

Western Kentucky University

TopSCHOLAR®

Masters Theses & Specialist Projects

Graduate School

Spring 2021

Response to Intervention in Early Childhood Education

Kendyl Young Hinson

Western Kentucky University, kendyl.young711@topper.wku.edu

Follow this and additional works at: <https://digitalcommons.wku.edu/theses>



Part of the [Early Childhood Education Commons](#), [Elementary Education Commons](#), [School Psychology Commons](#), and the [Special Education and Teaching Commons](#)

Recommended Citation

Hinson, Kendyl Young, "Response to Intervention in Early Childhood Education" (2021). *Masters Theses & Specialist Projects*. Paper 3475.

<https://digitalcommons.wku.edu/theses/3475>

This Thesis is brought to you for free and open access by TopSCHOLAR®. It has been accepted for inclusion in Masters Theses & Specialist Projects by an authorized administrator of TopSCHOLAR®. For more information, please contact topscholar@wku.edu.

RESPONSE TO INTERVENTION IN EARLY CHILDHOOD EDUCATION

A Specialist Project
Presented to
The Faculty of the Department of Psychology
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
Of the Requirements for the Degree
Specialist in Education

By
Kendyl Hinson

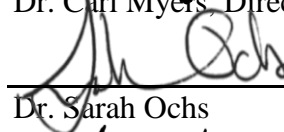
May 2021

RESPONSE TO INTERVENTION IN EARLY CHILDHOOD EDUCATION

Date Recommended March 5, 2021



Dr. Carl Myers, Director of Specialist Project



Dr. Sarah Ochs



Dr. Adam Lockwood



Associate Provost for Research and Graduate Education

ACKNOWLEDGMENTS

I would like to thank Dr. Carl Myers for all of his time and patience while working with me throughout the writing of this thesis. I would also like to thank my other committee members, Dr. Sarah Ochs and Dr. Adam Lockwood for their time and feedback throughout this process. Last, I would like to thank my parents and my husband, Peyton for their support and encouragement the last few years.

CONTENTS

Introduction.....	1
Literature Review.....	4
Statement of Problem.....	15
Method.....	17
Results.....	19
Discussion.....	41
References.....	46

LIST OF FIGURES

Figure 1. The PRISMA flow diagram (Moher et al., 2009).....	18
---	----

LIST OF TABLES

Table 1. Articles Examining Response to Intervention in Early Childhood Education.....	20
Table 2. Academic and Social Emotional Behaviors Recommended for RTI in Early Childhood.....	38
Table 3. Methods of Assessment within RTI at the Early Childhood Level.....	39
Table 4. Interventions and Tools used at the Early Childhood Level.....	40

RESPONSE TO INTERVENTION IN EARLY CHILDHOOD EDUCATION

Kendyl Hinson

May 2021

Pages 55

Directed by: Dr. Carl Myers, Dr. Sarah Ochs, and Dr. Adam Lockwood

Department of Psychology

Western Kentucky University

The purpose of this study was to review literature on Response to Intervention (RTI) at the early childhood level. RTI has become increasingly prevalent within K-12 settings. Less research exists for the expansion within early childhood settings. A systematic review of literature was conducted and all available literature on RTI in early childhood education since 2004 was identified and reviewed. Articles were sorted into three broad categories for review: (a) combined, (b) academics, and (c) social emotional behaviors. The review indicated the different behaviors recommended to be examined within the early childhood setting, types of assessment methods used, and interventions and measurement tools that can be used within RTI. Limitations, gaps in research, and future directions are discussed as well.

Introduction

Response to Intervention (RTI) has been implemented in many school settings across the United States. RTI is used to identify students who need additional instruction and support due to the lack of progress toward grade level benchmarks and behavioral goals. RTI was initially discussed at the 2001 Learning Disabilities Summit sponsored by the federal Office of Special Education Programs. It was promoted as a promising alternative to the severe discrepancy model, used for many years to identify students with learning disabilities (Herr & Bateman, 2013). Shortly thereafter, RTI was included in special education legislation as part of the Individuals with Disabilities Education Improvement Act of 2004 and offered an alternative approach for identifying students with learning disabilities (Bender & Shores, 2007, as cited in Parks, 2011). RTI uses a multi-tiered, problem solving approach, which has a prevention and intervention focus. The goals of RTI are prevention in general education, early identification and intervention, and intensive treatment of children with severe and chronic academic and behavioral challenges (Reschly, 2014). Multi-Tier System of Supports (MTSS) is also a term that is commonly used to refer to the same system as RTI and are often used interchangeably. However, throughout this paper the term RTI will be used.

Since its implementation, RTI has received extensive attention at the elementary school level (RTI Action Network, n.d.). The same cannot be said about the application of RTI in preschool settings. With inclusive preschool programs available, there is an increasing number of students with special needs in early childhood programs (Lawrence et al., 2016). It is important to understand the benefits of early identification and

intervention of children who exhibit challenging behaviors and basic skill concerns at the early childhood level. In this paper, the term “early childhood” is used to refer to children in their preschool years. Preschool age was chosen due to the lack of research regarding RTI with that particular age group. Kindergarten, first grade, and second grade are also considered part of early childhood education. However, there is more research regarding RTI within those grades than with the preschool population.

The purpose of educational assessment is to collect information about children that may be used for (a) screening to determine the need for additional testing, (b) diagnosis or eligibility determination to see if a child qualifies for services, (c) program planning to determine what to teach and what to modify, (d) reporting progress, and (e) program evaluation (Shepley & Grisham-Brown, 2019). According to Gillis et al. (n.d.) assessment in early childhood should provide an understanding of the whole child and their needs within their everyday learning environment.

With the implementation of RTI at the early childhood level, appropriate assessment tools are needed to assess and monitor early academic skills as well as behaviors such as social emotional skills. Assessment and data-based decision-making are large and necessary components of RTI. A primary focus of RTI is to identify struggling students before they fall behind their peers. This is done by collecting necessary data, determining which students are meeting benchmarks, which students are developing skills, and which students are not making progress toward goals or expected levels of performance (Coleman et al., 2006).

There are a number of issues that professionals within the field of early childhood education face with the implementation of RTI, one of the issues being that there are no clear rules or guidelines for identifying which behaviors or academic skills to measure at the early childhood level for intervention purposes (Shepley & Grisham-Brown, 2019). Socially and developmentally appropriate behaviors often vary significantly between children despite their closeness in age. This could be due, in part, to the range in age of children in early childhood programs. For example, a 5-year-old may be expected to transition through routines with no prompting, whereas a 3-year-old may need prompting. Another difficulty is the difference in skill level among children. Some children may enter preschool knowing all their letters and sounds, while others cannot identify letters and sounds yet (Shepley & Grisham-Brown, 2019).

This current paper aims to explore the literature on the different areas that are measured within RTI and MTSS at the early childhood level. These areas include academic skills, behaviors, and social emotional skills. It is helpful to examine different behaviors that are currently measured at the early education level to help guide decision making and to assist with establishing high quality instruction. For example, many early education programs do not have high quality or effective curriculum (Kagan & Kauerz, 2012). Therefore, when looking at the different behaviors that are currently measured and examined within early childhood, it can be helpful to develop specific teaching strategies and interventions related to those behaviors.

Literature Review

Response to Intervention

The roots of Response to Intervention (RTI) are found embedded within the history and field of learning disabilities as well as other sources of influence such as behavioral consultation, data-based program modification, and program modification (Preston et al., 2016). RTI gained national prominence in the 2004 reauthorization of the Individuals with Disabilities Improvement Act (IDEIA), as an alternative to the severe discrepancy model that was used to identify students with learning disabilities. The severe discrepancy model is based on the premise that a large discrepancy between a student's achievement and IQ scores is a "marker" for a learning disability (Fuchs et al., 2003).

The discrepancy model was widely used across the U.S. for decades and is still used in many states or school districts today. However, states define the discrepancy in different ways, which leads to large inconsistencies in learning disability prevalence between states (Maki et al., 2015). For example, some use a minimum point value when the achievement score was subtracted from the IQ score while others take into account the regression of IQ on achievement. In addition, there were also differences in the IQ and achievement tests used, and the size of discrepancy needs to be considered significantly discrepant (Fuchs et al., 2003). Maki and Adams (2019) states that ability–achievement discrepancy identification decisions have not demonstrated treatment validity because data do not provide meaningful information regarding how or what to

teach. Fuchs et al. (2003) noted that these inconsistencies in definitions and prevalence rates led to the negative view that learning disability qualifications are arbitrary.

Response to Intervention began to be used as a preventative, aiming to provide targeted interventions before special education services. As noted by Coleman et al. (2006), the main point of RTI is that early intervention can both prevent academic problems for students that have learning difficulties and determine which students actually have learning disabilities versus those whose lack of achievement can be linked to other factors, like insufficient instruction. However, there is no widely accepted nonresponse criterion and identification decisions vary across nonresponse thresholds and may not be stable over time (Maki & Adams, 2019).

An important component of RTI is assessment. RTI uses assessment data to monitor student progress in order to identify at-risk students and provide various levels of intervention (Swartz et al., 2011). Teachers gather information on individual students as well as the whole classroom's progress toward meeting goals, and this information is then used to make modifications to curriculum or instruction to help the student.

