on their behalf. Dispelling the long-standing notion that there were no individual differences among the retarded, the work of Werner and Strauss, therefore, had revolutionary impact. (p.6)

Through their work with children at Wayne County, Werner and Strauss found that exogenous children demonstrated a steady decline in cognitive functioning from the point of institutionalization forward, while endogenous subtypes demonstrated an average of four

point gains on tests of intellect (Bradley, Danielson, & Hallahan, 2013). They concluded that highly stimulating environments, while beneficial for those with endogenous mental retardation, were less than optimal for the exogenous group whose core symptoms included hyperactivity, distractibility, and impulsivity (Bradley, Danielson, & Hallahan, 2013).

The results of Werner and Strauss's investigations, as well as those of other researchers, provided a preponderance of evidence that supported the notion of perceptual-motor differences in children with exogenous mental retardation (Strauss & Werner, 1938; Strauss & Werner, 1942; Werner & Bowers, 1941; Werner & Strauss, 1939a, 1941). The work of Strauss and Kephart (1940), later expounded upon by Strauss and Lehtinen (1947), demonstrated that exogenous children could be differentiated from endogenous children on the basis of certain personality traits, such as disinhibition, impulsivity, and social ineptitude that characterize the behavioral deficits currently associated with hyperactivity in children.

It was from the work of Werner and Strauss that a definition of learning difficulties first emerged. Their definition was based on observable behaviors that were theorized to underlie brain dysfunction. The definition, identified as the Strauss Syndrome, introduced the idea of minimal brain dysfunction to describe children who showed a pattern of impairment that persisted in the absence of mental retardation, hearing impairment, and emotional disabilities (Strauss, 1943). Werner (1937) suggested a functional analysis approach to understanding the relationship between brain dysfunction and a child's problem-solving approach, contending that a thorough knowledge of both normal child development and the progression of mental deficiency were essential. In 1939(b) Werner and Strauss expanded this notion with the idea that assessments should be tailored to identify areas of weakness, as well as those of strength, both of which could be used to guide instructional initiatives.

Strauss and Werner's concept of minimal brain dysfunction, while highlighting the neurological basis for children's intellectual and behavioral deficits, also illuminated the idea that "academic achievements can best be understood in terms of the mental processing operations that underlie the achievement rather than as simple achievement test scores (Torgesen, 1986, p. 402)." In other words, Strauss's brain-based understanding of learning differences contributed to the idea that the way in which a person's brain processes the information it receives has a profound impact on the outcomes obtained through typical evaluations. A person's performance on a measure of achievement could not be viewed simply in terms of its quantitative value, but also in terms of the information such performance unveiled regarding underlying cognitive constructs.

William Cruickshank, an understudy of Werner and Strauss, endeavored to replicate the findings of Strauss and Werner with children of normal intelligence. He first demonstrated, through his personal work and that of the graduate students whom he supervised, that children with cerebral palsy demonstrated psychological characteristics, including perceptual, perceptual-motor, and selective attention deficits, similar to those identified in students with exogenous mental retardation by Strauss and Werner (Dolphin & Cruickshank, 1951a, 1951b, 1951c, 1952). Cruickshank's findings provided support for the notion that brain-injured children with average and above intellect can manifest psychological difficulties; however, "the need for a conceptual transition to the assessment of children of normal or near-normal intelligence who, while displaying behavioral characteristics often associated with brain damage, could not assuredly be assumed to have suffered central nervous system impairment (Hallahan & Cruickshank, p. 67)."

In the late 1950s Cruickshank, Bentzen, Ratzeburg, and Tannhauser (1961) initiated a pilot study to evaluate the impact of Strauss and Lehtinen's 1947 recommendations with children of normal to near normal intelligence. The study results were promising because they demonstrated the effectiveness of the instructional methods and provided recommendations for environmental modifications. While Strauss and Lehtinen focused on instructional recommendations, Cruickshank's understanding of attention dysfunction led him and his colleagues to become proponents of the idea of controlling the learning environment. His former student, Norris Haring and colleagues demonstrated the utility of behavioral modification techniques, particularly those that controlled and taught the child to control the extraneous stimuli in the environment (Nolen, Kunzelmann, & Haring, 1967).

Newell Kephart, like Cruickshank, was a student of Strauss and Werner. Kephart viewed learning through an evolutionary lens, believing that adaptations necessary for survival are acquired through learning (Kephart, 1960). Moreover, it was Kephart who theorized, based on Brown and Campbell's servomechanistic model of perceptual development and an understanding of efferent nerve conduction, that one's perceptions cannot be separated from one's motoric response (Hallahan & Cruickshank, 1973). Hence, Kephart conceptualized learning disabilities as one of perceptual-motor differences, wherein the percepts cannot be separated from the resulting actions.

Psycholinguistic functions. Samuel Orton was a neuropathologist practicing in the same 1930s era as Strauss and Werner; however, whereas Strauss and Werner focused attention on perceptual-motor differences, Orton was concerned with the linguistic impact of brain injury in children (Hallahan & Cruickshank, 1973). In 1925 he ran a two-week clinic for students "who were considered defective or who were retarded or failing in their school

work" (Orton, 1925, p. 582). Eighty-eight students were referred to Orton's clinic, with fourteen experiencing considerable reading difficulty. Of the 88 students 15 were found to have intellectual functioning near, within, or above the average level (Orton, 1925). His research further supported the notion that many students were erroneously identified as mentally retarded, despite measures of cognitive aptitude that were within the average range and beyond (Orton, 1925).

In 1939 Orton speculated the prevalence rates of reading disabilities to be approximately ten percent of the total population, and he developed a theory of dyslexia wherein he emphasized the negative impact that occurred as a result of the simultaneous processing of visual information by both hemispheres of the brain; an inheritable trait he identified as mixed cerebral dominance. Mixed dominance was used to explain the occurrence of letter reversals, confusion of palindromes, reading from right to left, and mirror reading. Orton also termed the phrase strephosymbolia as a more descriptive label for the deficits associated with word blindness (Orton, 1925).

Based upon his research, Orton disagreed with existing instructional techniques that relied heavily on whole word instruction and sight reading, instead advocating for "thorough repetitive drill on the fundamental of phonic association with letter forms (Orton, 1925, p. 614)" that are a part of today's phonics instruction. He later added the importance of sound blending in the remediation of reading disabilities, and he was a proponent of multisensory instruction. Orton suggested pairing kinesthetic with auditory by requiring children to trace letters while sounding them out (Orton, 1937). Orton's work was influential in the careers of Anna Gillingham, Grace Fernald, Marion Monroe, and Samuel Kirk, all of whom were associated with the psycholinguistic conceptualization of learning disabilities.

Grace Fernald, like Orton, stressed the importance of multisensory instruction and remediation; however, Fernald, in contrast to Orton, advocated a whole word approach to multisensory reading instruction (Fernald, 1943; Fernald & Keller, 1921). Fernald and Keller (1921) were responsible for the development of the visual-auditory-kinesthetic-tactual (VAKT) of reading instruction, which prescribes five stages of problem word identification and multisensory instruction.

Marion Monroe, also a student of Orton who assisted with his 1925 clinic, conducted research comparing the methods of Orton, Fernald, and Keller. Monroe focused her work on children with reading disabilities and multisensory intervention, as did Orton and Fernald; however, Monroe engaged in a process of systematic investigation that provided empirical support for the psycholinguistic theory (Monroe, 1932). A second contribution of Monroe was the development of diagnostic reading tests that could be used to inform instructional strategies and techniques (Hallahan & Mercer, 2002). Her model of diagnostic-prescriptive teaching, included analyzing error patterns in student's reading to develop profiles that were used to inform instructional strategies. Monroe also first introduced the idea of measurable discrepancies between cognitive aptitude and academic performance, a term commonly referred to as the discrepancy model (Hallahan & Mercer, 2002).

Perhaps one of the most influential persons in the evolution of the concept of learning disabilities in America, and a proponent of the psycholinguistic approach, was Samuel Kirk. Kirk was a psychologist who exemplified the notion of the scientist-practitioner model in psychology long before the development of such a formal label. Kirk's career began as an educator of delinquent or mentally retarded boys at the Oaks School in Chicago. Like others, Kirk's early work was with individuals identified with mental retardation (Gallagher & Kirk,

1957; Kirk & Kolstoe, 1953), and he had a particular interest in early childhood and development (Kirk, 1982; Kirk & Elkins, 1975). Kirk's professional endeavors and research afforded him a prominent and respected position in the learning disabilities landscape, representing the interests of both parent groups and the federal government. Kirk is credited as providing the lexical label of learning disabled to describe perceptually handicapped children, he was influential in the development of federal recognition and a definition of learning disabilities, and he had a vested interest in the development and continuation of the Head Start program (Isser & Kirk, 1977; Kirk, Isser, & Elkins, 1977).

Around 1970 Kirk developed the Illinois Test of Psycholinguistic Abilities (Kirk, McCarthy, & Kirk 1968), designed to be a definitive test for learning disabilities. The ITPA was designed to focus on profiles of intra-individual differences with regards to psycholinguistic abilities, making it much more amenable to instructional recommendations and planning. Kirk was opposed to categorical labels, such as brain injured and perceptually disabled children, instead focusing on the intra-individual strengths and weaknesses of the children with whom he worked (Hallahan & Cruickshank, 1973).

Impetus for Change

In the 1960s and 1970s, parents, keenly aware that their children with perceptual disabilities presented with unmet educational needs, began organizing and advocating for their children who were previously thought of as having mild mental retardation or minimal brain injury. At the same time research was accumulating which demonstrated differentiating characteristics between subtypes of mental retardation (Hallahan & Cruickshank, 1973), as well as the differentiation of those who demonstrated deficits but were of normal intelligence. Viewing school as the ultimate intervention and in the context of increasing parental

advocacy, the need for federal recognition of learning disabilities arose in the form of the development of a national advisory committee and the inclusion of a definition of learning disabilities in the Education for All Handicapped Children Act (EAHCA).

Parent movement. In early 1963 the parents of children with perceptual handicaps convened a conference in Chicago. They sought to explore the challenges faced by such students, as well as potential solutions. One of the most influential speakers at the convention was Samuel A. Kirk, and it was at this meeting that he made the case for and first introduced the term learning disabled to describe "children who can see and hear and who do not have marked general intellectual deficits, but who show deviations in behavior and in psychological development to such an extent that they are unable to adjust in the home or to learn by ordinary methods in school (Hallahan & Cruickshank, 1973, p. 4-5)."

In his address Kirk reviewed previous attempts to describe this group of children, highlighting the dichotomy of previous terms. Kirk argued that one term concerned etiology, typically suggestive of a cerebral dysfunction, while the other focused on the behavioral manifestations of such dysfunction. Then, based upon his understanding of the purpose of the parent meeting, Kirk rationalized that since the purpose of the parents was "not to conduct research on behavior and the brain, but to find effective methods of diagnosis, management, and training of the children (Hallahan & Cruickshank, 1973, p. 5)", their focus should be on behavioral manifestations and not biological etiology. Moreover, it was the charge of "research workers, neurophysiologists and physiological psychologists, to attempt to correlate the biological malfunctions with behavioral manifestations (p.5, Hallahan & Cruickshank, 1973)."

Kirk (1963) was eloquent in his explanation of the ways in which traditional classification labels, such as brain injured, mentally retarded, aphasic, and so forth were useless with regards to the management of the disease process or remedial training. In his words (as cited by Hallahan & Cruickshank, 1973)

> I have felt for some time that the labels we give children are satisfying to us but of little help to the child himself. We seem to be satisfied we can give a technical name to a condition. This gives us the satisfaction of closure. We think we know the answer if we can give the child a name or label – brain injured, schizophrenic, autistic, mentally retarded, aphasic, etc. As indicated before, the term "brain injury" has little meaning to me from a management or training point of view. It does not tell me whether the child is smart or dull, hyperactive or under-active. It does not give me any clues to management or training. The terms cerebral palsy, brain injured, mentally retarded, aphasic, etc., are actually classification terms. In a sense they are not diagnostic if by diagnostic we mean an assessment of a child in such a way that leads to some form of treatment, management, or remediation. (p. 5)

Kirk (1963) maintained that scientific labels lead to diagnostic confusion, while behavioral descriptions yield conceptual clarity. From such logic, he introduced the term *learning disabilities* to describe a group of children who have disorders in the development of language, speech, reading, and associated communication skills needed for social interaction (as cited in Hallahan & Cruickshank, 1973).

Kirk's understanding of learning disabilities was limited to psycholinguistic skill and aptitude, and did not include mathematics, as do contemporary definitions. Similar to contemporary definitions, Kirk's conceptualization excluded children with sensory handicaps

and those with mental retardation. Kirk (1963) rationalized that the purpose of identification was to guide intervention, and, because "methods of management and training (p.6)" already existed for these groups, they need not be included in the diagnostic label (as cited in Hallahan & Cruickshank, 1973). Following Kirk's address, the group organized itself as the Association for Children with Learning Disabilities and began to advocate on the behalf of children with learning disabilities (Hallahan & Cruickshank, 1973).

While Kirk's intent was upon describing the behavior of the children presenting with disabilities in learning, the term he coined gained in popularity and momentum, giving rise to the type of categorical label Kirk so eloquently advised against (Hallahan & Cruickshank, 1973). Though steeped in theory, the conceptualization of learning disabilities lacked the professional rigor and expertise that was observed in the evolution of mental retardation diagnosis and treatment (Hallahan & Cruickshank, 1973). Moreover, despite empirical support for characteristic differences between students with mental retardation and those with learning disabilities, much of what was known or theorized about learning disabilities had stemmed from research with individuals with mental retardation and brain injury. Given the pressure of the parent organizations advocating on behalf of students with perceptual learning differences, the growing popularity and acceptance of its existence, and the need for a concerted response to address the needs and interests of students, the diagnosis and treatment of learning disabilities became a premature focal point for educators, administrators, and policy makers alike (Hallahan & Cruickshank, 1973).

Federal government implements discrepancy model. The 1960s were marked by continued research, as well as the development of public policy and legislation, and, while Samuel Kirk's (1963) conceptualization of learning disabilities referred to perceptually

handicapped children, the federal government's pursuit of a common definition to guide school-based identification considered a greater variety of explanatory approaches. In 1968 (U.S. Office of Education) the federal government defined specific learning disabilities and recognized it as a category for special education as follows:

> Children with special learning disabilities exhibit a disorder in one or more of the basic psychological processes involved in understanding or in using spoken or written languages. These may be manifested in disorders of listening, thinking, talking, reading, writing, spelling or arithmetic. They include conditions which have been referred to as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, developmental aphasia, etc. They do not include visual, hearing or motor handicaps, mental retardation, emotional disturbance, or environmental disadvantage. (p. 34)

The description provided more specificity regarding what a learning disability was not, thereby producing a lack of operationally defined parameters upon which to base a learning disabilities classification (Kavale, 2002). As a result, practitioners and policy makers sought to identify observable behaviors upon which a learning disabilities classification might be made (Kavale, 2002).

Discrepancy Model

History and definition. In 1965 the discrepancy model previously espoused by Monroe in the 1930s, was reintroduced by Barbara Bateman as a means for the identification of learning disabilities. Bateman (1965) identified learning disabilities "as disorders in symbolic language functions (i.e., reading, speaking, writing, spelling, arithmetic) which are characterized by a discrepancy between apparent capacity for performance and the actual level of functioning in that area (p.1)." She went on to advocate for a diagnostic-remedial

model in which the purpose of assessment was to identify specific areas of difficulty, with the intent of prescribing appropriate remediation (Bateman, 1965). Bateman (1965) was rather clear regarding the "apparent mild chaos (p. 1)" of the field of learning disabilities, later stating that her attempts toward an integrated theoretical model were both tentative and potentially premature.