While the principles of RTI were used as a model for prevention and remediation of academic and behavioral difficulties (Fletcher & Vaughn, 2009), it began to be utilized to determine special education eligibility for students with learning disabilities. That is, RTI was already incorporated into the general education setting to prevent students from falling behind peers. However, it was also used to support students with potential learning disabilities, and students at risk for academic failure and/or displaying challenging behaviors.

There are numerous reasons why RTI methods became a desirable means of support for all students. RTI provides high quality instruction and classroom management strategies. It also provides early interventions for those considered at risk, interventions matched to student need, and frequent progress monitoring in order to make important educational decisions about changes in instruction or goals (Batsche et al., 2006). RTI uses a problem-solving framework to identify and address academic and behavioral difficulties for all students using scientific, research-based instruction.

RTI strategies can be applied to academic achievement as well as students' social behavior. Regardless of academics or behavior, the core principles of RTI remain the same. In general, RTI is based upon four core characteristics: (a) students receive high quality research-based instruction in their general education classrooms; (b) continuous monitoring of student performance; (c) all students are screened for academic and behavioral problems; and (d) multiple levels (tiers) of instruction that are progressively more intense, based on students' response to instruction (U.S. Department of Education, 2011). Both three and four tier models have been described in literature; however, most schools follow a three-tier model (Parks, 2011).

Tier 1 of RTI focuses on helping teachers be preventative and proactive. All students receive whole group, high quality instruction, and universal screening throughout the year. Tier 1, if implemented correctly, should reduce the number of students who need more extensive resources at Tier 2 and Tier 3. The general education curriculum is presumed to be high quality if 80% of the students who receive Tier 1 meet academic and behavioral benchmarks. If 80% of the students do not meet the

benchmarks, then a class wide intervention to improve instruction should be implemented (Coleman et al., 2006). During Tier 1, the goal is to prevent serious behavior and academic problems by the whole school adopting evidence-based practices. In Tier 2 and Tier 3, additional services are provided on top of Tier 1 services.

Tier 2 consists of small group tutoring and instruction within the general education classroom for students who are not making adequate progress within Tier 1. Tier 2 interventions consist of differentiated instruction, such as curriculum modifications, small group instruction, or standard treatment protocols. Standard treatment protocols consist of pre-determined interventions for groups of students rather than an intervention designed for the individual student. Teachers can expect 15% of students to make adequate progress as a result of additional instructional support provided in Tier 2 (Coleman et al., 2006).

Within Tier 3, students will receive longer, more intensive and individualized instruction beyond services provided at previous tiers. Intense instruction is provided individually or in a small group setting of one to three students and is provided more frequently than in Tier 2 to meet the individual needs of students (IRIS Center, 2015). Given the projected success of Tier 1 and Tier 2 interventions, only about 5% of students should need Tier 3 intervention. Failure to respond to Tier 3 intervention initiates a referral to consider eligibility for special education services (Swartz et al., 2011).

RTI in K-12 Settings

RTI has the potential to be a powerful framework for allocating and evaluating educational resources to meet the instructional needs of all students and prevent long

term school failure (National High School Center, National Center on Response to Intervention, and Center on Instruction, 2010). Recently, there has been increasing research regarding RTI within the K-12 setting. Cakiroglu (2015) stated that many professionals in special education and other related fields have studied and defined the implications of the RTI model for increasing student achievement of all students and improving the process of identifying learning disabilities. This section of this paper will provide an overview on some of the RTI research conducted in the K-12 setting.

VandDerHeyden et al. (2007) examined the effects of implementation of a RTI model on special education identification and evaluation in elementary schools. Their study used a multiple baseline design across schools. RTI's effect on the number of evaluations conducted, percentage of evaluated children who qualified for services, and proportion of identified children by sex and ethnicity before and after implementation of the model were variables examined by the researchers. The results from this study indicated that the RTI model reduced the number of students evaluated for special education and eliminated the disproportional rate at which ethnic minority and male students were referred.

Similarly, a meta-analysis conducted by Burns et al. (2005) reviewed research on four existing large scale RTI models and other models that were implemented for research. The authors found that effects were consistently strong regarding RTI currently in practice (field based). Both large effects for reductions in special education referrals and positive student outcomes (e.g., increases in reading scores) were noted. The data that were provided from this meta-analysis suggest that RTI is an effective practice.

In a case study by Fisher and Frey (2013), the authors examined the efforts of a small high school over a two-year period as it designed and implemented a RTI program for students at the school. The school focused on high quality core instruction (Tier 1) to prevent school failure. The study concluded that the school improved academic achievement, attendance, and grade point averages as well as a decreased the number of special education referrals.

Although RTI has been implemented in many schools across the United States, there are barriers to implementation as well as research that does not support the implementation of RTI. In a study by Werts et al. (2014), 211 teachers were surveyed to determine their perception of barriers of RTI implementation. Teachers were allowed to write their own responses. Most common barriers that were reported include the process being time consuming, and a heavy workload. Another barrier that was reported was the lack of knowledge and training regarding implementation and the process in general. The last common barrier included the lack of “buy-in” from school personnel and other teachers’ attitudes inhibiting successful implementation.

A study conducted by Balu et al. (2015) that examined the efficacy and implementation of RTI is one that yielded conflicting results. The study focused on 146 elementary schools that used RTI. The focus was on 1st-3rd grade students’ reading performance. The report concluded that RTI negatively impacted academic achievement for students in first grade and had no effect on second and third graders. The authors also noted, however, that among the 146 schools, not all of the schools implemented RTI as intended and competently.

A meta-analysis conducted by Tran et al. (2011) synthesized 13 articles that examined at risk students who were considered either responders or low responders to interventions in reading. The question that was addressed within this study was whether individual differences at reading pretest predicts responders at post-test. There were 107 effect sizes at posttest and 108 at pretest. The results showed that the magnitude of responders and low responders increased from pretest to posttest and on measures of reading. Posttest effect sizes were significantly moderated by pretest scores as well as the type of measure administered. Overall, these findings suggest that regardless of the type of treatment and identification criteria, response to intervention conditions were not effective in lessening learner response rate related to pretest conditions.

Similarly, a meta-analysis conducted by Stuebing et al. (2015) examined 29 studies that looked at the association between various baseline child cognitive characteristics and response to reading interventions. Participants were at risk students in elementary schools third grade and below. Three statistical models were used to analyze effects: cognitive characteristics predicting growth curve slope, gain, and post intervention reading controlling for pre intervention reading. Effects were homogeneous within each model when effects were aggregated within study. Therefore, the small effect size calls into question the practical significance and utility of using cognitive characteristics as predictors of response when baseline data is available.

In summary, RTI has become a popular model for service delivery and identification in education settings and is emerging as a popular method for improving outcomes of students (Cummings et al., 2008). While the research is inconsistent, several

studies suggest that positive student outcomes do occur in K-12 settings if school staff are trained and willing to participate, and if RTI is implemented correctly. When that happens, RTI can be successful at reducing special education referrals and improving student outcomes.

RTI in Early Childhood Education

According to the U.S. Department of Education (2015), approximately four million children enter Kindergarten each year. However, many children enter Kindergarten a year or more behind their classmates in academic and social emotional learning domains. Every year, more preschoolers are exhibiting behavior problems that many teachers are not trained to handle (Hemmeter et al., 2008; Hoffman & Kovalanka, 2019). Research has shown that challenging behavior in early childhood years is a predictor of future challenges (Miller et al., 2017). Preschoolers need to be taught essential social emotional skills that are critical for future success in school.

Early childhood education refers to a variety of programs that serve young children from infancy through age five and their families. Several critical contexts in the field of early childhood have caused national attention to focus on early education issues and have helped to influence attitudes about the importance of services for very young children and their families (Coleman et al., 2006). One of these factors influencing services in early childhood education includes the importance of prevention and early intervention. Early intervention can be beneficial to children in many different ways. As examples, early educational intervention can have substantive short- and long-term

effects on cognition, social-emotional development, school progress, antisocial behavior, and even crime (Barnett, 2011).

The Individuals with Disabilities Education Improvement Act of 2004 (IDEIA) includes a specific provision that highlights the need for early intervention services, including formula grants for states to support special education and related services and early intervention services. Early educators have standards regarding the appropriate skills that should be addressed within the preschool classroom (National Association for the Education of Young Children, 2009). For example, students need to learn to follow classroom rules and routines, as well as academic skills such as oral vocabulary, letter names and sounds, and color and shape knowledge. Preschoolers need these basic skills to prepare them for Kindergarten and beyond.

Response to Intervention at the elementary level has gained fairly substantial support and research attention. According to Ball and Trammell (2011), there is a continuing push to expand the model to early childhood setting. And while there is existing literature that opposes the expansion of RTI into early childhood, most objections emphasize implementation issues. Even with the mixed opinions from research, sufficient knowledge exists to implement RTI at the early childhood level (Ball & Trammell, 2011).

The existing knowledge base of Tier 1 is relatively well established in regard to instructional and classroom elements at the pre-kindergarten level (Ball & Trammell, 2011). To have a successful RTI model, instruction that is evidence-based should be the base of the RTI pyramid. Without high quality instruction at Tier 1, it will be more

difficult to meet the needs of a larger number of students who need more intense interventions. Early childhood programs have not always been known for using high quality instruction. However, there has been more focus on identifying preschool curricula that is researched based (Kagan & Kauerz, 2012). Along with high quality instruction, other elements can be incorporated into Tier 1, such as classroom management strategies and positive classroom environments. For example, elements of positive behavior support have been shown to reduce misbehavior among preschoolers (Blair et al., 2010). Also, encouraging teachers to develop a literacy rich classroom that promotes children's acquisition of oral language has been shown to increase children's engagement in reading (Gerde et al., 2015).