Samuel Kirk led the 1968 National Advisory Committee on Handicapped Children (NACHC), a committee tasked with refining the learning disability term (Hallahan & Cruickshank, 1973). The NACHC provided a small change in the definition, adding the adjective specific, in an attempt to "emphasize that 'the learning failure was not a generalized problem like [mental retardation] but rather one predicated on the possession of only a discrete number of deficits'" (Colker, 2011, p. 87). The implication was, for example, that a student may have difficulties in math, but not reading or writing. Kirk's model, based upon differential diagnosis and functional assessment, continued to emphasize the utility of the discrepancy model for identification purposes; however, it was not until the 1994 publication of APA's Fourth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV, 1994) that the aforementioned discrepancy was operationalized.

The DSM-IV (2004) defined a learning disability as a discrepancy in which the individual's achievement on individually administered, standardized academic measures was "substantially below" his level of intelligence. While this notion of a significant discrepancy was not new, the manual went on to operationalize the meaning of substantially below as "a discrepancy of more than 2 standard deviations between achievement and IQ (p. 49)", while acknowledging that "a smaller discrepancy between achievement and IQ (i.e., between 1 and 2 standard deviations) is sometimes used (p. 49)" (APA, 1994). Despite Bateman's (1965)

earlier cautions and Congressman Lehman's assertion that "no one really knows what a learning disability is (Colker, 2011, p. 88)", the discrepancy model was incorporated as the federal definition of a learning disability in 1975 EAHCA legislation.

Federal definition. The U.S. Office of Education adopted specific learning disability as an area of special education classification in 1968, relying on the definition Kirk espoused at the 1963 parent advocacy meeting in Chicago as "a group of children who have disorders in development, in language, speech, reading, and associated communication skills needed for social interaction" (Kirk, 1975, p. 9). In 1975 the U.S. Congress adopted the Education for All Handicapped Children Act (EAHCA), a landmark federal legislation that mandated an education for all children, regardless of disability. The government, fearing a steep and overwhelming increase in the number of students identified for and able to receive special education services under the learning disability category, implemented temporary caps such that the number of students identified with a learning disability in any one state "could not be more than one-sixth of all the children classified as disabled within a state (Colker, 2011, p. 88)."

Congressman Lehman, a key supporter of the EAHCA, supported the government issued cap "until the diagnosis and definition become more clear because 'no one really knows what a learning disability is'" (Colker, 2011, p. 88). Indeed, the congressional definition provided a lengthy description of the symptoms typically associated with a learning disability, as well as an array of exclusionary criteria, but failed to delineate guidelines for diagnosis. Instead, congress included a tentative and provisional definition of the term while charging "the Commissioner of Education to further study the term and devise a more refined definition as well as diagnosis (p. 81)." Despite this charge, the 1975

definition of learning disabilities found within the federal regulations has remained relatively stable, and was heavily influenced by Barbara Bateman's (1965) discrepancy model.

The government's most recent definition of learning disabilities, influenced by ideas of both neuropsychological and information processing paradigms, defines a learning disability as "a disorder in one or more basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations (U.S. Department of Education, 2004)". The definition has remained relatively stable since its inception in 1968, and excludes circumstances in which the primary cause of the learning difficulty is attributable to sensory deficits, motor disabilities, mental retardation, or emotional disturbance, as well as those situations in which difficulties are attributable to environmental, cultural, or economic disadvantages (U.S. Department of Education, 2004). The discrepancy model remained the primary identification model for more than thirty years, despite a growing body of research undermining the basic tenets of this model, and the practitioner's diagnostic focus included psychological processing and perceptual functioning (Fletcher et al., 1994; Siegel, 1990; Stanovick, 2005; Stuebing et al., 2002; Vellutino, Scanlon, & Lyon, 2000).

Discrepancy model criticisms. One complaint regarding the discrepancy model is with regard to the discretion allotted to individual states in determining classification criteria. Indeed, differences in the ways in which individual states have interpreted and operationalized the federal regulations over time have resulted in inconsistent diagnostic practices across states. As Colker (2011) states

> Under the discrepancy model, seven states specify that there must be at least a 1.5 standard deviation variation between achievement and aptitude…New Mexico uses the 1.5 standard deviation rule for children in grade seven through twelve. The State of Washington uses a 1.55 standard deviation discrepancy test. Minnesota and Wisconsin insist on a 1.75 standard deviation discrepancy. North Carolina [and Alabama] requires…only one standard deviation…Florida only requires 1.0 standard deviation discrepancy for students aged seven to ten but requires 1.5 standard deviations for students aged eleven and above. (p. 97)

Colker (2011) goes on to say that, in addition to the differences in required standard deviations among states, there also exists variance in the ways in which those discrepancies are calculated. Reschly and Tilly (1998) documented that learning disabilities prevalence rates varied from 2.73 to 9.43 percent across the fifty states. The authors concluded that "these variations in prevalence are more likely to be related to unique state-by-state practices regarding how children and youth with mild disabilities are identified as disabled than to real differences in student populations" (p. 21).

Indeed, a range of approaches continues to be applied across states with respect to the discrepancy model. For example, Montana defines a severe discrepancy as a "50% or higher probability of a two standard deviation discrepancy between cognitive ability and achievement in one or more of the areas identified [in the regulations] when adjusted for regression to the population mean (ARM 10.16.3019B)". In Utah special education teams must report a 93% confidence level that a discrepancy between IQ and achievement exists based upon regression formulas (Utah State Board of Education, 2011). Such inter-state differences have real and lasting impact for students.

The reality exists that a student may be considered learning disabled by the standards of one state and not be considered disabled according to a different state's guidelines, particularly given considerable differences in the classification rate of learning disabilities among individual states. For example, in Iowa 37,038 of the 61,418 or 60.26% of all students identified with a disability were classified as learning disabled. In contrast, 13,587 of the 87,977 or 13.5% of children identified with a disability in Kentucky were identified with a learning disability (Colker, 2011). One can be certain that there is a low probability that Iowa's population is more learning disabled than that of Kentucky. Rather, the more likely hypothesis might be that the way in which these states determine classification for a learning disability are quite different, with Kentucky utilizing a much more stringent model than the one employed in Iowa.

A second criticism deals with individual student learning and the notion that students struggling with reading benefit from similar remedial strategies whether or not an IQ-achievement discrepancy exists (Connecticut, 2010). Moreover, traditional discrepancy practices may be biased toward Caucasian middle- and upper-income students (Fletcher et al., 2007; Speece, Case, & Molloy, 2003), and it may be the case that minority students, who perform more poorly on traditional measures of aptitude, may be underrepresented in the learning disabilities population due to an insufficient discrepancy (Ysseldyke & Marston, 1999). Further, evidence suggests that testing for an IQ-achievement discrepancy often does not provide instructionally useful information and may, in fact, contribute to inadequate remedial efforts (Aaron, Joshi, Gooden & Bentum, 2008; Vaughn, Levy, Coleman, & Bos, 2002).

A third criticism pertains to the wait-to-fail bias inherent in the model. Although children at risk for later reading failure can be reliably identified as early as the first grade (Juel, 1988; Torgesen, 2004), under the discrepancy model the majority of children identified with a learning disability are first classified as such in the third or fourth grade (Lyon, Fletcher, Fuchs, & Chhabra, 2006). Thus, children initially struggling in the first grade must wait an average of two to three years, until such time as their achievement is sufficiently delayed to warrant a discrepancy-based classification, despite research which demonstrates that remedial efforts at younger ages are more robust than those applied at a later time (Fletcher et al., 1998; Fletcher et al., 2002; Gresham, 2002; Speece, 2002; Torgesen, 2004; Torgesen et al., 2001). Torgesen (2004) commented on interventions with late elementary children, noting that impairments in reading fluency, a major effector of reading success, are often intractable for children with moderate to severe reading fluency delays, a necessary and unfortunate precursor toward assessment and intervention within a discrepancy model.

A fourth and significant criticism is with regard to the considerable measurement error inherent in the ability-achievement discrepancy (Reschly & Ysseldyke, 2002). As Restori, Katz, and Lee (2009) point out, "empirical evidence demonstrating the reliability and validity of the IQ-achievement discrepancy model for identifying SLD is virtually non-existent" (p. 134). Moreover research by Kavale and Forness (1984) found no consistent aptitude profile among students identified with a learning disability. A number of discrepancy models (i.e., accomplishment quotient, formula-based, grade-level deviation, expectancy formula) have been proposed, and all are marked by questionable reliability and poor validity (Kavale, 2002).

Response to Intervention.

Congress addressed the aforementioned complaints regarding the discrepancy model in the 2004 reauthorization of the federal IDEA (1990) mandates by including an alternative approach defined as responsiveness to scientific-based instruction (IDEIA, 2004). While the Responsiveness to Intervention (RtI) model was not specifically identified, it was the adopted model of many local education agencies, including the North Carolina Department of Public Instruction (Braden & Joyce, 2008). As such, it will be the model around which the current review is focused, and RtI will refer not only to a specific implementation model, but also to the responsiveness to scientific-based instruction agenda in general.

While federal regulations implemented RtI as a means of learning disabilities identification, the RtI model, as it was originally developed, was never intended as such (Gersten & Dimino, 2006; Ikeda, 2012). Rather, as Ikeda (2012) eloquently explains, "RTI evolved out of a paradigm in which assessment data were used to support instructional interventions rather than diagnose disabilities" (p. 274). Moreover, the inclusion of RtI, intended to provide further guidance and specification regarding the definition and characteristics of a learning disability, in its implementation created confusion and a widening of classification practices amongst states (Gersten & Dimino, 2006; Ikeda, 2012).

RtI History. The RtI model has theoretical underpinnings similar to those applied within a public health framework. Within the public health setting exists an idea of universal, selected, and indicated actions with the intended goal of risk assessment and disease and disorder prevention (Simeonsson & Pan, 2013). Similarly, RtI approaches student needs from a risk assessment model rather than a deficit appraisal perspective (Gresham, VanDerHeyden, & Witt, 2005). RtI is a problem-solving model based on the scientific method and applied to

educational contexts for the purpose of systematically identifying and addressing academic and behavioral problems through a tiered service delivery system (Education Evolving, 2005).

RtI was not applied to educational settings until the late 1990s (Texas Council for Developmental Disabilities, 2008); however, psychologists theorized the application of a prevention/intervention model in education as early as the 1970s, and the current educational framework is founded on Bergen's earlier consultative model (Texas Council for Developmental Disabilities, 2008). The problem-solving model alone, however, lacked systematic data collection upon which to evaluate hypotheses and interventions (Tilly, 2008). Thus, continued educational and psychological research lead to the development of an improved problem-solving model that was steeped in hypothesis development and revisions based upon data collection and analysis, or, the RtI model (Texas Council for Developmental Disabilities, 2008).

RtI initially emerged within the educational arena due to concerns with the ways in which students' academic and behavioral needs were addressed, often inadequately, as well as the over-identification of students as learning disabled (Lyon & Fletcher, 2001; Griffin, 2009). It was meant to allow students access to necessary interventions based upon individual need (Buffum, Mattos, & Weber, 2010; Ikeda, 2012), and has been described as a multi-tiered system of data collection, analysis, and intervention (Tilly, 2008). Given its loose association with the multi-tiered nature of public health prevention frameworks, the RtI educational model's guiding premise focused on the prevention of learning and behavioral disabilities, through a multi-tiered, problem-solving model that was thought to be both more economical than the long-term treatment of preventable conditions and contributed to an overall better quality of life (Fuchs & Fucsh, 2007; Gersten & Dimino, 2006).

Upon implementation in the schools, however, RtI became not only a means of intervention, but a method of identifying disabilities as well (Education Evolving, 2005). Moreover, it was purported that implementation of the RtI model would afford the added benefit of reducing special education referrals, a goal the federal government had been trying to obtain since EAHCH's inception in 1975, particularly reducing the incidence rate of learning disabilities (Fuchs & Vaughn, 2012). However, as Ikeda (2012) notes, "'Sorting' kids through tiered level of intervention, so that 'the truly LD' are identified, is not the point of RTI…This is the real power of RTI: having ambitious goals, implementing rigorous instruction, and using data to judge effect" (p. 276).

RtI intervention model. Within an RtI model the primary or universal tier provides the same preventative strategies and screenings to the entire student population (Education Evolving, 2005), and it is expected that 80 to 90 percent of students' educational needs will be sufficiently provided for at this level (Tilly, 2008). For example, all students may receive 45 minutes of a district-approved, research-based literacy curriculum within their regular education setting. The curriculum is universal, in that it is provided to all students, and it is preventative in that it teaches children the literacy skills essential for reading success (Tilly, 2008). In addition to a universal curriculum, all students are screened at the primary or universal level in an effort to identify those who may be at-risk for some type of academic failure. Universal screenings typically consist of short, approximately one-minute fluency probes that are administered to all students within a grade, school, district, and so on. Student performance on such measures is compared to criterion norms to determine whether they are proficient, moderately at-risk, or at significant risk for academic failure. Students deemed to be at-risk for academic failure are referred on to the secondary tier (Education Evolving,

2005; Fuchs, 2004; Fuchs & Fuchs, 2007; Johnson, Mellard, Fuchs, & McKnight, 2006; Tilly, 2008).

The second tier within the RtI model typically contains five to ten percent of a total student population (Shapiro, 2008; Tilly, 2008). When this percentage is greater than five to ten percent, then changes to the universal prevention may be indicated. Students found to be at-risk of academic failure, based upon their performance on the universal screening measures administered as a part of the universal assessment plan are administered diagnostic assessments to further delineate areas of pronounced difficulty. Following these diagnostic assessments, students are grouped into small groups according to their area of need. Evidence-based interventions are matched to observed student deficits, and only those students demonstrating academic risk receive the indicated intervention. The focused instruction will likely be provided in smaller groups of three to six students in the general education classroom. This tier may be considered preventative in that it teaches children the academic skills essential for remediating their difficulties and preventing the full-blown manifestation of a disability. Progress monitoring data is collected for all students receiving selected intervention, typically with a fluency probe similar to those used for universal screening. The progress monitoring data is reviewed on a regular basis, and instructional initiatives are adjusted accordingly. Students who demonstrate limited progress at this level are then referred to the third tier of response (Fuchs & Fuchs, 2007; Johnson, Mellard, Fuchs, & McKnight, 2006).

The third tier within the RtI framework is typically composed of one to five percent of the learners with the most significant delays and poorest rates of progression (Shaprio, 2008; Tilly, 2008). These students are typically referred for an individual psychoeducational

assessment to further delineate the nature of their academic difficulties and determine the possibility of an underlying disability. Intervention is provided at this level as well, though typically on an individual basis or in groups of two to three students with similar deficits. Student's progress is monitored similar to the monitoring described in tier two.

While the goal of RtI is to both identify students who are struggling with learning sooner than would occur with traditional referral and assessment methods, and then to provide intervention more rapidly than conventional wait-to-fail approaches (Fuchs & Vaughn, 2012), the implementation of RtI, in terms of screening, prevention, and intervention has been inconsistent (Reschly, 2005). There is both a lack of consistency with regards to the components that are deemed essential and necessary to include within an RtI model (Colorado Department of Education, n.d.; Kansas Multi-Tier Systems of Support, n.d.), as well as the ways in which those components are operationalized and implemented. This lack of agreement upon what constitutes the core components of the model, as well as inconsistent implementation of those components has resulted in considerable variation.

A synthesis of the literature on the implementation of RtI suggests that, at its most basic level, the core components of an RtI model may include data-based decision making, universal screening, frequent progress monitoring, and multilevel intervention and instruction (Fuchs & Fuchs, 2007; Harlacher & Siler, 2011; Stollar et al., 2008). However, it is difficult to separate these ideas from their indirect counterparts, including the need for professional development and staff buy-in within the context of a collaborative, team-based approach to planning, data analysis, and intervention implementation. Care must also be given to resource allocation at each tier, ensuring that the students with the greatest level of need receive the most intensive interventions. Further complicating the implementation task is the necessity

that all components must be implemented with a high degree of fidelity using evidence-based practices (National Center on Response to Intervention, 2010).