According to the Center on Positive Behavioral Interventions and Supports (PBIS 2019), early childhood Tier 2 and Tier 3 interventions are less "packaged" than what may be seen in K-12 setting. However, specific interventions have received some attention in the empirical literature. Tier 2 of RTI in the early education setting is for those students who are not responding to Tier 1 instruction. These students would receive differentiated small group instruction. For example, group interventions for reading instruction would include introduction to vocabulary before storybook reading or providing visual cues. For behavior, teachers could make adjustments to classroom routines, have social skills instruction, or visual schedules. Tier 3 would be more individualized, one on one instruction. These students may need to learn basic academic skills. Tier 3 for behavior may include a behavior support plan focusing on prevention strategies, instruction to new skills, and how to respond to challenging behavior (PBIS, 2019). There is no clear

consensus in literature on how intense Tier 2 and Tier 3 interventions should be within the early education setting (Ball & Trammell, 2011)

Statement of Problem

Although RTI is prevalent in K-12 education settings, particularly at the elementary level, there appears to be less support for the expansion of the RTI model in early childhood settings. While most researchers encourage the expansion of RTI into early childhood settings, there are still implementation issues such as insufficient measurement tools, organizational barriers, and lack of evidence-based intervention strategies that can be implemented on a large scale (Ball & Trammell, 2011).

For a number of reasons, children who are entering preschool may not have had opportunities at home to learn the expected language, early literacy, and social emotional regulation skills (National Center for Learning Disabilities, 2014). Consistent with early intervention models, an early childhood RTI approach would assume a proactive preventative model of promoting the timely acquisition of key emergent literacy skills, while decreasing the risk of developing learning disabilities (Hagans-Murillo, 2005). RTI at the early childhood level targets all skills such as early academics, social competence, and motor skills (Shepley & Grisham-Brown, 2019).

Examining different behaviors that are measured within RTI at the early childhood level can be beneficial to the future expansion of RTI within this particular age group. Looking specifically at behaviors that are measured in early childhood helps educators identify interventions and progress monitoring tools that can be used to intervene with early childhood students. Many measurement and progress monitoring tools already exist for K-12 settings whereas less exist for early childhood settings. Looking at the behaviors that are currently being measured can help researchers and

educators develop high quality assessments to monitor behaviors and track progress. The purpose of this literature review is to identify, summarize, and synthesize articles that discuss academic skills and behaviors that are measured within the RTI process at the early childhood level. Throughout this literature review, the following research questions will be addressed:

1. What types of behaviors are measured or recommended to be measured at the early childhood level?
2. How are behaviors assessed within the RTI process?
3. What type of interventions and progress monitoring tools are used with early childhood students?

Method

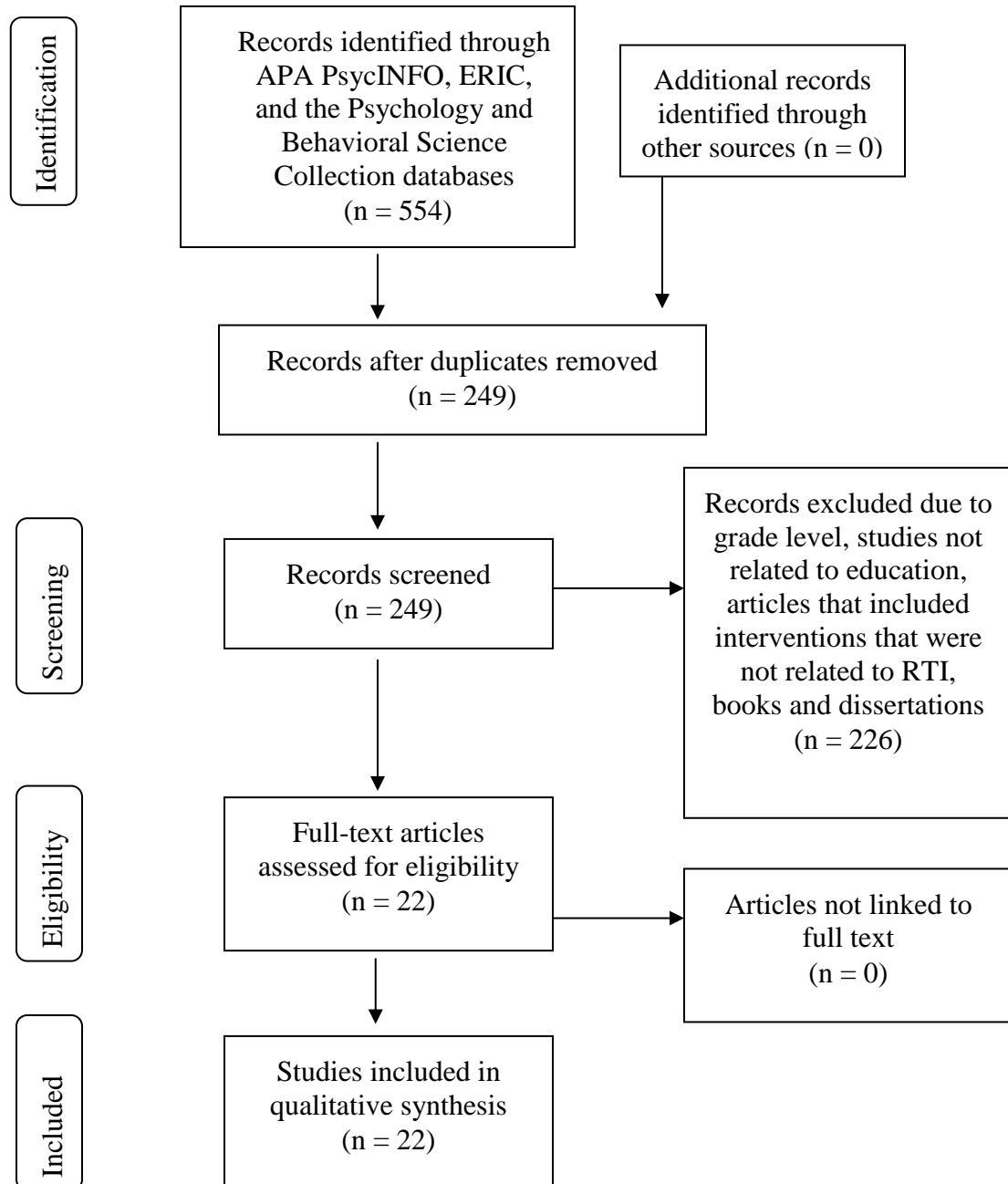
Procedures

This specialist project examined existing, peer reviewed literature regarding academic skills and behaviors that are measured by RTI within the early childhood setting. Articles were identified using the search engine EBSCOhost. Within EBSCOhost, the following databases were selected: APA Psych Info, ERIC, and Psychology and Behavioral Sciences Collection. Only articles with the following keywords and combinations were included: RTI or response to intervention or MTSS and early childhood. Articles were only included if they were published between 2004 and 2020. The year 2004 was selected due to the reauthorization of IDEIA. Both research articles and commentaries completed in the United States were included. In addition to a written review of the literature, a summary of the studies reviewed is presented in a table format.

The number of articles found within the initial search was 554. After removing duplicates, 249 articles were reviewed more in depth. Books and dissertations were excluded, along with articles that did not relate to RTI in early childhood were removed. Examples of resources that were removed included articles that related to grades other than preschool, studies not related to education settings or articles that discussed interventions not related to RTI. After those were removed, 22 journal articles were left and will be examined in this project (see Figure 1).

Figure 1

The PRISMA flow diagram (Moher et al., 2009)



Note. APA - American Psychological Association; ERIC - Education Resources Information Center.

Results

Journal articles that examined RTI at the early childhood level are summarized in the following sections. Articles are summarized into three broad categories: (a) combined, (b) academics, and (c) social emotional behaviors. Combined articles include articles that look at both social emotional behaviors and academic skills or discusses RTI outcomes in early childhood. Articles under academics include any articles that focused on literacy or early numeracy within early childhood RTI. Social emotional behavior articles are those that address behaviors with RTI. Table 1 provides a summary of the articles by category and type (i.e., commentary or research). Commentary articles are those that discuss a topic, but no actual study is conducted. Whereas research articles are those that conduct a study and discuss data. Almost half of the articles (41%) were commentary types of articles. Most articles (64%) focused on academics while only a few (14%) focused on social emotional behaviors.