Harlacher and Siler (2011) completed a qualitative analysis of available literature pertaining to RtI to delineate the various factors that may be related to a successful RtI model. Their results outlined thirteen factors associated with successful RtI implementation, including professional development, staff buy-in, leadership, time for collaboration, broad ownership, resources/infrastructure, accountability for using practices, family involvement, proactive navigation of barriers, clarity of utilized language, clear policies and procedures, collaboration with pre-service training, and time for implementation. Of the thirteen, Harlacher and Siler (2011) found that the most often referenced components included professional development (55%), staff buy-in (50%), leadership (45%), time for collaboration (45%), and broad ownership (40%). Stollar et al. (2008) highlighted additional considerations, including focusing on systems change, comprehensive and systematic implementation with on-going technical assistance and support, and planning for sustainability.

RtI as a diagnostic model. The transition of the RtI model from intervention to diagnostic occurred in response to the government's need to more consistently and accurately identify students with learning disabilities (Gresham, VanDerHeyden, & Witt, 2005). For 44 years the learning disabilities definition had remained relatively close to resembling the definition espoused by Kirk at the 1963 parent convention (Education Evolving, 2005), and government officials were increasingly aware of the inherent flaws of the aptitude-achievement discrepancy model. As such, researchers began to consider the ways in which an RtI model might more consistently identify students in need of more stringent intervention

and policymakers sought more clarity to definition and eligibility quandaries (Education Evolving, 2005).

In August of 2001, a series of papers presented at the *LD Summit* provided further support for the intervention to diagnosis transition (Gresham, VanDerHeyden, & Witt, 2005). Gresham (2002) presented a paper that reviewed the inherent flaws of an ability-achievement discrepancy model, and built the case for the responsiveness-to-intervention approach to learning disabilities identification and treatment. Gresham (2002) noted that, while the RtI model was based on discrepancy, the discrepancy was between an individual's performance before and after an educational treatment, and not a difference between innate attributes. Gresham (2002) outlined three models of responsiveness-to-intervention, including predictor-criterion, dual-discrepancy, and functional assessment, and suggestions for how these models might be utilized in identifying learning disabilities. The dual discrepancy model appeared to garnish the greatest theoretical and empirical support, in terms of learning disability identification utility.

The dual discrepancy notion originated with the work of Fuchs and Fuchs (1998), as they offered a reconceptualization of learning disability identification based on treatment validity. Treatment validity included four phases of assessment, ranging from classroom to individual student, which assisted in determining both the presence of a disability and the need for more intensive intervention. Whereas the traditional discrepancy model focused on an individual's ability and achievement performance at one point in time, the treatment validity model focused on frequent, repeated assessments using curriculum-based measures. The model based eligibility for special education services on the evidence of a dual discrepancy, which meant that the student's performance on curriculum-based measures and

their rate of learning were dramatically below that of peers. Once a student was provided special education services, the effectiveness of those initiatives was gauged according to the student's improved growth rates (Fuchs & Fuchs, 1998). Vellutino (2002) supports the dual discrepancy model, and Grimes (2002) goes on to elaborate the various ways in which such a model might be implemented.

In 2002 the President's Commission on Excellence in Special Education (2002) issued a report regarding the current state of special education in America, as well as recommendations for future implications. The President's Commission on Excellence in Special Education (2002) found "that the IDEA establishes complex requirements that are difficult to effectively implement at the state and local level (p.21)", noting the most significant difficulties in determining eligibility. With regards to learning disabilities, it was noted that the definitions were "ambiguous and unrelated to intervention (p.25)". The report recommended early identification of and intervention with children suspected of having a disability, a simplification of the identification process, and the incorporation of a responsiveness-to-intervention model (President's Commission on Excellence in Special Education, 2002). Additionally, a preventative model was recommended, along with a shift toward assessment practices that analyzed classroom-based learning and behavior over traditional intelligence tests. The Commission was eloquent in citing the misgivings of traditional discrepancy models, and provided ample support for moving toward a research-based approach to integrated identification and treatment (President's Commission on Excellence in Special Education, 2002).

RtI and incidence of learning disabilities. The primary objective of the RtI model is improved student achievement; however, it has also been suggested that a secondary and

conceptually different purpose is the prevention of specific learning disabilities as noted by a reduction in the number of students referred to and found eligible for special educational services as a student with a learning disability (Denton, 2012; Fuchs et al., 2012; Mastropieri & Scruggs, 2005; Reschly, 2005). While much research has been dedicated to the implementation of RTI practices, essential components, and intervention fidelity, to date there is limited published research regarding the incidence of learning disabilities when an RTI model is employed (Fuchs & Vaughn, 2012; Reschly, 2005). Though academic progression is important, the absence of such research makes it difficult to ascertain the utility of the model for the prevention of learning disabilities within the population. A comprehensive search of available databases returned some dissertations aimed at such an inquiry (Ajay, 2010; Hare, 2008; Krieder, 2009; Kucera, 2008; Pennycuff, 2010; Polcyn, 2012; Wannemuehler, 2010), however there was just one peer-reviewed inquiry (VanDerHyden et al., 2007) regarding the incidence of learning disabilities following the implementation of the RtI model.

VanDerHyden et al. (2007) evaluated the impact of a prescribed RtI model on special education referral and identification rates. While their results demonstrated a reduction in the quantity of referrals and a higher percentage of those referrals qualifying for special education services, the RtI model utilized may be cost prohibitive to other school districts as a screening and intervention approach. Therefore, research needs to be completed with non-prescribed, district planned and implemented RtI models to determine their effectiveness in reducing referrals to and eligibility for special education services. Dissertations attempting such inquiry were completed (Ajay, 2010; Hare, 2008; Krieder, 2009; and Kucera, 2008), with mixed results.

Two studies found an increase in referral and eligibility rates (Hare, 2008; Krieder, 2009), one study reported a decrease in referral rates (Ajay, 2010), and a fourth study reported no change in referral or eligibility rates following the implementation of the RtI model (Kucera, 2008). An observed limitation of all but one study (Krieder, 2009) was the failure to take into account qualitative data, such as the degree of rigor and integrity with which the RtI model was structured and implemented and the fidelity of the RtI data analyses and interventions. Krieder (2009) reported that there may be a relationship between the integrity with which an RtI model is implemented and referrals to special education. Moreover, none of the identified studies explicitly collected and analyzed data regarding the presence of all essential components within the utilized RtI model. There has also been little published research into the impact of the RtI model on both the quantity and quality of referrals to special education. The studies that have been conducted; however, appear promising, suggesting a reduction in the referral rates and a greater percentage of referred children qualifying for exceptional children's services (Pennycuff, 2010; Polcyn, 2012; Wannemuehler, 2012).

In summary, there has been little investigation into the impact that the presence of essential components and implementation integrity play with regards to the utility of the RtI model for reducing both the number of referrals to special education and the number of children identified with a learning disability. Based on the available research, RtI, as it is currently applied within educational settings, may well serve its intended purpose of improved student achievement, while falling short of the goal of reducing the number of children identified with a learning disability. While the ability of the RtI model to prevent

disabilities may be questioned, the nature and extent of data produced within such a model appears to lend itself nicely to disability evaluation and classification.

Continued confusion

As Colker (2011) so eloquently points out, “Although Congress has retained the 1975 definition of specific learning disabilities, it enacted new guidelines for diagnosing the impairment with the 2004 Amendments to the IDEA. But that Amendment only added to the confusion in the field (p. 83)." Indeed, confusion has persisted regarding the nature, diagnosis, and remediation of learning disabilities. At the present time, states may choose to use a discrepancy model approach, the RtI approach, or a combination of the two in determining eligibility for special education services. The American Academy of School Psychology (APA, 2005) took the position that, while the discrepancy model may be biased, the response to intervention approach should not be used in isolation. Their position was founded on the work of Dombrowski, Kamphaus, and Reynolds (2004) and that of Shepard (1989) that demonstrated the utility of traditional, normative-based, standardized assessments for ruling out other factors that might be underlying a child’s academic difficulties. The American Academy of School Psychology (APA, 2005) advocates for use of the RtI model as part of a comprehensive evaluation, including the use of standardized, norm-referenced tests. Perhaps the integration of traditional assessment and RtI approaches provides further documentation of the continued confusion in the field of learning disabilities.

Study Purpose and Rationale

While research has been conducted with regards to the essential components of the RtI model, as well as the importance of implementation fidelity, limited research has examined the impact of the RtI model on the referral and identification of children suspected of having a disability. It is also unclear if the RtI model has, as it was touted to do, reduced the number of new referrals to special education for learning disabilities consideration. To that end, the purpose of the present study was to examine the impact of an RtI model on the proportion of children referred for special education, the number of children found eligible for special education, and the incidence of learning disabilities. The research questions and corresponding hypotheses are as follows:

(A) Has the implementation of the RtI model for special education eligibility impacted the proportion of students referred for special education consideration?

H_1: In schools implementing the RtI model there will be a significant increase in referrals for special education in the second year of RtI model implementation, followed by a leveling off in subsequent years of implementation.

H_2: There will be significantly fewer referrals to special education in schools implementing the RtI model, with a higher proportion of referred students in schools using a standard model.

(B) Has the implementation of the RtI model for determining eligibility for special education impacted the proportion of referred students who qualify for special education services?

H_3: There will be a significantly higher proportion of referred students who are determined eligible for special education services in schools implementing the RtI model compared to those using the standard model.

(C) Has the implementation of a RTI model for determining eligibility for special education impacted the incidence of learning disabilities?

H_4: There will be a significantly lower incidence of students identified with learning disabilities with the implementation of the RtI model as compared to the standard model.

CHAPTER III: METHOD

Participants

Two school districts (hereafter referred to as District 1 and District 2) in the southeastern region of the United States provided extant educational data sets for the purposes of the present study. The demographic composition of each district is represented in Table 1. As can be seen, District 1 is appreciatively more rural than District 2, with less ethnic diversity. District 1 also has a markedly lower English as a Second Language (ESL) population than District 2. In terms of indicators of economic stability, it appears that District 1 may earn a lower median wage than District 2; however, there is less unemployment in District 1. Across the years for which study data were collected, District 1 served an average of 15,806 students per year, while District 2 served an average of 22,438 students per year. District 1 operates 29 schools, as compared to 32 schools in District 2.

School District RtI History

Both school districts received identical training and similar support in terms of orientation to and implementation of the RtI model through their state department of public instruction. With regards to training, both districts approached training from a top-down perspective, organizing an implementation team at the district level. The implementation teams attended similar trainings to orient them to the RtI model and to learn best practices for using the RtI model to define disability criteria in determining whether or not a student is eligible for special education services. District 1 began implementing the model in 2009, while District 2 began model implementation in 2007. Both districts approached

implementation in a stepwise fashion, beginning implementation with a subset of elementary schools and adding additional schools each year. Schools maintained a standard referral model that included standard referral and assessment practices and eligibility criteria until they received training and support specific to the RtI model. Both districts began RtI implementation with elementary schools. At the present time only elementary schools in each district are implementing the RtI model, though there were plans to add secondary schools in the coming years.

Table 1
School District Demographics

	District 1	District 2
Total Population	97,076	155,792
Community Setting		
Urban	44.2%	69%
Rural	55.8%	31%
Ethnicity		
Caucasian	64.3%	51%
African American	25.5%	21%
Hispanic	4.7%	22%
Socioeconomic Climate		
Unemployment Rate	5.9%	9.3%
Free/Reduced Lunch	63.3%	56%
Median Household Income	$39,197	$42,592
Persons in Poverty	21.1%	17.9%
Student Variables		
English as a Second Lang.	0.18%	23%
Limited English Proficiency		9%
Average Total Enrollment	15,806	22,438

In both districts training regarding the RtI model as an intervention model occurred for a minimum of one year prior to introducing and using the model to determine eligibility for special education. While, in the context of diagnostic decision-making, the RtI model was first introduced as a means for determining the identification of learning disabilities, the model was not exclusively utilized in that capacity at either district. Rather, it was

implemented as a global system of data collection, through which all students suspected of having a disability that might require special education services received targeted intervention and frequent, ongoing assessment to monitor their skill progression. As such, this investigator made the decision to review referral and eligibility data in light of schools implementing the RtI model versus schools continuing to utilize the standard model for special education identification. In the context of the present study, the standard model represents conventional referral and assessment strategies that include a traditional system of referral to special education, evaluation for a suspected disability, and eligibility determination made upon standardized assessment data and the meeting of established criteria. In terms of learning disabilities, schools using a standard model can be assumed to utilize any combination of the traditional discrepancy model, the alternative to discrepancy, and a pattern of strengths and weaknesses in determining the presence of a learning disability.

Extant Data Set

Each school district provided data sets that covered the years from 2009 through 2014. Given that District 2 began implementing the RtI model prior to District 1, the chronological year provides less insight than the year of implementation that corresponds to each chronological year. Table 2 presents the chronological year with the corresponding year of RtI implementation for each school district. It should be noted that there are no data for District 1 for implementation years seven and eight. This is due to the fact that the district is currently in their seventh year of implementation, with data not available until six months after the current year has ended. It should also be noted that, although District 2 began implementing the RtI model in 2007, data were not available for either 2007 or 2008. Thus, there is no data set available for implementation years one or two for District 2.

In the United States the Federal government requires that data be collected on an annual basis regarding the number of students who are enrolled in and receiving special education services, as well as the number of students that are evaluated for special education services and the outcome of said evaluations. As Maenner and Durkin (2010) point out "annual special education enrollment data frequently are used as a proxy measure of disability prevalence (e1019)." It stands to reason, then, that data regarding the first referral and classification of someone with an educationally relevant disability is a suitable proxy for the incidence of said disability. Given that rationale, only data regarding new referrals to special education, and not total enrollment in special education, were requested for this study.

Table 2
Implementation Year Compared to Chronological Data Set

	School District 1	School District 2
Implementation Year 1	2009	2007[a]
Implementation Year 2	2010	2008[a]
Implementation Year 3	2011	2009
Implementation Year 4	2012	2010
Implementation Year 5	2013	2011
Implementation Year 6	2014	2012
Implementation Year 7	---	2013
Implementation Year 8	---	2014

[a] There is no data for this year.

Each data set included all grade levels and disability categories, and referrals were organized according to students' school of attendance. Also included was whether or not an individual student was found eligible for special education services, and, if eligible, their area of disability classification. Demographic information included gender and sex for each individual referred. Birth dates, grade levels, and socioeconomic status were not included in an effort to maintain confidentiality.

District Level Interviews

Both districts provided a point of contact to collaborate with the principal investigator throughout this study. The point of contact was interviewed to gain a better understanding of the history, implementation, and function of the RtI model within their district. A sample of interview questions is provided in Appendix 1. In addition to these questions, the principal investigator gained general insights with regards to the history and nature of the district's introduction to and training in the RtI model, both as an intervention model and as a model for determining eligibility for special education. Interviewees also provided information that was helpful in understanding the nature of the data collected and limitations associated with data collection procedures that occurred prior to implementation of the RtI model.

The principal investigator had originally sought to review data prior to RtI training and implementation; however, data of this nature were not consistently maintained prior to RtI training and implementation. It was therefore not feasible to review referral and eligibility proportions in the absence of the RtI model, as well as prior to the provision of training in the model. Moreover, any data that were collected were not centrally located, and were not available for retrieval.

Procedures

A request was submitted to each school district to share existing data regarding referrals to special education, the results of those referrals (i.e., eligible or not eligible), and, if eligible, which of each of the 13 identified eligibility categories a student qualified for (North Carolina Department of Public Instruction [NCDPI], 2013). Schools of attendance were included in the original data set; however, these were recoded to maintain confidentiality and further de-identify the data. Data were organized according to referral

source, including referrals from elementary schools, middle schools, high schools, early college school, and alternative schools. Parent referrals were also included, however, the original data did not indicate the educational setting (i.e., elementary, middle, high, early college, or alternative) from which parent referrals initiated. For that reason, it was determined that parent referrals would represent an independent referral source. Elementary school data was further divided based upon whether a school was using the RtI model or the standard model for disability classification and eligibility determination.