Combined

Commentary Articles

Bagnato (2006) discussed issues that early childhood programs face regarding the implementation of RTI. Naturally, most young children have limited abilities to wait, share, take turns, follow directions, or communicate their needs. However, most children can learn these things through guided daily experiences. Some children will require more individualized guidance and structure to reach their potential. Bagnato stated that RTI and its emerging evidence-based structure needs to be reframed to accommodate early childhood practices. Furthermore, interventions must be simple, understandable, easy to

Table 1*Articles Examining Response to Intervention in Early Childhood Education*

Category/Study Authors	Year	Article Type
<i>Combined</i>		
Bagnato	2006	Commentary
VanDerHeyden & Snyder	2006	Commentary
Greenwood et al.	2011	Commentary
Pretti-Frontczak et al.	2014	Commentary
Greenwood et al.	2018	Research
<i>Academics</i>		
VanDerHeyden et al.	2007	Commentary
Gettinger & Stobier	2008	Commentary
Gettinger & Stobier	2012	Research
Noe et al.	2013	Research
Wackerle-Hollman et al.	2013	Research
McConnell et al.	2014	Research
Greenwood et al.	2014	Commentary
Carta et al.	2014	Research
Kaminski et al.	2014	Research
Kaiser & Hemmeter	2015	Commentary
Purpura & Lonigan	2015	Research
Lonigan & Phillips	2016	Research
Albritton et al.	2017	Research
Kaminski & Powell-Smith	2017	Research
<i>Social Emotional Behaviors</i>		
Greenwood & Kim	2012	Commentary
Steed et al.	2013	Research
Greenwood et al.	2019	Research

implement, and compatible with developmentally appropriate practices. Bangato believed that RTI is the right direction for providing services to many children. He encouraged the use of measurement probes or samples that capture everyday problem-solving capabilities

of young children in facilitated play or learning situations. The use of such probes is expected to better monitor progress toward expected outcomes.

Similarly, VanDerHeyden and Snyder (2006) stated that students in early childhood special education programs should be making progress toward three outcomes. These outcomes include: (a) positive social emotional skills (including social relationships), (b) acquisition and use of knowledge and skills (including early language and communication and literacy), and (c) use of appropriate behaviors to meet their needs. Examining the growth and performance related to engagement, social interaction, communication, independence, participation, and early academic skills is also encouraged. Additionally, they discussed the need for general outcome measures that possess standards of technical adequacy described in RTI and curriculum-based measurement literature. The use of general outcome measures in the early childhood setting will allow practitioners to monitor progress and make decisions about intervention selection based on child performance. VanDerHeyden and Snyder recommended using Dynamic Indicators of Basic Early Literacy (DIBELS) to track and monitor early reading skills at the early childhood level.

Greenwood et al. (2011) discussed the socio-emotional, language, and early literacy skills that they believe should be the outcomes of early childhood education in a commentary article. The authors contended that these outcomes should be the ones examined within the RTI process at the early childhood level. Emergent literacy skills include vocabulary knowledge, oral language skills, language comprehension, and conceptual knowledge leading to reading comprehension. In regard to social-emotional

skills, Greenwood et al. summarized research that indicated learning language and literacy skills in preschool is moderated by personal or social competencies. These competencies include regulation of attention, engagement, and the ability to follow classroom directions (Greenwood et al., 2011). The authors stated that children need to learn to function independently in the classroom. Children who are able to complete work independently, participate in groups, and make timely, independent transitions between activities have better outcomes than those who do not have these skills. As such, the authors recommended that practices, procedures, and measures that target these behaviors can lead to improved annual outcomes for early childhood students.

In another commentary article, Pretti-Frontczak et al. (2014) discussed the need for ongoing assessment and continuous progress monitoring at the early childhood level. At the early childhood level, programs can engage in universal screening to gauge children's performance level on specific outcomes. The authors gave the example of preschool teachers administering a curriculum-based measure such as Individual Growth and Development Indicators of Early Literacy (myIGDITM) three times a year to monitor all children's performance on skills such as picture naming, sound identification, rhyming, and alliteration, which are all skill indicators toward literacy outcomes (Pretti-Frontczack et al., 2014). Likewise, progress monitoring data can be used by early childhood educators and teams to determine if children's rates of learning are increasing or if they are making little to no progress toward instructional or behavioral goals. To assist in reaching behavioral goals and support prosocial behaviors and peer relationships, teachers and caregivers can create interesting and engaging environments.

Research Articles

In the only research article in the combined category, Greenwood et al. (2018) stated that RTI progress monitoring is helpful in indicating *when* an intervention change is needed, but progress monitoring alone provides little information on *what* to change. Greenwood et al. sought to investigate if ecobehavioral observation data could provide information on what to change to improve children's academic skills and other behaviors. A group of 39 teachers and two cohorts of preschool children were observed using an ecobehavioral momentary time sample observation system called Code for Interactive Recording of Children's Learning Environments (CIRCLE). The students were observed on multiple occasions over a two-year time period. Thirteen behaviors were consolidated into three theoretical composites. Child Academic Engagement was the sum of writing, reading words or letters out loud, academic manipulation, academic verbal response, and academic attention frequencies. Other Engagements was the sum of play, singing/music, nonacademic manipulation, gross motor, eating drinking, and nonacademic attention. Other Behaviors was a composite of inappropriate behaviors (aggression, noncompliance, etc.) and any other child behaviors not defined in CIRCLE.

Results of Greenwood et al.'s (2018) study indicated that children in both cohorts were not experiencing instruction that was particularly strong. Classroom teachers were providing inadequate focus on academic instruction and more of their time in the Other Engagements category than in other categories. Students spent most of their time in centers (Other Engagement) where writing, reading, and other academic engagement behaviors were minimal. Also, activities were mostly provided in whole group rather than

small group or individualized. The category of Other Behaviors was found to be moderated by special education status. Students were more likely to be less engaged and exhibiting other behaviors if they were receiving special education services. These results add to the existing research of how instructional elements in preschools are associated with academic engagement in inclusive classrooms and provide a tool that can be used to measure behaviors within a response to intervention system at the preschool level.

Academics

Commentary Articles

Gettinger and Stoiber (2008) described an early literacy program called EMERGE that incorporates a response to intervention framework that promotes the development of early literacy skills among low-income minority preschool children. The assessment component of EMERGE incorporates screening and progress monitoring procedures. These procedures focus on identifying preschool children at risk for reading failure and to assess quality of instruction. The assessment component evaluates several dimensions of early literacy including vocabulary, phonological awareness, letter knowledge, and oral language. It combines both norm referenced and informal assessment of skills.

Gettinger and Stoiber (2008) explained that screening data are used to determine baseline level of functioning for all children and to identify the lowest performing children. The screening and outcomes assessment battery includes three measures: (a) the Phonological Awareness and Literacy Screening– Prekindergarten (PALS), (b) the Peabody Picture Vocabulary Test-III (PPVT-III), and (c) an informal oral-story-retelling measure developed by the authors. The PALS measures preschoolers’ developing

knowledge of literacy skills that are predictive of future reading success. The PPVT-III is administered as a measure of children's receptive comprehension and vocabulary acquisition. Lastly, the informal measure was developed specifically for the EMERGE early literacy program as a measure of oral expressive vocabulary and memory and comprehension of short stories. In conclusion, the authors believed that the implementation of EMERGE can provide significant benefits to an RTI approach for promoting early literacy development in preschool children.

VanDerHeyden et al. (2007) conducted a study that examined the utility of using curriculum based early literacy measures as screening tools and whether growth in early literacy skills was altered following brief interventions. Participants included 35 preschool children who were considered at risk for a learning disability. The five-week intervention focused on key phonemic awareness skills that were delivered in both class wide and individual formats. Curriculum based measurement probes (i.e., alliteration, rhyming, DIBELS Initial Sound Fluency, DIBELS Letter Naming Fluency, letter sound fluency) were administered each week to all children. The authors found that children who were initially low performers benefited and demonstrated growth toward early literacy targets from class wide early literacy interventions. Results from the study also showed curriculum-based measures used for progress monitoring led to better decision accuracy about at-risk children, especially when combined with brief classroom interventions.

Greenwood et al. (2014) summarized the work of The Center for Response to Intervention in Early Childhood through descriptions of how the Center developed and

validated tools needed for an RTI approach. Emerging from this work includes the Individual Growth and Development Indicators (IGDI) which are progress monitoring measures that corresponded with their interventions. These five IGDI include: oral language (picture naming vocabulary), comprehension (which one doesn't belong), two different phonological awareness (rhyming and first sounds), and sound identification (alphabet knowledge). Tier 2 vocabulary and comprehension interventions were also developed. "Story Friends" consisted of two storybook series that were delivered to children through headphones in a small group. The lessons focused on vocabulary and answering questions about the story. An intervention for phonological awareness and alphabet knowledge called "Path to Literacy" were also developed. This was a teacher led intervention that uses instructional scripts implemented in small groups. The instruction in the lessons progresses from compound words, to two-syllable words, to single syllable words, to words with simple and complex initial onsets and sounds. Tier 3 reading ready interventions (Language and Literacy) were also developed. This is a brief intervention intended to be used by the classroom teacher during center or free choice time. The intervention should be delivered daily in a one-on-one session and is designed for preschool children with limited attention as well as limited literacy and language skills. In conclusion, the authors aimed to provide new knowledge, tools, and practices that are appropriate and evidence-based regarding response to intervention at the preschool level.

Similarly, Kaiser and Hemmeter (2015) discussed the findings from the Center of Response to Intervention in Early Childhood. The authors discussed that learning to read is one of the most challenging skills for young children. Effective and developmentally

appropriate instruction for vocabulary, comprehension, phonological awareness, and other reading skills during the preschool years are critical. The Center provided a needed view of the components that are needed to provide effective RTI at this age level. They described the IGDI measurement system that was developed and how it is a well-established method for progress monitoring at all three tiers of instruction. However, the authors also expressed concerns regarding preschool staff's ability to commit the time needed for ongoing progress monitoring and interventions (Kaiser & Hemmeter, 2015).