While extant data were collected across all grade level and disability categories, the elementary grade levels are the primary basis of analysis and implications for the present study. Analyses regarding total numbers across each district and across non-elementary referral sources and grade levels were conducted; however, primary analyses were restricted to elementary grades because the literature documents successful and consistent RtI applications at this level. Further, both districts chose to limit their implementation of the RtI model to elementary populations, making a comparison at other grade level unfeasible at this time. Both districts do, however, plan to pursue training and implementation for secondary school settings (i.e., middle school and high school) in the coming years, and data related to these settings will be maintained.

The data were provided in excel format, and SAS was utilized to organize and summarize the data. The summary data generated in SAS were exported to an excel file, and the principal investigator utilized excel to compute proportions for students referred, students qualified, and students categorized as learning disabled. These proportions were further subdivided according to referral classification, as well as the RtI versus standard model for eligibility determination. Given that the RtI model was initially proposed to address the issue

of learning disabilities, incidence of learning disabilities identification were also generated in the same manner. Table 3 provides an explanation of referral proportions and calculations, Table 4 an explanation of eligibility proportions and calculations, and Table 5 an explanation of incidence calculations.

Table 3
Explanation of Referral Proportions

	Explanation	Equation
Total	Proportion of students referred across the school district, inclusive of all referral sources.	$\frac{\text{Referred Students (K-12)}}{\text{Enrolled Students (K-12)}}$
Total Elementary	Proportion of students referred across all elementary schools in the school district, inclusive of both RtI and standard elementary schools.	$\frac{\text{Referred Students (K-5)}}{\text{Enrolled Students (K-5)}}$
RtI Elementary	Proportion of students referred across elementary schools using a RtI model for eligibility determination.	$\frac{\text{Referred Students (K-5, RtI)}}{\text{Enrolled Students (K-5, RtI)}}$
Standard Elementary	Proportion of students referred across elementary schools using a standard model for eligibility determination in the school district.	$\frac{\text{Referred Students (K-5, Standard)}}{\text{Enrolled Students (K-5, Standard)}}$

Table 4

Explanation of Eligibility Proportions

	Explanation	Equation
Total	Proportion of students who met eligibility criteria across the school district, inclusive of all referral sources.	$\frac{\text{Eligible Students (K-12)}}{\text{Referred Students (K-12)}}$
Total Elementary	Proportion of students who met eligibility criteria across all elementary schools in the school district, inclusive of both RtI and standard elementary schools.	$\frac{\text{Eligible Students (K-5)}}{\text{Referred Students (K-5)}}$
RtI Elementary	Proportion of students who met eligibility criteria across elementary schools using the RtI model for eligibility determination.	$\frac{\text{Eligible Students (K-5, RtI)}}{\text{Referred Students (K-5, RtI)}}$
Standard Elementary	Proportion of students who met eligibility criteria across elementary schools using a standard model for eligibility determination in the school district.	$\frac{\text{Eligible Students (K-5, Standard)}}{\text{Referred Students (K-5, Standard)}}$

Table 5

Explanation of Incidence of Learning Disabilities

	Explanation	Equation
Total	Proportion of students who met eligibility criteria as a student with a learning disability across the school district.	$\frac{\text{LD Eligible Students (K-12)}}{\text{Eligible Students (K-12)}}$
Total Elementary	Proportion of students who met eligibility criteria as a student with a learning disability across all elementary schools in the school district, inclusive of both RtI and standard schools.	$\frac{\text{LD Eligible Students (K-5)}}{\text{Eligible Students (K-5)}}$
RtI Elementary	Proportion of students who met eligibility criteria as a student with a learning disability across elementary schools implementing RtI.	$\frac{\text{LD Eligible Students (K-5, RtI)}}{\text{Eligible Students (K-5, RtI)}}$
Standard Elementary	Proportion of students who met eligibility criteria as a student with a learning disability across elementary schools using a standard model.	$\frac{\text{LD Eligible Students (K-5, Standard)}}{\text{Eligible Students (K-5, Standard)}}$

Referral proportions for eligibility determination were calculated by dividing the number of children referred by the total number of enrolled children. In schools implementing the RtI model, the total number of children referred for eligibility consideration in RtI schools was divided by the total of children enrolled in RtI schools. Likewise, in schools using the standard eligibility model, referral proportions were calculated by dividing the total number of children referred for eligibility consideration in schools using the standard model by the total of children enrolled in schools using the standard model. Proportions were selected as the metric of choice due to variability in the population (i.e., total enrollment) from year to year, as well as annual variation in the number of students referred for an evaluation. Several referral proportions were calculated, including Total Referral Proportion; Total Elementary Referral Proportion; Referral Proportion RtI Elementary; and Referral Proportion Standard Elementary. Total referral proportions refer to the total number of children from all referral sources (i.e., elementary school, middle school, high school, parent, early college, and alternative school) out of the total number of children enrolled in the district. Proportions were calculated for each year of implementation. Total Elementary Referral Proportions refer to the total number of children referred from elementary schools, inclusive of schools using the RtI model for eligibility determination and those using a standard model, out of the total number of children enrolled in elementary schools in the district. Referral Proportions RtI Elementary refers to the total number of children referred for an evaluation from elementary schools that were using the RtI model for eligibility determination out of the total number of elementary children attending an elementary school that was using the RtI model for eligibility determination. Referral Proportion Standard Elementary refers to the total number of children referred for an

evaluation from elementary schools that were using not using the RtI model (i.e., standard model schools) for eligibility determination out of the total number of elementary children that were attending a standard model elementary school.

A second variable of consideration was whether or not a child who was referred for evaluation met eligibility criteria. Eligibility proportions were determined by dividing the total number of students who met eligibility criteria for special education by the total number of students who were referred for an evaluation. Again, proportions were the metric of choice due to variability in the number of students that were referred from year to year, as well as annual variability in the number of students who met diagnostic and eligibility criteria. Several eligibility proportions were calculated, including Total Eligibility Proportion; Total Elementary Eligibility Proportion; RtI Elementary Eligibility Proportion; and Standard Elementary Eligibility Proportion. Total Eligibility Proportions were determined by dividing the total number of students from all referral sources who qualified for special education by the total number of students referred for an evaluation from all referral sources. Total Elementary Eligibility Proportions refer to the total number of children who met eligibility criteria for special education in elementary schools, inclusive of schools using a RtI model for eligibility determination and those using a standard model, out of the total number of children who were referred for evaluation from all elementary schools in the district. RtI Elementary Eligibility Proportions refer to the total number of children who qualified for special education in elementary schools that were using the RtI model for eligibility determination out of the total number of elementary children who were referred for evaluation from an elementary school that was using the RtI model for eligibility determination. Standard Elementary Eligibility Proportions refer to the total number of

children who qualified for special education in elementary schools that were using a standard model for eligibility determination out of the total number of elementary children who were referred for evaluation from an elementary school that was using a standard model for eligibility determination.

A third variable of consideration was with regards to the incidence of learning disabilities. Maenner and Durkin (2010) used special education enrollment data as a proxy to disability prevalence; therefore, it stands to reason, that data regarding an individual's initial eligibility are a suitable basis for determining disability incidence. Incidence of learning disabilities was determined by dividing the number of children found eligible for special education as a student with a learning disability by the total number of students eligible for special education across all eligibility categories in a given year.

Four incidences were calculated with regards to learning disabilities, including the Total Incidence of LD, Total Elementary Incidence of LD, RtI Elementary Incidence of LD, and Standard Elementary Incidence of LD. The total incidence of LD represented the number of children found eligible as a student with a learning disability across all referral areas (i.e., elementary school, middle school, high school, parent, early college, and alternative school) divided by the total number of children found eligible for special education under any of the 13 federal categories and from all referral sources. The Elementary Incidence of LD was calculated by dividing the number of children found eligible as a student with a learning disability in elementary schools, inclusive of RtI and standard schools by the number of students found eligible for special education under any of the 13 federal categories across all elementary schools. The RtI Elementary Incidence of LD was calculated by dividing the number of children found eligible as a student with a learning disability in elementary

schools that were using the RtI model for eligibility determination out of the total number of children who were found eligible for any of the 13 federal categories in schools using the RtI model for eligibility determination. The Standard Elementary Incidence of LD was calculated by dividing the number of children found eligible as a student with a learning disability in elementary schools that were using the standard model for eligibility determination out of the total number of children who were found eligible for any of the 13 federal categories in schools using the standard model for eligibility determination.

Data Analysis

The main approach to data analysis in this study was to test for the significance of difference between two proportions. As shown in the equation below, the test involves calculating a "z" value based on the proportions of two groups and associated sample sizes.

$$z = \frac{P_1 - P_2}{\sqrt{\frac{P_1(1-P_1) + P_2(1-P_2)}{N_1 + N_2}}}$$

For hypothesis one tests of significance were calculated for District 1 to determine if the observed differences in referral proportions between each year of RtI implementation (i.e., year one to year two, year two to year three, year three to year four, and so on) were significant. District 2 data were excluded from this analysis, given the lack of referral data for the first two years of RtI implementation. The values entered into the significance of difference between two proportions for the first hypothesis are summarized in Table 6.

Table 6
Values used for significance test of hypothesis one.

	P_1	P_2	N_1	N_2
Test 1	Proportion of elementary RtI referrals in year one.	Proportion of elementary RtI referrals in year two.	Enrollment in RtI elementary schools in year one.	Enrollment in RtI elementary schools in year two.
Test 2	Proportion of elementary RtI referrals in year two.	Proportion of elementary RtI referrals in year three.	Enrollment in RtI elementary schools in year two.	Enrollment in RtI elementary schools in year three.
Test 3	Proportion of elementary RtI referrals in year three.	Proportion of elementary RtI referrals in year four.	Enrollment in RtI elementary schools in year three.	Enrollment in RtI elementary schools in year four.
Test 4	Proportion of elementary RtI referrals in year four.	Proportion of elementary RtI referrals in year five.	Enrollment in RtI elementary schools in year four.	Enrollment in RtI elementary schools in year five.
Test 5	Proportion of elementary RtI referrals in year five.	Proportion of elementary RtI referrals in year six.	Enrollment in RtI elementary schools in year five.	Enrollment in RtI elementary schools in year six.

For hypothesis two, data from District 1 and District 2 were analyzed separately, and significance tests were calculated on the difference between referral proportions between RtI and standard elementary schools to determine if the observed differences in referral proportions between these models were significant. The values entered into the significance test for hypothesis two are as follows

P_1 = the proportion of elementary RtI referrals

P_2 = the proportion of elementary school standard model referrals

N_1 = the number of students enrolled in RtI elementary schools

N_2 = the number of students enrolled in standard model elementary schools

Tests of significance for hypothesis three were calculated similarly to hypothesis 2, with District 1 and District 2 data analyzed separately. Significance tests for hypothesis three were calculated to determine if the observed differences in eligibility proportions between

elementary schools implementing the RtI model and elementary schools using the standard eligibility model were significant. The values entered into the significance tests for hypothesis three are as follows

P_1 = the eligibility proportion for RtI implementing elementary schools

P_2 = the eligibility proportion for standard model elementary schools

N_1 = the number of students referred from RtI elementary schools

N_2 = the number of students referred from standard model elementary schools

Tests of significance for hypothesis four were calculated to determine if the observed differences in incidence of students with learning disabilities between elementary schools implementing the RtI model and elementary schools using the standard model were significant. District 1 and District 2 data were analyzed separately, and the values entered into the significance tests for hypothesis four are as follows

P_1 = the incidence of students with learning disabilities for RtI implementing elementary schools

P_2 = the incidence of students with learning disabilities for standard model elementary schools

N_1 = the number of students who were found eligible for special education in RtI elementary schools

N_2 = the number of students who were found eligible for special education in standard model elementary schools

CHAPTER IV: RESULTS

An important caveat in interpreting the data is recognition of the fact that the number of referrals reported may have been artificially depressed. Students who were referred for an evaluation, but whose individualized education program team determined that an evaluation was not warranted, were often not included in the data set because those data were not collected in a systematic manner. That is to say, the actual referrals to special education, which did not end in a formal evaluation, were not included in the obtained data sets. This is particularly salient when reviewing the data from schools that were using a standard model for eligibility determination, because referrals within this model can be made in the absence of sufficient data. In that case, individualized education program teams may decline to provide an evaluation, based on the justification that the data are insufficient. This is often less likely in schools that are using the RtI model for eligibility determination because a basic tenet of the data-centered focus of the RtI model is that students typically would not be referred for special education consideration until there was sufficient documentation that a disability would be confirmed. Therefore, it is highly probable that, within schools utilizing the RtI model for eligibility determination, the majority, if not all, of students who were referred for disability consideration were also evaluated, and that those evaluations were entered into the data set.

Interview Findings

Interviews with key stakeholders at each district revealed identical training and introduction to the RtI model, with similarities and differences noted in district-level

implementation. Both districts created a district-level implementation team, composed of individuals whose job it was to attend on-going trainings, develop a plan for district-level RtI implementation, and facilitate the training of school-based implementation. Similarities were also noted with regards to district-level implementation. Both districts utilized a three tier model, both administered and analyzed universal screenings three times per year, and both used the model to intervene with all children who demonstrated insufficient learning, regardless of probable etiology (i.e., across all disability categories). Both districts also reported a great deal of autonomy, and resulting variation, at the school level with regards to the monitoring of adherence to the model, implementation fidelity, and intervention selection.

Despite the noted similarities, there were appreciable differences in the ways in which the districts implemented the RtI model. Variation was noted in the data collection instruments and assessments, the measurement of progress, and how a disability was determined. An important difference was with regards to the way individual student progress was monitored between the districts. At Tier II, both districts used grade level normative data to establish an anticipated, or expected, rate of learning against which the individual student's progress monitoring performance was compared. District 1 maintained this comparison at Tier III, while District 2 moved to a dual comparison. That is, in District 2, progress monitoring was completed on a weekly basis at a child's instructional level and on a monthly basis at the child's grade level. Both of these normative comparisons were utilized in determining the need for a referral to special education in District 2, while only the student's rate of progress as measured against grade level normative data were utilized in District I.

Another important difference was the way in which districts determined eligibility for the category of learning disabilities. Both districts used a dual discrepancy to document the presence of a learning disability; however, the criteria for defining the discrepancies differed. In this context, the term discrepancy does not refer to the traditional discrepancy model, in which the difference between a child's intelligence quotient and performance on standard assessments of academic achievement were measured. Rather, in this context, discrepancy refers to documentation that a student's grade level, instructional level, or rate of learning are discrepant from that of peers. District 1 used grade level performance to define two discrepancies (i.e., dual discrepancy) that should be documented prior to referring a child for special education consideration, including a gap in performance and a discrepant rate of learning. Performance gaps were defined as either performance below the 10^{th} percentile or performance that was two times discrepant from typically performing peers (i.e., twice as low as that of peers performing at grade level), while rate of learning measured the student's individual rate of learning against that of typically progressing peers with the expectation that the individual student's rate of learning should be approximating that of typically progressing peers. District 2 also employed a dual discrepancy based upon performance gaps and rate of learning; however, the comparative groups differed. District 2 defined performance gaps in terms of the child's current functioning (i.e., instructional level) and the time required to acquire grade level expectations; however, rate of learning was determined based upon a child's instructional level, and not their grade level. A child's progression at the instructional level must align with or exceed expected progress models, and the difference between instructional level and grade level must be decreasing at a rate that suggests a likelihood to catch up.

Summary Data

Summary data for both districts are presented in Table 7. The number of students enrolled in District 1, for the years of data collection, ranged from 15,138 to 16,566. The number of students enrolled in District 2, for the years of data collection, ranged from 22,328 to 22,615. As shown in the Table 8 and Table 9, the number of elementary students in schools using the RtI model for eligibility determination increased for each successive year of implementation, while the number of elementary students in schools using the standard model decreased. This pattern reflects the stepwise implementation plan within both districts. For District 1, this means that for implementation year six there are no available data regarding the standard model because by the sixth year of implementation all elementary schools had transitioned to utilization of the RtI model for eligibility determination. As such no population remained from which to make referrals. Proportions were the metric of choice for all analyses to accommodate the variation in the total population of students, number of students referred, and number of students who met eligibility criteria for each year of implementation. Given that elementary schools were the analytic focus of the current study, Table 8 and Table 9 provide sample sizes specific to elementary populations. Table 8 provides data pertaining to District 1, while Table 9 presents the data for District 2. These tables provide the raw number of data points for each sample, with population numbers for total enrollment.

Table 7

Summary Data on Enrollment, Referral, and Eligibility by Implementation Year for School Districts

	1	2	3	4	5	6
District 1						
Total Enrollment*	16,566	16,150	15,900	15,662	15,420	15,138
Total Referred	459	553	532	488	466	447
Total Eligible	384	459	421	395	376	371
Total LD Eligible	91	81	87	85	77	91
	3	4	5	6	7	8
District 2						
Total Enrollment*	22,536	22,328	22,391	22,360	22,399	22,615
Total Referred	486	530	516	494	501	545
Total Eligible	276	351	308	301	295	359
Total LD Eligible	86	124	102	110	97	119

Note. Column headers indicate the year of implementation.

* Population from which all samples were drawn.

Table 8
Number of Students Enrolled, Referred, Eligible, and Eligible LD Across Elementary Schools in District 1

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Elementary Enrollment	7252	6996	6892	6490	6314	6205
Elementary Referred	254	397	382	338	326	341
Elementary Eligible	220	340	305	279	269	284
Elementary Eligible LD	51	47	48	50	47	53
RtI Elementary Enrollment	2443	3537	5044	5855	5978	6205
RtI Elementary Referred	96	232	284	294	304	341
RtI Elementary Eligible	85	206	229	248	253	284
Standard Elementary Enrollment	4809	3459	1848	635	336	0
Standard Elementary Referred	158	165	98	44	22	0
Standard Elementary Eligible	135	134	76	31	16	0

Table 9
Number of Students Enrolled, Referred, Eligible, and Eligible LD Across Elementary Schools in District 2

	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Elementary Enrollment	10591	10409	10366	10214	10197	10338
Elementary Referred	263	311	289	236	248	305
Elementary Qualified	209	263	225	205	201	269
Elementary Qualified LD	52	73	59	56	49	76
RtI Elementary Enrollment	6560	7644	8239	9103	9086	9207
RtI Elementary Referred	122	164	215	209	224	267
RtI Elementary Qualified	102	150	183	186	182	236
Standard Elementary Enrollment	4031	2765	2127	1111	1111	1131
Standard Elementary Referred	141	147	74	27	24	38
Standard Elementary Qualified	107	113	42	19	19	33

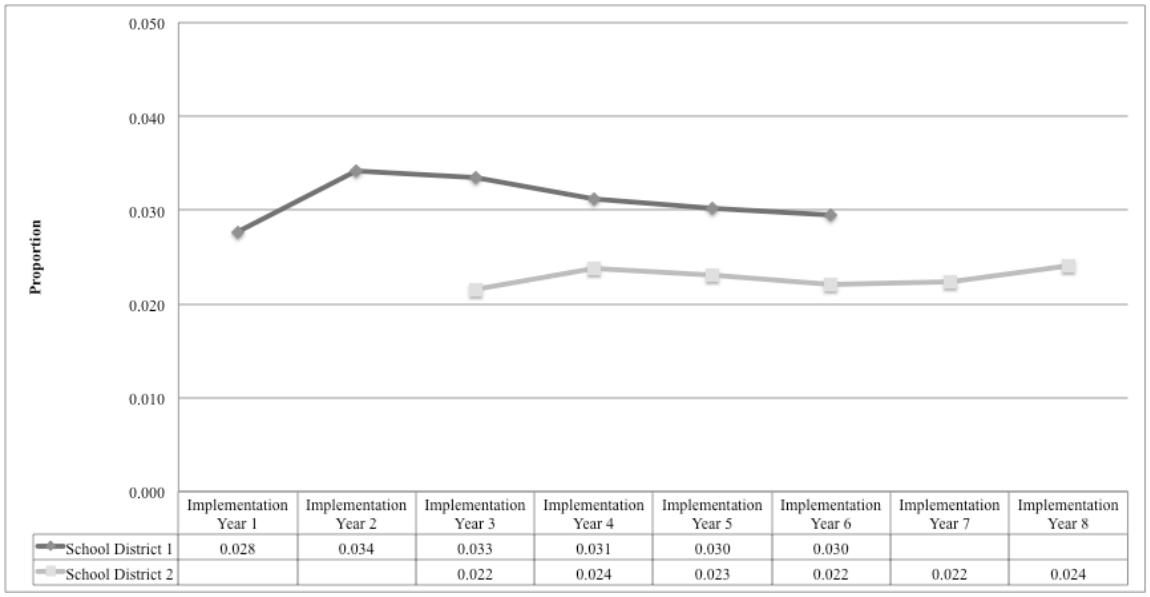
District Overall Data

While district level K-12 data were not the focus of analytic procedures for the present study, they are presented to provide an overall backdrop across districts. A substantial number of non-elementary, standard referral sources (i.e., middle school, high school, early college, alternative school, and parent) that did not implement or plan to implement the RtI model across the years of data collection were included in the total district data. The overall proportion of students referred across years by districts are reported in

Figure 1 and the overall proportions of students eligible across years by district are displayed in Figure 2.

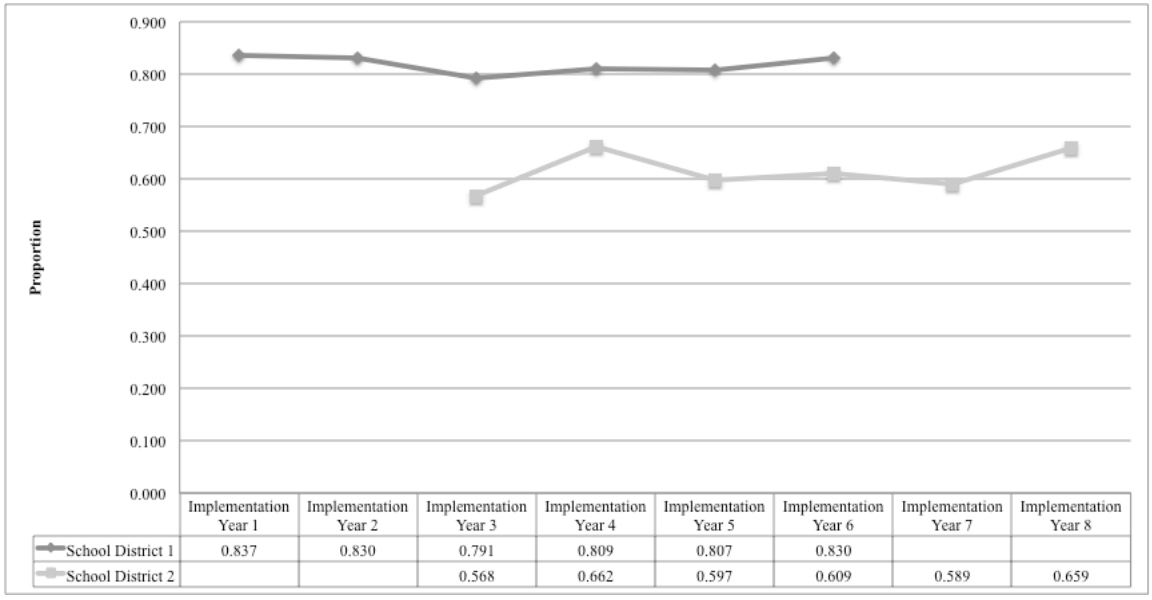
The overall referral proportion in Figure 1 includes referrals from all referral sources (i.e., elementary schools, middle school, high schools, parents, early college, and alternative schools), and reflects the trend of District 1 to refer a larger proportion of children, overall, than District 2. A review of the data indicates that the proportion of referrals are relatively stable over time, with minimal variation. This is consistent across both districts.

Figure 2 depicts the total eligibility proportions across both districts and years of implementation, inclusive of all referral sources (i.e., elementary school, middle school, high school, parent, early college, and alternative school). A review of overall eligibility proportions indicates that while both districts appear to have relatively stable eligibility proportions across referral sources, proportions for District 1 were consistently higher than for District 2.



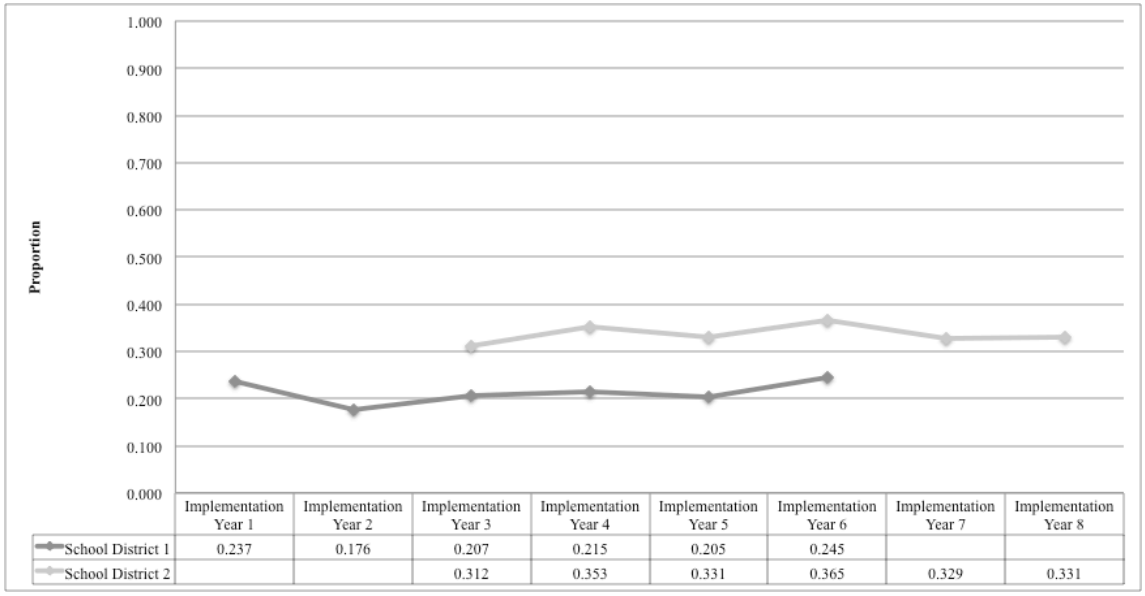
	Implementation Year 1	Implementation Year 2	Implementation Year 3	Implementation Year 4	Implementation Year 5	Implementation Year 6	Implementation Year 7	Implementation Year 8
School District 1	0.028	0.034	0.033	0.031	0.030	0.030		
School District 2			0.022	0.024	0.023	0.022	0.022	0.024

Figure 1. Overall proportion of students referred for each district across years of implementation.



	Implementation Year 1	Implementation Year 2	Implementation Year 3	Implementation Year 4	Implementation Year 5	Implementation Year 6	Implementation Year 7	Implementation Year 8
School District 1	0.837	0.830	0.791	0.809	0.807	0.830		
School District 2			0.568	0.662	0.597	0.609	0.589	0.659

Figure 2. Overall proportion of students eligible for special education for each district across years of implementation.



	Implementation Year 1	Implementation Year 2	Implementation Year 3	Implementation Year 4	Implementation Year 5	Implementation Year 6	Implementation Year 7	Implementation Year 8
School District 1	0.237	0.176	0.207	0.215	0.205	0.245		
School District 2			0.312	0.353	0.331	0.365	0.329	0.331

Figure 3. Overall incidence of LD, for each district across all referral sources for years of implementation.

Figure 3 depicts the incidence (i.e., number of students eligible) of learning disabilities across years of implementation for both school districts, inclusive of all referral sources (i.e., elementary school, middle school, high school, parent, early college, and

alternative school). The incidence of learning disabilities remained quite stable across both districts for all years of implementation., but was higher fro District 2 than for District 1.

Elementary Level Referral Data

The first research question pertained to whether or not the RtI model for determining eligibility for special education had impacted the number of referrals made for special education consideration. It was hypothesized that implementation of the RtI model would result in an increase of referrals between the first and second years of implementation, followed by a leveling off in successive years. This hypothesis was tested with comparisons of selected proportions. Figure 4 depicts the referral proportions of all elementary students, inclusive of students in schools using the RtI model for eligibility determination, as well as those in schools using a standard approach. Figure 5 and Figure 6 portrays the differences in referral proportions of students in schools utilizing the RtI model for eligibility determination versus those in schools using a standard model for eligibility determination across years of implementation and districts. Figure 5 presents data from District 1, and Figure 6 presents data from District 2.

According to Figure 4, although District 1 has fewer total enrolled students than District 2, District 1 refers a greater proportion of students than District 2. The difference is significant comparing years three, four, five, and six, as show in Table 10. Moreover, proportion of referrals in District 2 appear to be relatively stable, while the proportion of students referred in District 1 increased significantly between years one and two of implementation ($z=-8.774$, $p<.05$), followed by a leveling off of referral rates with non-significant differences between subsequent referral proportions during subsequent years. District 1 data are consistent with our initial hypothesis that referrals for special education

consideration would increase during the second year of implementation and then a level off in subsequent years. It is uncertain if a similar trend occurred in District 2, as data was not available for the first two years of implementation in that district.

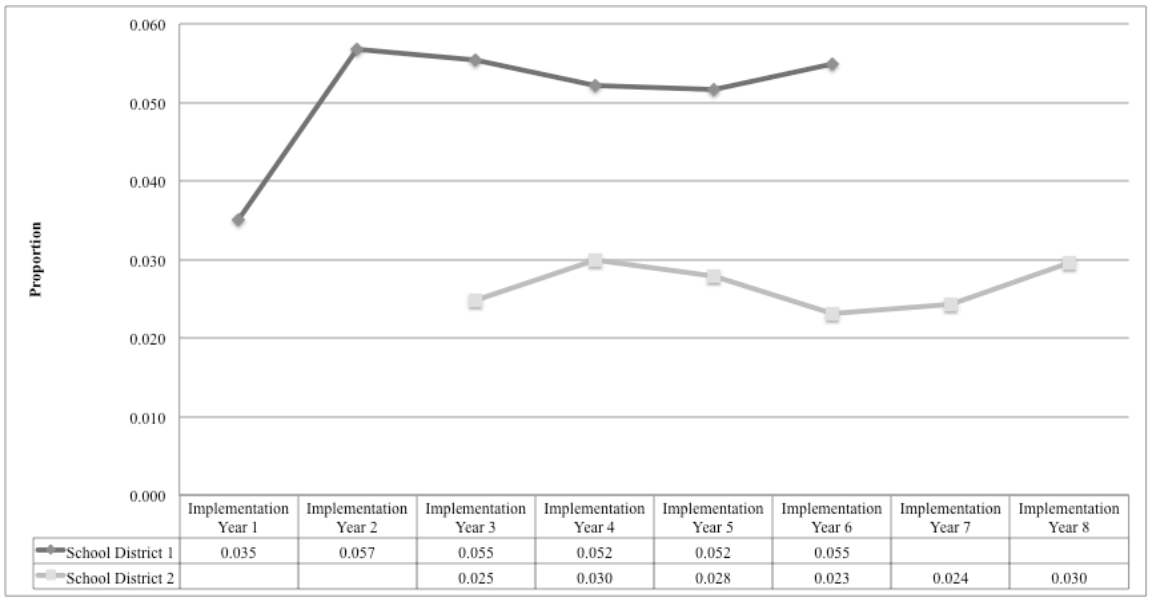


Figure 4. Total elementary referral proportion for each district across years of implementation.