Research Articles

McConnell et al. (2014) described the overall structure and components of a measurement system that is specifically designed and evaluated to support RTI in early childhood programs. The authors noted that the universal screening instrument, IDGIs, have been applied in number of studies but research to date has not produced benchmarks that reliably distinguish between Tier 2 and Tier 3 ability levels using the IDGIs 2.0 alone (McConnell et al., 2014). The authors developed a decision-making framework to use in conjunction with the universal screening IGDI scores. A teacher questionnaire was used with the universal screeners to obtain information regarding children's skills and abilities in two domains of intervention (oral language/comprehension and phonological awareness/alphabet knowledge). Results indicated that the teacher questionnaires were correlated with a standardized measure of early childhood language and literacy performance (Clinical Evaluation of Language Fundamentals Preschool–2) and is able to serve as an alternative for the lengthier assessment.

Gettinger and Stoiber (2012) examined the utility of curriculum-based probes as tools to guide teachers' decision making and the extent to which differentiated instruction informed by progress monitoring data promoted skill development for all learners. Participants were drawn from a sample of 300 children who were enrolled in 15 HeadStart classrooms. Of the 15 classrooms, eight were designated as Exemplary Model of Early Reading Growth (EMERGE) sites. EMERGE is an intervention to strengthen the integration of evidence based, early literacy practices into daily activities and classroom routines. Assessment data were collected for all children in the fall and spring. Measures used include the Peabody Picture Vocabulary Test- III (PPVT-III), Get Ready to Read (GRTR), Phonological Awareness Literacy (PALS-Prek), and Story and Print Concepts Task (SPCT). Also, four brief curriculum-based measures were constructed by the authors. The measures assessed letter knowledge, awareness of print, vocabulary development, and book comprehension.

Results indicated that across low, middle, and high-performance groups, children evidenced similar growth on curriculum-based probes of letter naming, vocabulary word knowledge, book/print recognition, and book comprehension. The students that were in classrooms where curriculum-based progress monitoring and differentiated instruction were implemented demonstrated higher performance on spring outcome measures, compared to students who were in no treatment classrooms. This study provides preliminary support for application of an RTI model in early education for the development of early literacy skills as well as what types of progress monitoring tools can be used within the early childhood setting.

Noe et al. (2013) examined the effects of a Tier 3 early literacy intervention on preschool children's phonological awareness. Seven children who did not make progress on identifying first sounds in words in a Tier 2 program participated in a more intensive Tier 3 intervention. Children listened to stories and participated in early literacy activities led by an interventionist 15 minutes, 3-4 days a week. Three types of measures were used: proximal, distal, and descriptive. A proximal measure assessed specific skills taught in the intervention. Proximal measures included First Sound First, which is a one-minute timed measure that requires children to produce the first sounds of words. Distal measures assessed skills that were related to the intervention but not directly taught. Distal measures included Test of Preschool Early Literacy, Rhyming Individual Growth and Development Indicator, First Sounds IGDI, Sound Identification IGDI, and Word Parts Fluency. One descriptive measure was used to assess language ability (Clinical Evaluation of Language Fundamentals Preschool- 2nd Edition). Data indicated that five of the seven children made progress on first sound identification as a result of the Tier 3 intervention. These children also made gains on more distal measures of phonological awareness. The descriptive measure findings indicated that two of the children had low language skills. The lack of progress on the intervention for the two students was thought to be due to their low language skills. This article describes interventions and measures that can be used in early childhood settings.

Two studies presented by Wackerle-Hollman et al. (2013) described four measures of phonological skills: Individual Growth and Development Indicators Sound Blending, Syllable Sameness, Rhyming, and Alliteration 2.0. The measures developed

are designed to be used within the RTI model to meet the ability levels of preschool aged children for the use of identification of children who may need additional intervention. Study one suggested that the 2.0 measures are superior to the 1.0 measures, but the phonological awareness measure needs improvement to accurately capture child performance. For example, more items are needed on the lower or earlier level of ability. Results of study two indicated that items for each measure demonstrate utility and have implications for use within an RTI model. The items within each measure represent student abilities that are appropriate for preschool aged children. Results of both studies indicated that Rhyming and Alliteration showed growth for high achieving students, but modifications were needed for low achieving students to be appropriate measures in an RTI model. It was suggested that reducing cognitive load and including new items at lower ability levels would assist in more accurate identification of students in need of Tier 2 and Tier 3 interventions. This article addresses the characteristics of measures needed to identify students for RTI.

Carta et al. (2014) addressed questions about the proportions of children who qualify at levels of language and early literacy risk greater than Tier 1 in preschool programs in a secondary analysis of data that is from a larger investigation. Participants were 659 children in 65 pre-K classrooms. The universal screeners that were used in the fall include Get Ready to Read and the IGDIs Picture Naming and Sound Identification. The study yielded several important findings regarding early education programs adopting RTI frameworks. The first finding being that approximately 30%-35% were identified for higher tiers of support rather than the 20% often indicated for RTI models

implemented in K-12 settings. Also, the proportions of children identified for Tier 2/3 were much larger in income-eligible programs compared to tuition-based programs. More than 80% of English language learning (ELL) children were identified by the Picture Naming IGDI, because the Picture Naming only measures a child's expressive vocabulary in English. These screening measures did not consistently identify similar proportions of children as being at risk for literacy and language problems.

The Preschool Early Literacy Indicators (PELI) is an assessment tool developed for screening and progress monitoring. It was designed to incorporate psychometrically sound assessment practices within a practical assessment format (Kaminski et al., 2014). The study conducted by Kaminski et al. provided data on concurrent and predictive validity of PELI and investigated the diagnostic accuracy of benchmark goals on the PELI with a large sample of children. Two cohorts of children were included in the study. The first cohort included children that were either 3- or 4-years-old. The second cohort included children who were 4- or 5-years-old. Measures used included the PELI, which is comprised of four subtests called Alphabet Knowledge, Phonological Awareness, Vocabulary and Oral Language, and Listening Comprehension. DIBELS Next First Sound Fluency, DIBELS Next Letter Naming Fluency, and Clinical Evaluation of Language Fundamentals: Preschool 2 (CELF-P) were also used.

PELI forms were administered to all children in both age cohorts three times per year. DIBELS and CELF-P were administered as well. The correlations with criterion measures were significant and generally considered at moderate to strong levels for various subtests. Correlations were higher between individual subtests and outcomes of

the same construct than between subtests and outcomes of different constructs, which suggests that the PELI is accurate at measuring early literacy and language skills that it aims to measure. The PELI also provides benchmark goals that indicate a level of skill that the child is likely to achieve the next PELI benchmark goal or early literacy outcome (Kaminski et al., 2014).

Purpura and Lonigan (2015) noted a need to develop an RTI system for early mathematics. The authors conducted a study that focused on the construction and validation of 12 brief early numeracy assessment tasks that measure the skills and concepts that are key to early mathematics development. Participants were preschool children ages 3-5. In the spring of both year 1 and year 2, children were assessed on 12 different early numeracy tasks (i.e., verbal counting, one to one counting, cardinality, counting subtests, set comparison, subtilizing, numeral comparison, set comparison, number order, set to numerals, story problems, and number combinations). In the spring of year 2, children were also assessed on the applied problems and calculation subtests for the Woodcock Johnson III Test of Achievement. Measure development and validation occurred through three phases designed to ensure that the measures were brief, reliable, and valid. Phase one items were examined through a differential item functioning test to determine if they functioned differently based on sex or race. No items were removed after phase one. Phase two's purpose was to reduce the number of items that contributed to each task while maintaining the discriminating ability of each task over ability continuum. All tasks were reduced to between three and nine items. The last phase was to provide evidence of predictive validity of the measures and findings suggest that all tasks

were significantly correlated with the same task given a year later. This study addresses the first step of the development of an RTI system for math assessment development (Purpura & Lonigan, 2015).

Lonigan and Phillips (2016) presented results from two studies that examined the impacts of Tier 2 instruction with preschool children. Children in the study were identified as delayed in developing early literacy skills despite being exposed to high quality, evidence-based instruction. Children were randomly assigned to either receive or not receive supplemental Tier 2 early literacy interventions that were based on instructional activities shown to promote significant growth in children's language and skills. Children assigned to Tier 2 instruction participated in small group language focused instruction. Measures included the Preschool Comprehensive Test of Phonological and Print Processing, Test of Early Reading Ability- 3rd edition, Clinical Evaluation of Language Fundamentals- Preschool, and Code and Language Intervention Posttest. Results indicated that intensive Tier 2 instruction in small groups can have a significant impact on both code-related and language skills of preschool children. Results demonstrate the potential for effective Tier 2 instruction in the context of an RTI model for the identification of preschool children at risk for reading difficulties.

Abrittton et al. (2017) investigated the proportion of at-risk children who may need additional instructional support when screening and norm referenced measures are administered at the beginning of the year. The sample included 274 four-year-old students who were enrolled in pre-K classrooms. Measures used included Get Ready to Read (Early Literacy), PPVT-4 (Receptive Vocabulary), and The Test of Preschool Early

Literacy (Early Literacy Achievement). Results indicated that two-thirds of the sample were performing at expected levels on the screening tool (Get Ready to Read) at the beginning of the school year and also performed at expected level on the standardized measures (PPTV-4 and The Test of Preschool Early Literacy). The remaining third of the sample were classified as needing more intensive instruction at the beginning of the year.

Abrington et al. (2017) went on to explain that the results from the standardized measures indicated that children in Tier 2 and Tier 3 demonstrated the greatest need in the areas of receptive vocabulary and phonological awareness. This study provides important findings regarding the implementation of RTI in early childhood settings. First, oral vocabulary and phonological awareness may be the most appropriate targets for instruction. Second, children in these settings may respond appropriately to Tier 1 instruction, at least to achieve early literacy performance levels. In conclusion, this study provides some insights on how to implement screening into an RTI framework in early childhood settings and what should be instructional targets.

Kaminski and Powell-Smith (2017) evaluated the effects of a Tier 3 phonemic awareness intervention with preschool children who were identified as needing additional support in early literacy skills. The intervention used was Reading Ready Early Literacy Intervention and DIBELS Next First Sound Fluency was used to evaluate the effects of the intervention. A multiple baseline design across children was used to evaluate effectiveness. During the intervention phase 6 children received the intervention individually over 8 to 11 weeks. Overall, the effects of the Tier 3 early literacy intervention were positive. All children showed some skill gains in in the intervention

phase; however, the intervention was more effective for some children than others. After the final phase, three students scored above the cut point for risk and two surpassed the goal. Overall effect sizes for the sample indicate medium to strong effects. This study produced promising results with regard to the efficacy of the intervention, Reading Ready Early Literacy Intervention.

Social-Emotional Behaviors

Commentary Articles

Greenwood and Kim (2012) described the Eco behavioral approach and how data derived from the Eco behavioral assessment and analysis may be used by school staff when implementing RTI programs. An Eco behavioral approach provides descriptions of the occurrence of classroom events. Eco behavioral taxonomies have been designed to measure the occurrence of the event categories close in time: (a) school and classroom ecological arrangements, (b) the person serving the role of the teacher and teacher behavior, and (c) student behavior. Using Eco behavioral assessment information for intervention decisions in RTI requires problem-solving logic and supporting data. The Eco behavioral measures have strong implications for children with challenging behaviors as well as replacement behaviors for social and academic problems (Greenwood & Kim, 2012). Information from the Eco behavioral assessment, in combination with other data on student progress, such as CBM, DIBELS, and academic outcomes is helpful for the implementation of RTI programs at the preschool level.

Research Articles

Steed et al. (2013) described findings from an evaluation of program-wide positive behavioral interventions in three rural preschool programs. The authors believed preschool children can benefit from tiered behavioral interventions by building positive relationships amongst preschool personnel, students, and families; establishing a positive classroom climate; developing and teaching core behavioral expectations; and having an organized and predictable classroom environment. Each preschool program engaged in a three-year process that included on-site training, technical assistance, and coaching support in Tier 1. The process included following a professional development framework for teachers and numerous professional development activities such as establishing clearly defined behavioral expectations, teaching expectations and expected behaviors, encouraging expected behaviors, discouraging problem behaviors, and monitoring and record keeping. Measures used include the Preschool-wide Evaluation Tool, Classroom Assessment Scoring System Pre-k, and Response to Intervention Preschool Leadership Team Checklist. Results indicate that improvements were observed in defining program wide behavioral expectations, teaching expectations, responding consistently to challenging behaviors, and providing a predictable environment. Results also indicated that teachers improved their use of strategies to support children's emotional development and offered differentiated and encouraging instruction over each year.

Greenwood et al. (2019) investigated the potential of filling the information gap in RTI decision making by using an ecobehavioral approach to inform steps that could be taken with children who are not responding to preschool instruction. The author's purpose was to replicate the sensitivity of an observation system called CIRCLE to

variations in classroom instruction and students co-occurring academic engagement as reported previously. Get Ready to Read was used as a preliteracy screener. CIRCLE data were used to describe and quantify: (a) classroom activities, (b) teachers' behavior, and (c) a target child's behavior. Three questions were examined: (a) To what extent did teachers provide language and literacy focused instruction? (b) Was children's academic engagement significantly associated with momentary variations in activities and literacy focused instruction? and (c) Did children's risk characteristics moderate instruction- child behavior dependencies? (Greenwood et al., 2019). Findings indicated that children were not frequently provided exposure to literacy focused instruction (question one), and children's academic engagement was significantly more likely to occur during story time, individual activities, and large group compared to small group, center, and other activities (question 2). Results also indicated that personal risk characteristics did moderate instruction-behavior dependencies differentially (question 3). This study represents the ability to understand preschool instruction as it is actually implemented and help guide changes in instruction based on evidence.

Summary of Findings

The first research question of this project sought to determine what types of behaviors are measured or recommended to be measured at the early childhood level. Table 2 provides a list of both academic and social emotional behaviors gleaned from this literature review. Findings indicate that academic behaviors that are recommended focus on early literacy skills, whereas there is less emphasis on early numeracy skills. Social emotional behaviors that are recommended to be measured are skills that are important

for students to obtain in order to be successful throughout their schooling (e.g., regulation of attention, following directions).

Table 2

Academic and Social Emotional Behaviors Recommended for RTI in Early Childhood

Academic Behaviors

- Vocabulary knowledge
- Oral language skills
- Language comprehension
- Conceptual knowledge
- Picture naming
- Rhyming
- Sound identification
- Phonological awareness
- Letter knowledge
- Awareness of print
- Vocabulary development
- Phonological skills
- Verbal counting
- Number comparison
- Number order

Social Emotional Behaviors

- Compliance
- Regulation of attention
- Following directions
- Communicating needs

Sharing/taking turns
Positive peer relationships
Engagement
Transitioning between activities
Completing work independently

The second research question aimed to address how social emotional behaviors are assessed within the RTI process at the early childhood level. Table 3 provides a summary of findings regarding the different ways social emotional behaviors are assessed at the early childhood level. Most assessment methods require the use of a measurement tool. However, regarding social emotional behaviors, methods such as observations and teacher questionnaires are used.

Table 4 summarizes the third research question, which sought to answer what types of interventions and progress monitoring tools are used within RTI at the early childhood level. Interventions at the early childhood level must be simple, understandable, and compatible with developmentally appropriate practices. Brief interventions are more suitable for early childhood education. Articles described both previously created tools and tools that have been created specifically for RTI at the early childhood level.

Table 3

Methods of Assessment within RTI at the Early Childhood Level

Measurement probes
General outcomes measures
Curriculum based measures
Universal screening

Progress monitoring tools
Behavior observation data
Teacher questionnaires
Standardized measures
Ecobehavioral approach

Table 4

Interventions and Tools used at the Early Childhood Level

Interventions

CIRCLE-Eco behavioral
EMERGE- promotes the development of early literacy skills
“Story friends”- vocabulary and comprehension intervention
“Path to Literacy”- phonological intervention and alphabet knowledge
Reading Ready Early Literacy Intervention
Program Wide intervention- Professional development framework

Tools

Individual Growth and Development Indicators of Early Literacy (myIGDIs)
Dynamic Indicators of Basic Early Literacy Skills (DIBELS)
Phonological Awareness and Literacy Screening– Prekindergarten (PALS)
Peabody Picture Vocabulary Test-III (PPVT-III)
Clinical Evaluation of Language Fundamentals Preschool–2
Get Ready to Read
Story and Print Concepts Tasks
Preschool Early Literacy Indicators (PELI)
Woodcock Johnson Test of Achievement-Applied Problems and Calculations
Preschool-Wide Evaluation Tool
Classroom Assessment Scoring System Pre-k
RTI Preschool Leadership Team Checklist

Discussion

Response to Intervention is used across the U.S. in educational settings to identify and intervene with students who are struggling academically and behaviorally. Although RTI is common in most K-12 settings, it is less common in early childhood education settings. Some factors influencing RTI becoming more prevalent in early education settings include implementation issues, lack of evidence-based tools, and organizational barriers. This literature review aimed to investigate what types of behaviors are measured or recommended to be measured at the early childhood level, how behaviors are assessed within the RTI process, and the types of interventions and progress monitoring tools that are used with early childhood students.

Overall, 22 articles were included in this review. These articles were grouped into three categories: (a) combined, (b) academic, and (c) social-emotional behaviors. While the majority of the articles were research studies (59%), almost half were commentary articles, where only a discussion of RTI at the early childhood level was presented. Thus, the research base for early childhood RTI is severely limited.

Similar to issues that are found with RTI in the K-12 setting, early childhood RTI research shows that there are implementation issues such as teacher buy in, lack of training, and workload. For RTI to be implemented with fidelity, teachers must be on board. Due to the lack of funding for early childhood programs, adequate training for teachers is not always feasible. This leaves early childhood professionals on their own implementing RTI, which leads to added stress and negative feelings regarding the implementation process.

Another similarity to RTI in K-12 settings, when implemented correctly, RTI can have positive effects on student outcomes. RTI can improve student's academic performance and behavior problems. It gives extra support to students who are behind their peers and allows them to make progress toward goals.