Table 10
Z-scores for tests of significance between District 1 and District 2 Referral Proportions across years of implementation

	Year 3	Year 4	Year 5	Year 6
z-score	14.619*	10.311*	11.122*	14.952*

Note. Column header refers to year of implementation. Only implementation years three through six were analyzed because those were the only years where data were available for both districts.
*p<.05

Figure 5 and Figure 6 represent a more detailed analysis of the first hypothesis with consideration of the difference in referral proportions across years of implementation for schools utilizing the RtI model for eligibility determination and for those schools using a standard model for eligibility determination. As can be seen in Figure 5, referral proportions

in elementary schools using the RtI model for eligibility determination in District 1 rose sharply between implementation years one and two from a proportion of .039 to a proportion of .066, followed by a decrease across years two through four from a proportion of .066 to a proportion of .050, and a leveling out in years five and six, with proportions around .050. The observed increase in referral proportions between year one and year two is significant ($z = -6.462$, $p<.05$), as are the observed decreases between years two and three ($z=2.543$, $p<.05$) and years three and four ($z=2.003$, $p<.05$). The difference between proportions across years four through six were not significant.

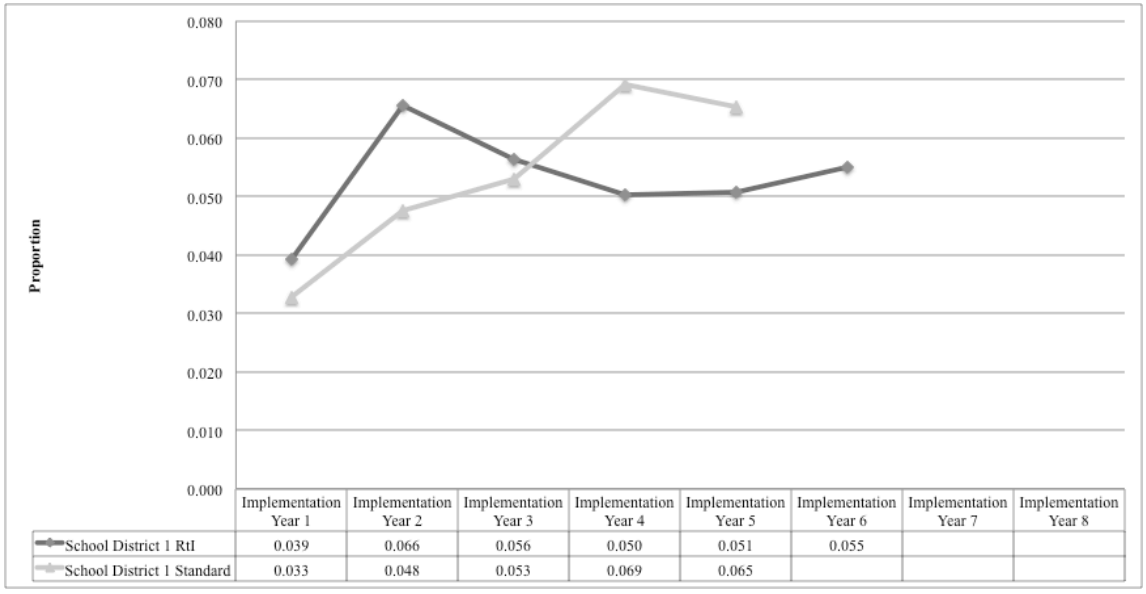
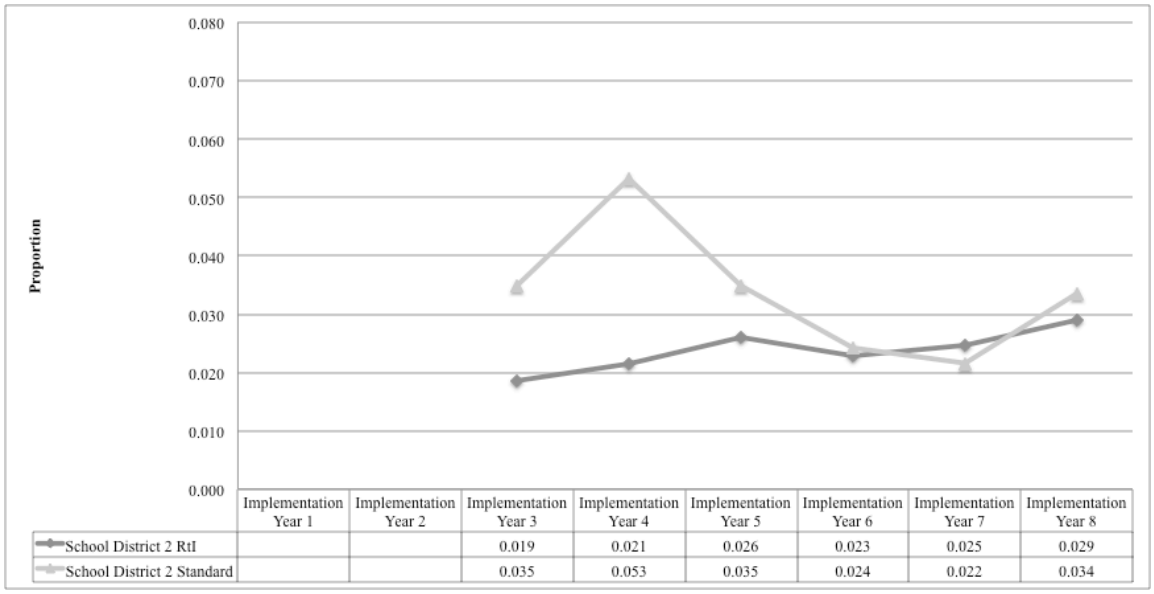


Figure 5. Referral proportions for RtI and standard elementary schools in school District 1 across years of implementation.

In contrast, the proportion of referrals from schools using a standard model in District 1 appear to consistently rise across implementation years one through four ranging from .033 in year one to .069 in year four, with slight leveling out in the fifth year (proportion=.065). There is no data for the sixth year, as all elementary schools had transitioned to the RtI model for eligibility determination by the sixth year. The increase in referrals from implementation year one to implementation year two ($z= -4.859$, $p<.05$) and the increase in referral

proportions from implementation year three to implementation year four (z=-2.392, p,.05) are significant. The observed trends in District 1 are consistent with the first hypothesis regarding the anticipated trends in referrals to special education following the implementation of the RtI model for eligibility determination, specifically, the RtI data support the research hypothesis, while the standard data do not.



	Implementation Year 1	Implementation Year 2	Implementation Year 3	Implementation Year 4	Implementation Year 5	Implementation Year 6	Implementation Year 7	Implementation Year 8
School District 2 RtI			0.019	0.021	0.026	0.023	0.025	0.029
School District 2 Standard			0.035	0.053	0.035	0.024	0.022	0.034

Figure 6. Referral proportions for RtI and standard elementary schools in school District 2 across years of implementation.

The data from District 2 do not include implementation years one and two. Therefore, information regarding initial trends in referral is not available for District 2. As shown in Figure 6, however, the referral proportions of students in RtI schools remain relatively stable across the third through eighth year of implementation with proportions around .020, while the referral proportions of students in schools using a standard model for eligibility determination rise sharply from implementation year three to year four with proportions increasing from .035 in year three to.053 in year four, followed by a decrease across years four through seven with proportions ranging from .053 in year four to .023 in year seven, and

another increase in year eight with a proportion of .034. These data reflect the variable nature of standard school referral proportions in District 1.

Results for the second hypothesis, that the implementation of the RtI model would result in significantly fewer referrals over time as compared to a standard model of eligibility determination, were inconclusive and differed across districts. District 1 data revealed referral proportions of students in RtI elementary schools were significantly higher than referral proportions in elementary schools that were utilizing a standard model for eligibility determination across implementation years one ($z= 2.081$, $p<.05$) and two ($z= 4.581$, $p<.05$), with similar referral proportions observed in year three. The referral proportions of students in standard model elementary schools surpassed those of RtI elementary schools to a significant degree in years four ($z= -4.589$, $p<.05$) and five ($z= -3.512$, $p<.05$). A comparison was made between the mean referral proportion of students in RtI schools across years one through five and the mean referral proportion in standard elementary schools across years one through five. The difference between mean referral proportions under the RtI and the standard model in District 1 was not significant ($z= -.317$).

In District 2 referral proportions of students from schools using a standard model to determine eligibility significantly exceeded referral proportions from schools using the RtI model in years three ($z=-7.392$, $p<.05$), four ($z=-12.257$, $p<.05$), and five ($z=-3.645$, $p<.05$). The difference in referral proportions across years six through eight were not significant. As with District 1, a comparison was made between the mean referral proportion of students from RtI schools across years three through eight and the mean referral proportion from standard elementary schools across years three through eight. The difference between mean

referral proportions was significant ($z=-4.307$, $p<.05$), but only for years three through five of implementation.

Elementary Level Eligibility Data

A second research question focused on whether or not the implementation of the RtI model impacts the proportion of referred students who are determined eligible for special education services. It was hypothesized that following implementation of the RtI model there would be a significantly higher proportion of students who qualified for special education services in RtI implementing schools as opposed to schools using a standard model for eligibility determination. This hypothesis was tested by examining the proportion of students found eligible for services by the number of students referred for an evaluation under the RtI model compared to the proportion of students found eligible by number referred under the standard model.

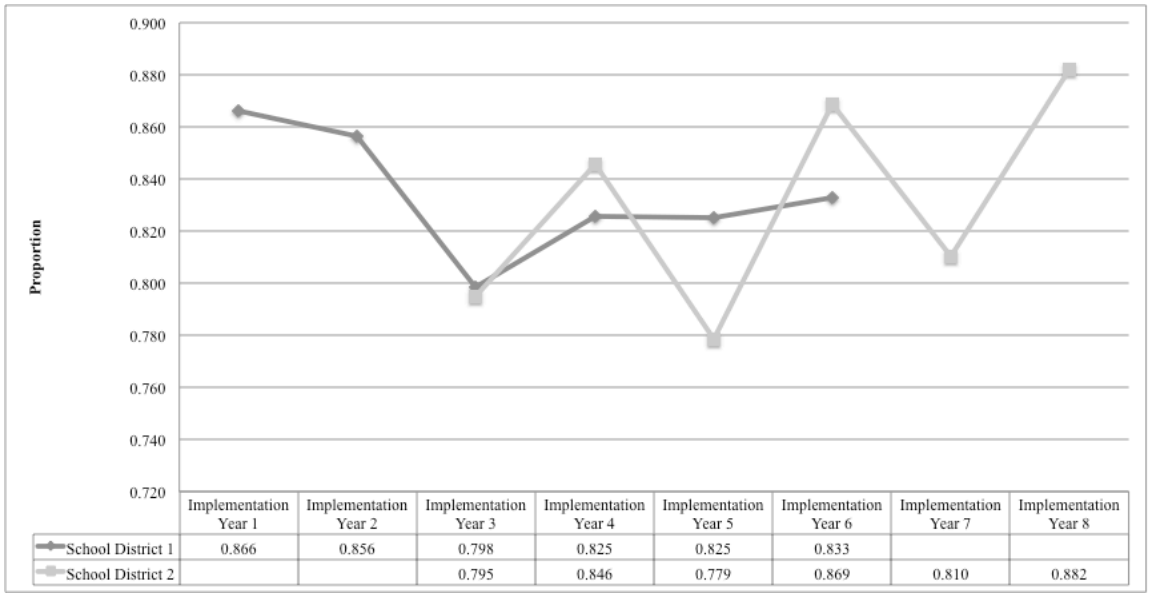


Figure 7. Total elementary proportions for each district across years of implementation.

Figure 7 presents the proportions of eligible students across all elementary schools, across each school district and years of implementation. The total elementary data includes

schools that are using the RtI model for eligibility determination, as well as those that are using a standard approach. In District 1 eligibility proportions are slightly different from year one to year two, with a significant decrease in proportions ($z= 2.472$, $p<.05$) from year two to three. There is a non-significant increase in eligibility proportions from year three to four, and the proportions remain relatively stable in years four through six, with non-significant differences. In District 2 significant variability of eligibility proportions was found across all years of implementation (Table 11).

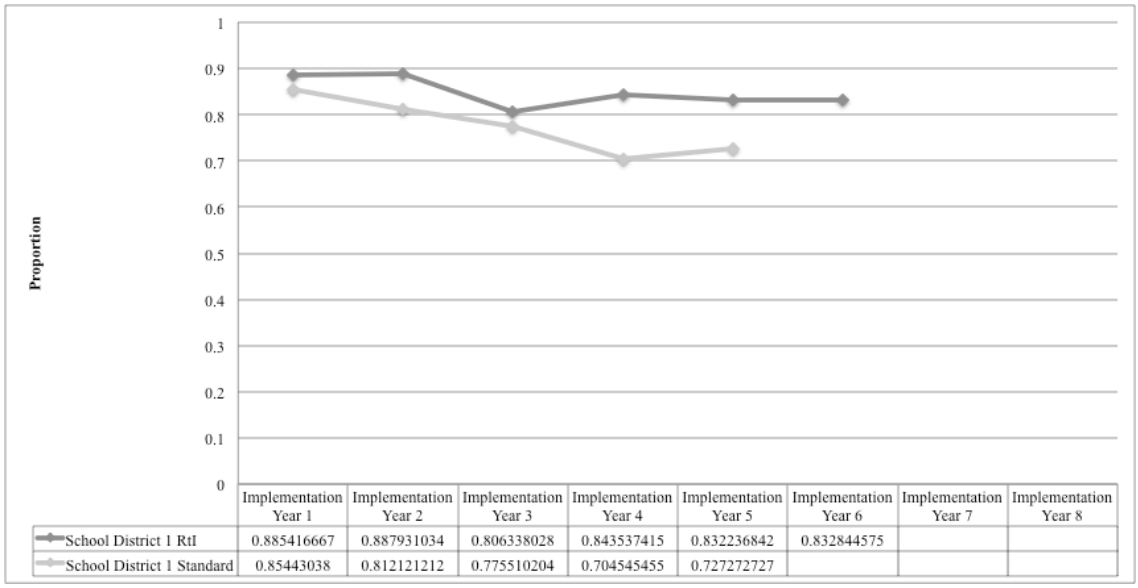
Table 11
Z-scores for tests of significance of eligibility proportions between years of implementation across all elementary schools.

	1 – 2	2 – 3	3 – 4	4 – 5	5 – 6	6 – 7	7 – 8
District 1, z-score	0.195	2.472*	-1.176	0.013	-0.367		
District 2, z-score			-2.254*	2.987*	-3.857*	2.473*	-3.311*

Note. Column headers indicate the years of implementation between which the difference in eligibility proportions were calculated.
*p<.05

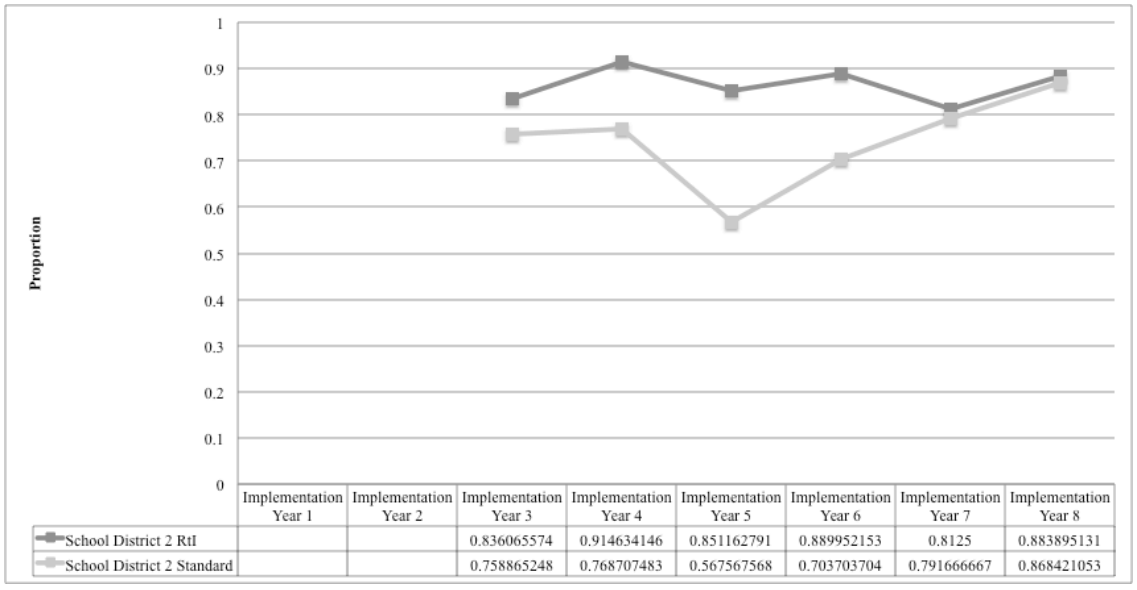
Figure 8 and Figure 9 present data on the difference in eligibility proportions between schools using the RtI model for eligibility determination versus those schools using the standard model for eligibility determination across years of implementation. As can be seen across both districts, the eligibility proportions are consistently higher in schools that are using the RtI model, versus those that are using the standard model. Differences between eligibility proportions between schools that are implementing the RtI model and those that are using a standard model for eligibility determination are significant in District 1 across years two ($z=3.008$, $p<.05$), four ($z=4.381$, $p<.05$), and five ($z=3.260$, $p<.05$), as well as in years three ($z=2.213$, $p<.05$), four ($z=5.087$, $p<.05$), five ($z=7.903$, $p<.05$), and six ($z=5.169$,

p<.05) for District 2. Eligibility proportions in District 2 are similar and the differences are not significant between RtI and traditional schools across both implementation years seven (z=.582) and eight (z=.580).