Implications

Findings from this literature review have implications for both practice and research. RTI is very prevalent within K-12 education settings and articles in this review highlight the use of RTI in early education settings and potential tools that can be used with this particular age group. As stated previously, RTI has numerous benefits for students. It aims to prevent students from falling behind academically and behaviorally through early identification and intervention. For implementation at the early childhood level, appropriate progress monitoring tools and interventions are needed. Several studies highlighted academic behaviors, interventions, and progress monitoring tools. This included a large number of early literacy screening tools and interventions targeting phonological awareness, alphabet knowledge, vocabulary, and listening comprehension. For early numeracy, one article discussed 12 early numeracy tasks to assess at the preschool level. Social emotional behavior articles focused on an ecobehavioral approach and using data to guide RTI implementation.

Articles that were reviewed suggested that a variety of behaviors are examined within the RTI process. At the early childhood level, academic behaviors such as alphabet knowledge, early listening skills, comprehension, language skills, verbal counting, and recognizing number symbols are considered important and critical to

developing later skills. Social emotional skills such as following directions, transitioning between tasks, and communicating needs are skills needed to be successful in the school settings. Due to the importance of these skills, an emphasis is placed on helping students who have yet to develop these skills or who are considered behind their peers.

Implementing RTI at this level allows children who may have not had prior exposure to learning opportunities the ability to receive additional instruction and assist in keeping them from falling behind.

Findings from this review indicate that there are several different measures that can be used for early literacy skills. It is important to note that several articles mentioned and used the progress monitoring tool, Individual Growth and Development Indicators of Early Literacy (myIGDIs). This can be administered by teachers to measure progress towards early literacy goals. This tool was used with multiple interventions, indicating that it is useful in monitoring progress of students in early childhood settings. Other progress monitoring tools that were mentioned in numerous academic articles include Dynamic Indicators of Basic Early Literacy Skills (DIBELS) and Clinical Evaluation of Language Fundamentals Preschool (CELF-P).

Academic articles noted interventions that can be used with early childhood students. A few interventions were mentioned in more than one study. These include the early literacy interventions Get Ready to Read and Reading Ready. These interventions were used in multiple studies, which provides more evidence for effectiveness of its implementation in early childhood settings.

Social emotional behavior articles brought attention to the importance of observations and examining classroom setting, teacher behaviors, and student behaviors when monitoring progress toward goals. Also, teacher questionnaires can be helpful when assessing social emotional behaviors. Using these data in conjunction with other progress monitoring tools can be helpful with the decision-making portion of RTI, especially at the early childhood level.

Limitations and Future Directions

One limitation of the study is the lack of articles included. A low number of articles met inclusion criteria. It is likely that there are additional articles that were missed due to lack of access or that might be found using other databases. Books and dissertations were excluded which could have also limited findings. Another limitation is that a second person did not verify the appropriateness of the placement of articles into the three categories of general outcomes, academics, and social emotional, although any disagreement on such placements is not critical to the research questions of this study.

The findings of this study are important because it brings attention to the lack of research studies conducted regarding RTI at the early childhood level. Future research should focus on interventions being implemented and student outcome data. This will give more information regarding progress monitoring tools and intervention effectiveness. There is also a need for research of social emotional interventions being implemented at the early childhood level.

Many of the articles in the academic section examined early literacy skills and early literacy interventions. Future researchers should examine early mathematics as well

as social emotional skills within RTI as very few studies addressed those topics. Specifically, progress monitoring tools for social emotional skills and early mathematics are needed. Also, with social emotional skills, identifying behaviors that can be targeted within the tiers of RTI can be helpful in developing interventions and tools.

Finally, research regarding RTI in the K-12 setting is well established, but more research regarding RTI in early childhood is needed. While RTI can be beneficial if implemented correctly, additional research regarding implementation of RTI at the early childhood level is needed to better develop tools and interventions that are effective for this population.

References

- Abrington, K., Stuckey, A., & Patton Terry, N. (2017). Identifying Head Start children for higher tiers of language and literacy instruction. *Journal of Early Intervention*, 39(4), 267–280. <https://doi.org/10.1177/1053815117714568>
- Bagnato, S. J. (2006). Of helping and measuring for early childhood intervention: Reflections on issues and school psychology's role. *School Psychology Review*, 35(4), 615–620.
- Ball, C. R., & Trammell, B. A. (2011). Response-to-intervention in high-risk preschools: Critical issues for implementation. *Psychology in the Schools*, 48, 502-512. <https://doi.org/10.1002/pits.20572>
- Balu, R., Zhu, P., Doolittle, F., Schiller, E., Jenkins, J., & Gersten, R. (2015). *Evaluation of response to intervention practices for elementary school reading*. National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. <http://ies.ed.gov/ncee/pubs/20164000/pdf/20164000.pdf>
- Barnett, W. S. (2011). Effectiveness of early educational intervention. *Science*, 333, 975–978. <https://doi.org/10.1126/science.1204534>
- Batsche, G., Elliott, J., Graden, J. L., Grimes, J., Kovaleski, J. F., Prasse, D., Schrag, J., & Tilly, W. D. (2006). *Response to intervention: Policy considerations and implementation*. National Association of State Directors of Special Education, Inc.

- Bender, W. N., & Shores, C. (2007). *Response to intervention: A practical guide for every teacher*. Corwin Press.
- Blair, K. S. C., Fox, L., & Lentini, R. (2010). Use of positive behavior support to address the challenging behavior of young children within a community early childhood program. *Topics in Early Childhood Special Education, 30*, 68-79.
<https://doi.org/10.1177/0271121410372676>
- Burns, M. K., Appleton, J. J., & Stehouwer, J. D. (2005). Meta-analysis of response-to-intervention research: Examining field-based and research-implemented models. *Journal of Psychoeducational Assessment, 23*, 381–394.
- Cakiroglu, O. (2015). Response to intervention: Early identification of students with learning disabilities. *International Journal of Early Childhood Special Education, 7*, 170–182. <https://doi.org/10.20489/intjecse.10399>
- Carta, J. J., Greenwood, C. R., Atwater, J., McConnell, S. R., Goldstein, H., & Kaminski, R. A. (2014). Identifying preschool children for higher tiers of language and early literacy instruction within a response to intervention framework. *Journal of Early Intervention, 36*(4), 281–291. <https://doi.org/10.1177/1053815115579937>
- Center on Positive Behavioral Interventions and Supports. (2019). *Early Childhood PBIS*. <https://www.pbis.org/topics/early-childhood-pbis>
- Coleman, M. R., Buysse, V., & Neitzel, J. (2006). *Recognition response: An early intervening system for young children at-risk for learning disabilities. Executive summary*. The University of North Carolina at Chapel Hill, FPG Child Development Institute.

- Cummings, K., Atkins, T., Allison, R., & Cole, C. (2008). Response to intervention: Investigating the new role of special educators. *Council for Exceptional Children, 40*, 24-31. <https://doi.org/10.1177/004005990804000403>
- Fisher, D., & Frey, N. (2013). Implementing RTI in a high school: A case study. *Journal of Learning Disabilities, 46*, 99–114. <https://doi.org/10.1177/0022219411407923>
- Fletcher, J. M., & Vaughn, S. (2009). Response to intervention: Preventing and remediating academic difficulties. *Child Development Perspectives, 3*, 30–37. <https://doi.org/10.1111/j.1750-8606.2008.00072.x>
- Fuchs, D., Devery, M., Morgan, P., & Young, C. (2003). Responsiveness to intervention: Definitions, evidence, and implications for the learning disabilities construct. *Learning Disabilities Research & Practice, 18*, 157-171. <https://doi.org/10.1111/1540-5826.00072>
- Gerde, H. K., Bingham, G. E., & Pendergast, M. (2015). Reliability and validity of the Writing Resources and Interactions in Teaching Environments (WRITE) for preschool classrooms. *Early Childhood Research Quarterly, 31*, 34–46. <https://doi.org/10.1016/j.ecresq.2014.12.008>
- Gettinger, M., & Stoiber, K. (2008). Applying a response-to-intervention model for early literacy development in low-income children. *Topics in Early Childhood Special Education, 27*, 198-213. <https://doi.org/10.1177/0271121407311238>
- Gettinger, M., & Stoiber, K. (2012). Curriculum-based early literacy assessment and differentiated instruction with high-risk preschoolers. *Reading Psychology, 33*(1/2), 11–46. <https://doi.org/10.1080/02702711.2012.630605>

- Gillis, M., West, T., & Coleman, R. (n.d) *Assessment in early childhood*.
<http://www.getreadytoread.org/screening-tools/supportive-materials-for-elors/assessment-in-early-childhood>
- Greenwood, C., Beecher, C., Atwater, J. B., Petersen, S., Schiefelbusch, J., & Irvin, D. W. (2018). An ecobehavioral analysis of child academic engagement: Implications for preschool children not responding to instructional intervention. *Topics in Early Childhood Special Education, 37*, 219-233.
<https://doi.org/10.1177/0271121417741968>
- Greenwood, C., Bradfield, T., Kaminski, R., Linas, M., Carta, J., & Nylander, D. (2011). The response to intervention (RTI) approach in early childhood. *Focus on Exceptional Children, 43*, 1-24. <https://doi.org/10.17161/fec.v43i9.6912>
- Greenwood, C. R., Carta, J. J., Goldstein, H., Kaminski, R. A., McConnell, S. R., & Atwater, J. (2014). The Center for Response to Intervention in Early Childhood: Developing evidence-based tools for a multi-tier approach to preschool language and early literacy instruction. *Journal of Early Intervention, 36*(4), 246–262.
<https://doi.org/10.1177/1053815115581209>
- Greenwood, C. R., Carta, J. J., Schnitz, A. G., Irvin, D. W., Jia, F., & Atwater, J. (2019). Filling an information gap in preschool MTSS and RTI decision making. *Exceptional Children, 85*, 271–290. <https://doi.org/10.1177/0014402918812473>
- Greenwood, C. R., & Kim, J. (2012). Response to intervention (RTI) services: An ecobehavioral perspective. *Journal of Educational & Psychological Consultation, 22*, 79–105. <https://doi.org/10.1080/10474412.2011.649648>