	Implementation Year 1	Implementation Year 2	Implementation Year 3	Implementation Year 4	Implementation Year 5	Implementation Year 6	Implementation Year 7	Implementation Year 8
School District 1 RtI	0.885416667	0.887931034	0.806338028	0.843537415	0.832236842	0.832844575		
School District 1 Standard	0.85443038	0.812121212	0.775510204	0.704545455	0.727272727			

Figure 8. Eligibility proportions for RtI and standard elementary schools in District 1 across years of implementation.



	Implementation Year 1	Implementation Year 2	Implementation Year 3	Implementation Year 4	Implementation Year 5	Implementation Year 6	Implementation Year 7	Implementation Year 8
School District 2 RtI			0.836065574	0.914634146	0.851162791	0.889952153	0.8125	0.883895131
School District 2 Standard			0.758865248	0.768707483	0.567567568	0.703703704	0.791666667	0.868421053

Figure 9. Eligibility proportions for RtI and standard elementary schools in District 2 across years of implementation.

Mean eligibility proportions and differences were calculated for both districts, as well as the difference between these proportions. In District 1 the mean eligibility proportion for RtI schools across implementation years one through six was .851, while the mean eligibility proportion for standard elementary schools across years one through six was .775. In District 2 the mean eligibility proportion for RtI schools across implementation years three through eight was .865, while the mean referral proportion for standard elementary schools across years three through eight was .743. The observed difference between these eligibility proportions was significant in both District 1 ($z=2.562$, $p<.05$) and in District 2 ($z=3.635$, $p<.05$).

Eligibility proportions were also analyzed according to the difference in proportions between years of implementation, across models of implementation. While these analyses were not related to the proposed hypothesis, the observed trends in data were interesting, given the relative stability of eligibility proportions in schools implementing the RtI model contrasted against the variability in standard model schools. In District 1 elementary schools implementing the RtI model demonstrated eligibility proportions between .832 and .888 ($z= -2.651$, $p<.05$) were found across all years of implementation, while eligibility proportions in schools using a standard model for eligibility determination ranged from .705 to .854 ($z= -3.672$, $p<.05$). In District 2 elementary schools implementing the RtI model eligibility proportions were consistently above .80, with a range of .813 to .915. In elementary schools using a standard model for eligibility determination in District 2 considerable variability in eligibility proportions was found, with a significant decrease observed between years four and five ($z=4.596$, $p<.05$) and a significant increase between years five and six ($z=-2.031$, $p<.05$).

Elementary Level Incidence of LD

An important feature of the introduction of the RtI model with the passage of the IDEIA legislation in 2004 was to provide a more appropriate, data-driven, and accurate avenue to eligibility determination of learning disabilities. It was also theorized that the RtI model could reduce the incidence of learning disabilities (Fuchs and Vaughn, 2012). To that end, a fourth research hypothesis was advanced, asserting that there would be a significantly lower incidence of students identified as learning disabled with the implementation of the RtI model as compared to the standard model.

Figure 10 presents the incidence proportions across all elementary schools, across each school district and across years of implementation. The total elementary data includes schools that are using the RtI model for eligibility determination, as well as those that are using a standard approach. As shown in Table 12, the incidence of learning disabilities remains relatively stable across years of implementation for both districts. However, a significantly higher incidence of learning disabilities was found in District 2 than in District 1 for the years in which data were provided for both districts (i.e., implementation years three through six).

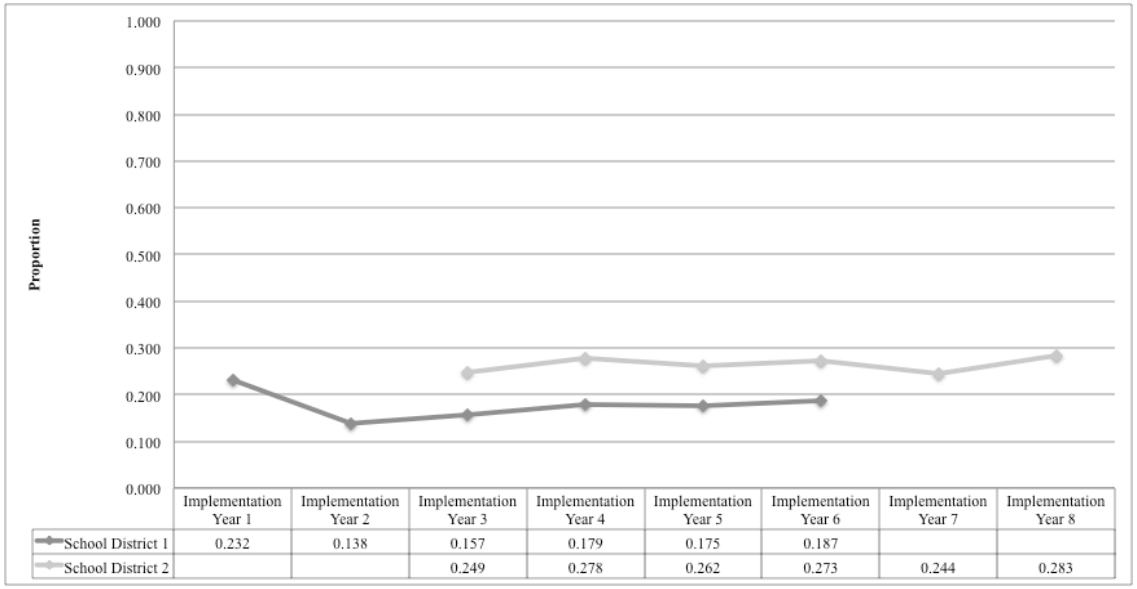


Figure 10. Total incidence of LD for RtI elementary and standard elementary schools across both districts for years of implementation.

Table 12
Z-scores for tests of significance of incidence proportions between years of implementation across all elementary schools.

	Years 3 – 4	Years 4 – 5	Years 5 – 6
District 1, z-score	-0.998	0.195	-0.514
District 2, z-score	-1.004	0.540	-0.363

Note. Column headers indicate the years of implementation between which the difference in incidence proportions of learning disabilities were calculated.
*p<.05

Figure 11 shows the incidence of learning disabilities for schools that are implementing the RtI model and for schools that are using the standard model of eligibility determination in District 1 across years of implementation, while Figure 12 displays this data for District 2. The incidence of learning disabilities during each year of implementation was similar between RtI schools and standard schools in District 1, with no significant differences (Table 13). In District 2 the incidence of students with learning disabilities was significantly

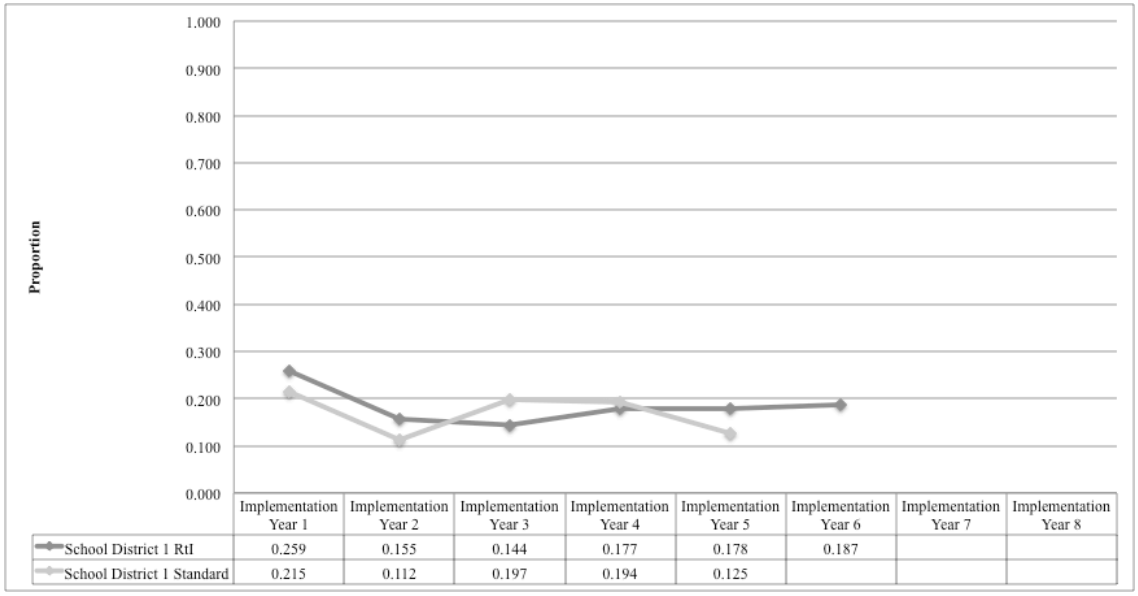
lower in implementation year three (z=-2.923, p<.05) in schools implementing the RtI model than in schools using a standard model. However, the incidence of students with learning disabilties was significantly higher in schools implementing the RtI model than in schools using the standard model in years five (z=2.220, p<.05), six (z=3.135, p<.05), and seven (z=2.370, p<.05).

Mean incidence of students with learning disabilities were compared across districts, as well as between the mean incidence for schools implementing the RtI model and schools using the standard model. In District 1 the mean incidence of learning disabilities for RtI schools across implementation years one through six was .183, while the mean incidence of learning disabilities for standard elementary schools across years one through six was .169. In District 2 the mean incidence of learning disabilities for RtI schools across implementation years three through eight was .257, while the mean incidence of learning disabilities for standard elementary schools across years three through eight was .240. The observed difference between these eligibility proportions was not significant in either District 1 (z=0.443) or District 2 (z=0.432).

Table 13
Z-scores for tests of significance of incidence proportions between elementary RtI schools and standard elementary schools across years of implementation, District 1.

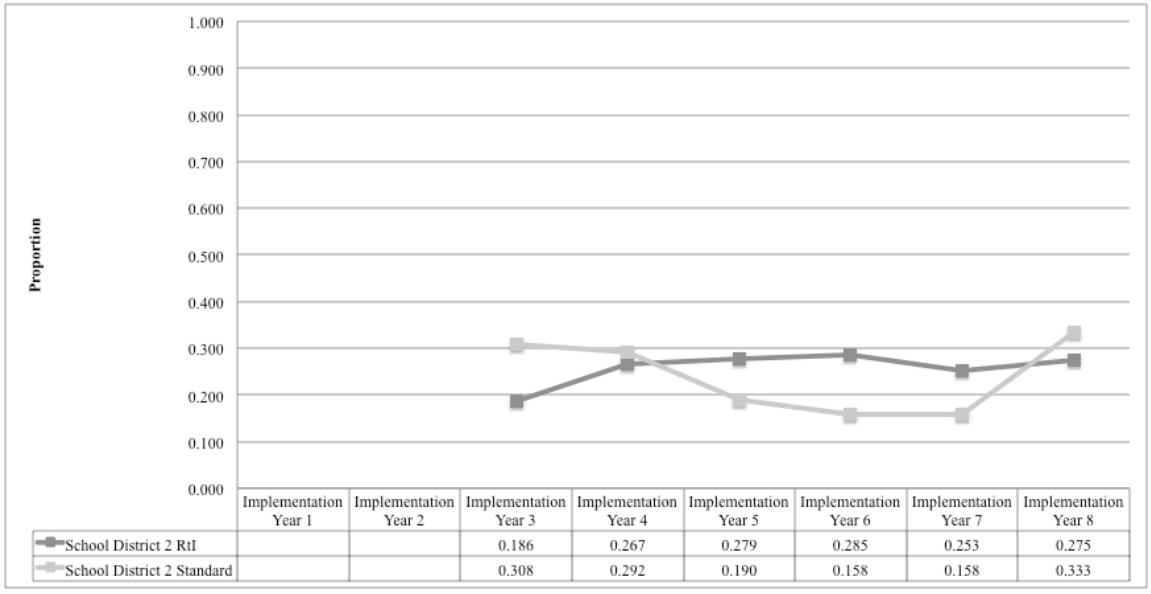
	Year 1	Year 2	Year 3	Year 4	Year 5	Mean
z-score	1.087	1.666	-1.752	-0.490	1.715	0.443

Note. Column header refers to year of implementation. Only implementation years three through six were analyzed because those were the only years where data were available for both districts.
*p<.05



	Implementation Year 1	Implementation Year 2	Implementation Year 3	Implementation Year 4	Implementation Year 5	Implementation Year 6	Implementation Year 7	Implementation Year 8
School District 1 RtI	0.259	0.155	0.144	0.177	0.178	0.187		
School District 1 Standard	0.215	0.112	0.197	0.194	0.125			

Figure 11. Incidence of LD for RtI and standard elementary schools in District 1 across years of implementation.



	Implementation Year 1	Implementation Year 2	Implementation Year 3	Implementation Year 4	Implementation Year 5	Implementation Year 6	Implementation Year 7	Implementation Year 8
School District 2 RtI			0.186	0.267	0.279	0.285	0.253	0.275
School District 2 Standard			0.308	0.292	0.190	0.158	0.158	0.333

Figure 12. Incidence of LD for RtI and standard elementary schools in District 2 across years of implementation.

CHAPTER V: DISCUSSION

Research Question One

The first research question examined in this study pertained to the impact of the implementation of the RtI model on the proportion of students referred for special education. As shown earlier, District 1 referred significantly more students for eligibility determination than District 2 across all years and referral sources (i.e., elementary school, middle school, high school, parent, early college, and alternative school). Further, the referral trend of District 1 having a higher referral proportion than District 2 was similar across elementary schools as well. Information gained through interviews with the implementation overseers at each district suggests that the observed differences in referral proportions between districts is primarily due to the way each district evaluated and measured progress.

District 1 uses curriculum-based assessments at the student's grade level, whereas District 2 uses a combination of grade level and instructional level assessments for progress monitoring. Independent, instructional, and frustration levels of functioning were first referenced in the context of reading (BETT, 1946), but are also applicable to other academic domains (Burns, Codding, Boice, & Lukito, 2010; Parker, McMaster, & Burns, 2011). Instructional level identifies the point at which a student is not proficient with a given skill, but at which the student has sufficient background knowledge and learning to access, practice, and augment the skill with instruction and typical levels of support (Betts, 1946; Halladay, 2010; Parker & Burns, 2014). In contrast, a frustration level is conceptualized as the point at which a student requires considerable assistance, scaffolding, and teacher support

to access information, and at which a student may not be able to perform requested tasks, despite substantial teacher support (Betts, 1946 and Collins & O'Brien, 2011). Therefore, it stands to reason that students would be better able to demonstrate their acquired skills and achieve progression within a skill set when those skills were measured at the student's instructional level versus a level that is far beyond the child's level of understanding and instruction. It also stands to reason that progress on instructional level objectives and measures is, theoretically, a more accurate depiction of a child's rate of skill acquisition (i.e., learning rate).

In the context of RtI, students who fail to meet grade level universal screening expectations are likely functioning at a frustration level and, as a result, are likely to have difficulty obtaining progress on grade level assessments, particularly when progress is measured against that of their typically progressing peers. In contrast, when student progress is measured at the student's instructional level, it is highly probable that the student will more easily demonstrate adequate progress. It might be, then, that the difference in overall referral proportions is primarily the result of a higher standard of comparison in District 1 as compared to District 2.

The first hypothesis proposed a significant increase in referrals to special education during the second year of RtI implementation, followed by a leveling off in subsequent years. Although the implementation of the RtI model for eligibility determination may have had an impact on referrals to special education, the extent of that impact is not consistent between the two school districts. The first hypothesis could only be tested with data from District 1, in that referral data during the first two years of implementation were critical to the hypothesized differences in referral proportions. Referral data were not available for the first

two years of implementation in District 2. Data from District 1, however, does offer support for the hypothesis that referrals would increase in the second implementation year, followed by a leveling off during subsequent implementation years.

The second hypothesis proposed a significant decrease in referrals to special education from schools implementing the RtI model as compared to schools using the standard model. Results for testing the second hypothesis are less clear, with different results observed across the two districts. The proportion of referrals for schools implementing the RtI model in District 1 was significantly greater than the referral proportions by schools using the standard model in year two, and significantly less than the proportions of schools using the standard model in years four and five. The reason for these differences is unclear; however, it may be that as schools had more practice with implementing the RtI model, they became more efficient in the process, thereby referring fewer students over time.

Significant variability of referral proportions was found between schools implementing the RtI model and those using the standard model in District 2 implementation years three through five, with similar referral proportions observed across years six through eight. A variable confounding results in District 2, however, may be the provision of RtI training in the absence of RtI implementation. Elementary schools using the standard model in District 2 in years five and six had received previous training in the RtI model, but were not implementing the model as a means of eligibility determination. Therefore, it is plausible that the training and orientation to the model may have fundamentally altered school staff's perceptions and thereby impacted the method and nature of referrals, causing referral trends in schools that continued to use a standard model for eligibility determination to approximate the trends in RtI schools. It is also plausible that the observed differences may be related to

factors beyond the scope of the present study. These results provide inconclusive support regarding the advantage of the RtI model in reducing overall referrals to special education over the standard approach. Further inquiry with a larger sample is warranted, given the differences between the two observed districts.

Research Question Two

The second research question concerned the impact of the RtI model on the eligibility determination of students referred for special education. At an overall district level, eligibility proportions appear relatively stable over the years of implementation; however, those proportions were inclusive of all referral sources. The variability across referral sources combined to yield total eligibility proportions that appear stable over time; however, when controlled for referral source a high degree of variability and marked outliers was observed. The proportion of referred elementary students, inclusive of both RtI and standard elementary schools, that were found eligible for special education varied significantly from year to year.

The third hypothesis asserted that there would be higher proportion of students determined eligible in schools implementing the RtI model versus those using a standard model. Given the need to control for referral source and the fact that RtI has only been implemented at the elementary level across both districts, data from elementary schools was isolated and analyzed, separating all elementary referrals into RtI and standard referring schools. Higher eligibility proportions were found when the RtI model was employed, as compared to when the standard model was used. Data from both districts indicate eligibility proportions near or in excess of 90% in RtI schools, while eligibility in standard elementary schools ranged from 55% to 85%, with an average of 75% and a median of 77%. The

eligibility proportion can be best seen as a measure of a true positive, that is, when a child referred for an evaluation is determined to indeed meet eligibility criteria. In District 2 eligibility proportions for schools implementing the RtI model were significantly higher than the proportions of schools using a standard model across years three through five ($p<.05$), with similar proportions observed in years seven and eight, a trend that is similar to the previously noted trend in referral proportions for District 2. As was previously mentioned in the discussion on District 2 referral proportions, the eligibility proportions of schools using a standard model may have been similar to the eligibility proportions of schools using the RtI model in implementation years seven and eight in District 2 because of the RtI training that was provided to all elementary schools, without subsequent implementation of the RtI model in elementary schools that continued to use the standard model.

Research Question 3

The third and final research question concerned the impact of implementing the RtI model on the proportion of students found eligible for special education as a student with a learning disability. The data pertaining to this question were framed in terms of the incidence of learning disabilities, that is, the number of students determined eligible for learning disabilities compared to the number of students found eligible for special education. The stability of the incidence proportions of learning disabilities across all years of implementation and referral sources for both districts, as well as across all elementary schools, inclusive of RtI and standard model schools, for both Districts, suggests that the implementation of the RtI model did not impact the incidence of learning disabilities at the district or total elementary level.

Hypothesis four asserted that the incidence of learning disabilities would be significantly lower in schools implementing the RtI model compared to schools using a standard model. The observed incidence of learning disabilities in District 1 was similar across both RtI implementing and standard model schools. Significant variability in incidence rates across RtI implementing and standard model schools was observed in District 2, with RtI schools demonstrating incidence rates lower than standard elementary schools in year three, incidence rates higher than standard elementary schools in years five through seven, and rates similar to standard elementary school in years four and eight. The basis for this variation is not clear, with further research needed into the mixed pattern of observed differences. The results pertaining to hypothesis four are inconclusive, with no significant difference in mean incidence proportions found between RtI and standard model schools in District 1 and District 2. The finding of this study is thus that the two the models of eligibility determination do not result in a difference in the proportion of students found eligible for special education as a student with a learning disability.

Limitations

A factor limiting findings for this study is the lack of experimental control over the source and nature of the primary data. The primary source of data for the current study was district level records that were translated into referral proportions, eligibility proportions, and incidence of learning disabilities. Disadvantages include lack of control on the methods and nature of data collection, as well as a lack of control of confounding variables. The principal investigator did not have control over the types of data that were collected and the periods for which data were collected. As a result, data were not available for either district prior to the implementation of the RtI model, and data were not available for the first two years of

implementation in District 2. A related factor limiting findings is that, since proportions were the data available for analysis, multiple applications of tests of significance were required which could inflate chance effects. However, hypothesized effects defined the basis for the tests.

The issue of confounding variables pertained to the implementation of the RtI model in District 2, in that District 2 provided training in a stepwise fashion to all elementary schools. Schools, however, varied in their transition to using the RtI model for eligibility determination. As such, the trends in data of standard schools in the seventh and eighth years of implementation may be due, in part, to prior training. That is, the training, in and of itself, may have changed the way school staff perceived and intervened with students prior to making a referral for special education consideration.

While results of the current study show promise for reduction of referral and increased eligibility proportions when the RtI model for eligibility determination is implemented, the data are at times inconsistent and confounded. Replication of the present study with districts that followed a stepwise approach to training and implementation, with no protracted delays between the end of training and the initiation of implementation, are needed to provide stronger evidence for the model's impact.

As can be seen from the interviews conducted within this study, even in the context of similar training and support, variations in the implementation of the RtI model are likely. It is unclear to what extent such variations impact the integrity of the model and decisions made within that model. What is clear, however, within the context of the present study, is that there is an impact, as found in observed differences between referral proportions across the two districts, differences that appeared to be a function of the distinctly different approaches

to assessing and monitoring progress. As such, further research is needed to aid understanding of how frequently variations in model implementation occur, the nature of those variations, and what difference, if any, those variations make in referral and eligibility proportions. Research should also seek to identify what aspects of model implementation are essential and should be implemented with rigid adherence, as well as which facets of implementation are malleable.

Analyses of intervention fidelity and monitoring as it relates to referral and eligibility proportions was beyond the scope of the present study; however, given the movement of states away from discrepancy-based evaluations and toward a focus on needs-based, success-focused services, intervention fidelity is an important consideration for future research. Conducted interviews revealed great variability in the monitoring of intervention fidelity, ranging from formal checklists to informal self-report. While it is reasonable to believe that methods were implemented with a high degree of fidelity, some variability of implementation is likely. Future research should look at referral and eligibility proportions, in light of intervention fidelity to determine if those variables play a role in resulting proportions.

The results indicate that the implementation of the RtI model is potentially associated with reduced referrals to special education and an increased number of referred students who are found eligible for special education. An increase in eligibility proportions is likewise associated with a concurrent decrease in false positive referrals, and reducing the number of children referred for an evaluation who do not qualify for services can conserve resources, including money and time. A search for literature addressing the cost associated with false positive referrals, however, returned no scientific evidence. A literature search regarding the

cost associated with implementing the RtI model was also not productive. As states move toward an intervention and eligibility model that is focused on student needs and ensuring success, it would be beneficial to have an idea of the associated costs and benefits of such a transition. Costs and benefits should be considered in terms of both tangible and intangible expenses and benefits. It would also be helpful to know the cost of implementing the RtI model above and beyond the cost of continuing with traditional models. Multiple avenues exist for resource allocation when transitioning between models, and it is possible that the greatest expense in implementing the RtI model is in terms of time dedicated to problem-solving, examining data in a new manner, and resource allocation, rather than the need for increased monetary funding.

In terms of school psychologists' role, should further research support a consistent decrease in referral proportions, then additional research should address how these decreases in referral proportions impact the job role and responsibilities for school psychologists. It would be interesting to see if the implementation of the RtI model were associated with a simultaneous role change for school psychologists, with less time focused on individual, standardized assessment and more time devoted to other tasks, such as intervention development, consultation, and systems level advocacy and consultation. Further research is needed in addressing these questions.

Implications

There is often a disconnect between training and implementation, such that elements of implementation are left open to interpretation as training is passed down from one level to the next. As an example, within the present study both districts received similar training and support at the district level from the state, but each district developed different ways of

measuring students' progress, particularly at Tier III. Moreover, both districts provided the same training to all schools, but there are differences at the school level in terms of adherence to the model, intervention fidelity, staffing, and intervention training. Given that little research exists as to why and how these differences occur, school districts implementing the RtI model and school psychologists supporting such implementation are encouraged to follow current best practice guidelines in the face of on-going research.

The North Carolina Department of Public Instruction released a memorandum to directors of exceptional children programs across the state on February 16, 2016 (W.J. Hussey, personal communication). The letter alerted directors to one of the most important pieces of learning disability legislative action in the state of North Carolina since the federal government's formal recognition of the learning disabilities construct in 1968 (U.S. Office of Education, 1968). The NC State Board of Education approved minor alterations to the definition of the category of learning disabilities by including reference to inadequate learning, in spite of high quality instruction and research-based interventions. Revisions to the way in which learning disabilities are to be documented and identified, however, were substantial.

Previously students could be found eligible for learning disabilities through one of three avenues, including the discrepancy model, the alternative to discrepancy analysis, and a pattern of strengths and weaknesses. The new policies do away with these methods for the determination a learning disability. Instead, a child's responsiveness to research-based interventions, as documented through a multi-tiered system of support is an essential component within a balanced, comprehensive assessment. Indeed, the proposed regulation amendments include language specific to the RtI model, such as universal screening,

progress monitoring, diagnostic assessment, and reference to the state's sanctioned problem-solving framework, Multi-Tiered System of Support (MTSS) (NCDPI, personal communication outlining procedural changes accepted February 4, 2016, February 16, 2016). The state has mandated that all school districts fully implement the new policies no later than July 1, 2020 (NCDPI, 2015).

The changes in policy highlight two important conceptual shifts that are steeped in sound theoretical underpinnings. First, there is a shift from focusing on who is and is not eligible for services toward focusing on meeting students' learning needs through a multi-tiered system of support with intervention based upon frequent, on-going, formative assessment and progress monitoring. Second, there is a focal shift "away from unexpected underachievement relative to intellectual ability to unexpected underachievement in the context of high quality instruction and intervention"(W.J. Hussey, personal communication, February 16, 2016).

The implications associated with the present study take on heightened importance in light of these recent changes. Preliminary data regarding the impact of the RtI model for reducing the incidence of learning disabilities is inconclusive, with one district demonstrating no impact and the other demonstrating variability across time. The potential benefit of the RtI model lies in the possibility of a simultaneous reduction of referrals to special education and increase in the proportion of referred students who are found eligible for special education services.

While variable across districts, the finding that a higher percentage of referred students may be found eligible for special education in RtI implementing schools may be an artifact of the noted shifts in the conceptualization of special education. Regardless of the

reason for the observed changes, reduced proportions of referred students are important to the degree that resources are saved as a result of less time compiling referral information, completing referral paperwork, and participating in decision-making meetings. However, perhaps an even more important benefit is the implied benefit to students. Given that student progress in the context of targeted intervention is the very criteria for refraining from initiating referral under the RtI model, a reduction in referral proportions within the RtI model suggests that the learning needs of students are being met and improved student outcomes are being achieved.

While reductions in the proportion of referrals to special education are important, the increase in proportions of eligible students and corresponding reduction in false positive referrals likely have the most tangible impact on the work of school psychologists. Eligibility proportions following RtI implementation at or approaching 90% across both districts suggest a marked increase in true positive referrals and a reduction in false positive referrals compared to standard model schools. Stated differently, RtI implementing schools correctly refer students for evaluation in about 90% of cases and refer false positives (i.e., students whom they believe to have a disability when the students, in reality, have no such disability) about 10% of the time. In contrast, schools using a standard model vary in their perception of the existence of a disability, resulting in true positives (i.e., students who meet criteria for a disability) about 50% to 85% of the time and resulting in false positive referrals 25% to 54% of the time.

Reduced false positive referrals is an important finding, given that, according to a google search, the average cost of a psycho-educational evaluation is estimated upwards of one- and two-thousand dollars and requires an estimated 30 or more hours of staff and

psychologist time. The cost of evaluating students prematurely or of evaluating a child who does not meet eligibility criteria is a substantial burden for both schools and tax-payers, and school districts and governing agencies should find encouragement in a 15% to 44% reduction in false positive referrals following the implementation of the RtI model. Reducing false positive referrals conserves educational, monetary, and staff resources, which may be better spent informing instruction and providing interventions earlier to struggling students, an implication that fits with current NC State Board of Education guidelines and guidance documents (W.J. Hussey, personal communication, February 16, 2016).

While categorical placement continues to be prevalent in special education, there is a shift away from traditional means of referral, evaluation, and eligibility toward identifying the level of support that each student requires for educational success. The RtI model changes the focus from post-referral assessment and data gathering to pre-referral intervention delivery and data collection through a multi-tiered system of support. As such, students are found eligible for special education based on their lack of measured progress rather than their demonstration of a discrepancy between cognitive and standardized achievement, and the benchmarks for referral and eligibility are comparable. The increased proportions of eligible students observed when the RtI model is implemented may thus be related to the similarities of pre-referral data and their use to make eligibility determinations, rather than increased accuracy in identifying the presence of disabilities and associated etiology in students.

Appendix 1:

RtI Interview Questions

1. What data for documenting RtI is required (i.e., data over time (progress monitoring), multiple measures, specific measure (e.g., CBM, fluency, etc), individual data analysis (factors contributing to change), instructional strategies used (description of interventions)?
2. What is the frequency of data collection for each form of data referenced?
3. What types of data collection instruments (i.e., universal screening, formative assessment, data over time (fluency measures, other progress monitoring), other data) are required during the RtI process?
4. What is the language regarding fidelity of practice?
5. Is intervention fidelity monitored? How? By whom?
6. How is progress or responsiveness defined (i.e., gap analysis, rate of learning, dual discrepancy)?
7. How many tiers?
8. What happens at each tier (e.g., universal at tier I; small group intervention, individual progress monitoring at tier II; special education referral at tier III…additional individual assessment required)?
9. Are additional assessments (i.e., cognitive testing, academic achievement, speech-language screening, speech-language evaluation, behavioral screening, other) as part of the eligibility process? If so, what types of assessment and at what level within the tiered system?

10. How are other disabilities (i.e, AU, DD, ED, HI, ID, SL, etc) handled within the RtI model?
11. How are parent referrals handled within the RtI model?

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