- Hagans-Murillo, K. (2005). Using a response-to-intervention approach in preschool to promote literacy. *The California School Psychologist, 10*, 45–54.
<https://doi.org/10.1007/BF03340920>
- Hemmeter, M. L., Santos, R. M., & Ostrosky, M. M. (2008). Preparing early childhood educators to address young children’s social-emotional development and challenging behavior: A survey of higher education programs in nine states. *Journal of Early Intervention, 30*, 321–340.
<https://doi.org/10.1177/1053815108320900>
- Herr, C. M., & Bateman, B. D. (2013). Learning disabilities and the law. In H. L. Swanson, K. R. Harris, & S. Graham (Eds.), *Handbook of learning disabilities* (2nd ed., pp. 51-68). Guilford Press.
- Hoffman, T. K., & Kovalanka, K. A. (2019). Behavior problems in child care classrooms: Insights from child care teachers. *Preventing School Failure: Alternative Education for Children and Youth, 63*(3), 259–268.
<https://doi.org/10.1080/1045988X.2019.1588215>
- IRIS Center. (2015). *Intensive intervention (part 1): Using data-based individualization to intensify instruction*. <https://iris.peabody.vanderbilt.edu/module/dbi1/>
- Kagan, S. L., & Kauerz, K. (2012). Preschool programs: Effective curricula. *Encyclopedia on Early Childhood Development [online]*, 2nd Edition.
<http://www.child-encyclopedia.com/preschool-programs/according-experts/preschool-programs-effective-curricula>

- Kaiser, A., & Hemmeter, M. (2015). Introduction to special issue on the center on response to intervention in early childhood: Developing evidence-based tools for a multi-tier approach to preschool language and early literacy instruction. *Journal of Early Intervention, 36*, 243-245. <https://doi.org/10.1177/1053815115585088>.
- Kaminski, R. A., Abbott, M., Bravo Aguayo, K., Latimer, R., & Good, R. H. (2014). The preschool early literacy indicators: Validity and benchmark goals. *Topics in Early Childhood Special Education, 34*(2), 71–82. <https://doi.org/10.1177/0271121414527003>
- Kaminski, R. A., & Powell-Smith, K. A. (2017). Early literacy intervention for preschoolers who need tier 3 support. *Topics in Early Childhood Special Education, 36*(4), 205–217. <https://doi.org/10.1177/0271121416642454>
- Lawrence, S., Smith, S., & Banerjee, R. (2016). *Preschool inclusion: Key findings from research and implications for policy*. Child Care and Early Education Research Connections. National Center for Children in Poverty. <https://eric.ed.gov/?id=ED579178>
- Lonigan, C. J., & Phillips, B. M. (2016). Response to instruction in preschool: Results of two randomized studies with children at significant risk of reading difficulties. *Journal of Educational Psychology, 108*(1), 114–129. <https://doi.org/10.1037/edu0000054>
- Maki, K. E., Floyd, R. G., & Roberson, T. (2015). State learning disability eligibility criteria: A comprehensive review. *School Psychology Quarterly, 30*(4), 457–469. <https://doi.org/10.1037/spq0000109>

- Maki, K. E., & Adams, S. R. (2019). A current landscape of specific learning disability identification: Training, practices, and implications. *Psychology in the Schools, 56*, 18– 31. <https://doi.org/10.1002/pits.22179>
- McConnell, S. R., Wackerle-Hollman, A. K., Roloff, T. A., & Rodriguez, M. (2014). Designing a measurement framework for response to intervention in early childhood programs. *Journal of Early Intervention, 36*(4), 263–280. <https://doi.org/10.1177/1053815115578559>
- Miller, S., Smith-Bonahue, T., & Kemple, K. (2017). Preschool teachers’ responses to challenging behavior: The role of organizational climate in referrals and expulsions. *International Research in Early Childhood Education, 8*, 38–57.
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). *Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement*. *PLoS Med 6*(7).
- National Association for the Education of Young Children. (2009). *Developmentally appropriate practice in early childhood programs serving children from birth through age 8*. <http://www.naeyc.org/>
- National Center for Learning Disabilities. (2014) *Roadmap to Pre-K RTI: Applying Response to Intervention in Preschool Settings*. <https://www.nclد.org/research/roadmap-to-pre-k-rti/>
- National High School Center, National Center on Response to Intervention, and Center on Instruction. (2010). *Tiered interventions in high schools: Using preliminary “lessons*

learned” to guide ongoing discussion. Washington, DC: American Institutes for Research.

Noe, S., Spencer, T., Kruse, L., & Goldstein, H. (2013). Effects of a Tier 3 phonological awareness intervention on preschoolers’ emergent literacy. *Topics in Early Childhood Special Education, 34*, 27–39.
<https://doi.org/10.1177/0271121413489172>

Parks, N. (2011). *The impact of response to intervention on special education identification.* Ed.D. Dissertation, Georgia Southern University: United States Georgia. <http://hdl.handle.net/10518/4779>

Preston, A., Wood, C., & Stecker, A. (2016). Response to intervention: Where it came from and where it's going, preventing school failure. *Alternative Education for Children and Youth, 60*, 173-182.
<https://doi.org/10.1080/1045988X.2015.1065399>

Pretti-Frontczak, K., Carta, J., Dropkin, E., Fox, L., Grisham-Brown, J., Edwards, C., & Sandall, S. (2014). Frameworks for response to intervention in early childhood: Description and implications. *Communication Disorders Quarterly, 35*, 108–119.
<https://doi.org/10.1177/1525740113514111>

Purpura, D. J., & Lonigan, C. J. (2015). Early numeracy assessment: The development of the preschool numeracy scales. *Early Education and Development, 26*(2), 286–313. <https://doi.org/10.1080/10409289.2015.991084>

- Reschly, D. J. (2014). Response to intervention and the identification of specific learning disabilities. *Topics in Language Disorders, 34*, 39–58.
<https://doi.org/10.1097/TLD.0000000000000003>
- RTI Action Network. (n.d.). *RTI Kindergarten—5th Grade Resources*. A program from the National Center of Learning Disabilities. <http://www.rtinetwork.org/k-5>
- Shepley, C., & Grisham-Brown, J. (2019). Multi-tiered systems of support for preschool-aged children: A review and meta-analysis. *Early Childhood Research Quarterly, 47*, 296-309. <https://doi.org/10.1016/j.ecresq.2019.01.004>
- Steed, E. A., Pomerleau, T., Muscott, H., & Rohde, L. (2013). Program-wide positive behavioral interventions and supports in rural preschools. *Rural Special Education Quarterly, 32*(1), 38–46. <https://doi.org/10.1177/875687051303200106>
- Stuebing, K. K., Barth, A. E., Trahan, L. H., Reddy, R. R., Miciak, J., & Fletcher, J. M. (2015). Are child cognitive characteristics strong predictors of responses to intervention? A meta-analysis. *Review of Educational Research, 85*(3), 395–429. <https://doi.org/10.3102/0034654314555996>
- Swartz, S., Geraghty, C., & Franklin-Guy, S. (2011). *Response to intervention (RtI): Implementation and legal issues*. Education Law Association.
https://www.researchgate.net/publication/288490525_Response_to_Intervention_RtI_Implementation_and_Legal_Issues
- Tran, L., Sanchez, T., Arellano, B., & Lee Swanson, H. (2011). A meta-analysis of the RTI literature for children at risk for reading disabilities. *Journal of Learning Disabilities, 44*(3), 283–295. <https://doi.org/10.1177/0022219410378447>

- U.S. Department of Education. (2011). *Memorandum: A response to intervention (RTI) process cannot be used to delay-deny an evaluation for eligibility under the Individuals with Disabilities Education Act (IDEA)*. Retrieved from <http://www2.ed.gov/policy/speced/guid/idea/memosdcltrs/osep11-07rtimemo.doc>.
- U.S. Department of Education. (2015). *A matter of equity: Preschool in America*. <https://eric.ed.gov/?id=ED555741>
- VanDerHeyden, A. M., & Snyder, P. (2006). Integrating frameworks from early childhood intervention and school psychology to accelerate growth for all young children. *School Psychology Review, 35*(4), 519-534.
- VanDerHeyden, A. M., Snyder, P. A., Broussard, C., & Ramsdell, K. (2007). Measuring response to early literacy intervention with preschoolers at risk. *Topics in Early Childhood Special Education, 27*(4), 232–249.
- Wackerle-Hollman, A., Schmitt, B., Bradfield, T., Rodriguez, M., & McConnell, S. (2013). Redefining individual growth and development indicators. *Journal of Learning Disabilities, 48*, 495–510. <https://doi.org/10.1177/0022219413510181>.
- Werts, M., Carpenter, E., & Fewell, C. (2014). Barriers and benefits to response to intervention: Perceptions of special education teachers. *Rural Special Education Quarterly, 33*, 3-11. <https://doi.org/10.1177/875687051403300202>