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Response to Intervention for Reading Difficulties in the Primary Grades: Some Answers and Lingering Questions

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Abstract

The purpose of this article is to describe the current research base and identify research needs related to response to intervention (RTI) frameworks in primary-grade reading. Research is reviewed on early reading instruction and intervention, the implementation of multitiered reading interventions, and the determination of intervention responsiveness. Areas identified as in need of research include (a) the conditions under which early reading interventions are most effective in RTI contexts, (b) multitiered interventions for students with limited English proficiency, (c) reading instruction for students who make limited progress in Tier 3 intensive interventions, (d) criteria for determining intervention responsiveness, and (e) the effects of fully implemented RTI frameworks. Although RTI research may be expensive and difficult to implement, it may contribute to improved reading outcomes for many students who are otherwise at risk of serious negative life consequences.

Keywords

response to intervention, reading intervention, learning disabilities, reading difficulties, instruction

The academic area most often targeted in schools that implement response to intervention (RTI) models is beginning reading (Spectrum K12 School Solutions, 2009). As in other academic and behavioral domains, RTI in early reading refers to comprehensive schoolwide frameworks through which students at risk for reading difficulties are identified and provided with evidence-based and data-informed instruction and interventions before they fall farther behind their peers. Schools across the United States are implementing RTI models to address early reading difficulties (Berkeley, Bender, Peaster, & Saunders, 2009) in an effort to provide every student the support necessary to develop adequate reading proficiency.

There are two factors underlying the wide-scale adoption of RTI frameworks for early reading instruction. First, early reading instruction has a well-established research base with a strong focus on the prevention of reading difficulties through early intervention (e.g., National Reading Panel, 2000; Snow, Burns, & Griffin, 1998). Second, the majority of students identified with learning disabilities (LDs) are primarily impaired in reading (Fletcher, Lyon, Fuchs, & Barnes, 2007). Over the past decade, researchers have identified key questions relating to the RTI framework for reading that have not been adequately studied (Denton & Mathes, 2003; D. Fuchs & Deshler, 2007; Kratochwill, Clements, & Kalymon, 2007). The purpose of this article is to describe the characteristics and current research base of the RTI framework in early reading. Topics addressed include (a) an overview of RTI models targeting early reading, (b) the current research base on early reading instruction and intervention, (c) research guiding the implementation of multitiered reading interventions, (d) determining responsiveness to early reading intervention, and (e) a research agenda related to RTI early reading models.

Overview of RTI in Primary-Grade Reading

RTI implementations addressing primary-grade reading vary on several dimensions but share essential characteristics (Gersten et al., 2008; Kovaleski & Black, 2010). They are multitiered intervention systems in which students are provided with evidence-based classroom reading instruction and supplemental intervention when it is needed, and decisions related to intervention are based on student

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assessment data. Some RTI prevention systems consist of four or more tiers of intervention (Berkeley et al., 2009); however, this article focuses on a three-tiered model in which (a) Tier 1 intervention (i.e., primary prevention) is quality evidence-based core classroom reading instruction with universal screening to identify students at risk for reading difficulties, (b) Tier 2 (i.e., secondary intervention or secondary prevention) is supplemental intervention provided to students identified as at risk for reading difficulties, and (c) Tier 3 (i.e., tertiary intervention or tertiary prevention) entails the provision of reading intervention of greater intensity to students with inadequate responsiveness in Tiers 1 and 2. Tier 2 and Tier 3 interventions typically consist of supplemental instruction that is added to regular classroom reading instruction rather than replacing it because students with reading difficulties need increased instruction and opportunities for practice (Gersten et al., 2008). In all tiers, student progress is monitored, typically through repeated curriculum-based measures, and summative assessment is used to evaluate student outcomes. Results of these assessments inform instructional decisions and judgments related to continuation at the current intervention tier or placement in a more or less intensive tier. Finally, teacher professional development has a large role in ensuring that instruction at all levels is of high quality and is delivered with fidelity to evidence-based and empirically validated programs and processes.

Multiple studies have demonstrated that with typical instruction, children who do not learn to read adequately in the primary grades will likely continue to struggle with reading in subsequent years (Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996; Juel, 1988; Torgesen & Burgess, 1998). Stanovich (1986) observed that early difficulties acquiring basic reading skills typically result in limited time engaged in text reading; because of this lack of exposure to text, a relatively mild decoding problem may eventually assume the appearance of a pervasive reading deficit characterized by low fluency, poor vocabulary, and limited world knowledge, all contributing to impaired reading comprehension. By the middle to upper elementary grades, some children have developed reading problems that may cause them to be identified as having LDs primarily because they did not receive appropriate early reading instruction in the primary grades. If the performance gap between typically developing readers and students at risk for reading difficulties is addressed aggressively in the early stages of reading acquisition, more serious reading problems may be prevented. Simmons et al. (2008) observed, "An underlying assumption of RTI is that there is a window of opportunity wherein reading difficulty is more easily altered by instruction and risk of later reading difficulty is likewise minimized" (p. 159).

Researchers have determined that at-risk students who respond inadequately to empirically validated instruction differ from at-risk students with adequate intervention responsiveness in the severity of their impairment in key cognitive domains (Fletcher et al., 2011; Vellutino, Scanlon, Small, & Fanuele, 2006) and also in brain function when engaged in reading tasks (Davis et al., 2010; Simos et al., 2007). Such studies help demonstrate the validity of the RTI framework as a prevention system that yields important data related to the identification of students with LDs. Thus, the implementation of a comprehensive RTI model "may reduce the number of students referred for special education, promote effective early intervention, provide diagnostic information to consider in the identification of a disability, and/or may reduce the impact of a disability on a child's academic progress" (Council for Exceptional Children, 2007, p. 2).

Evidence-Based Instruction and Intervention for Primary-Grade Readers

Although there is not one "right way" to teach children who have reading difficulties in the early grades, research reviews and meta-analyses have identified key characteristics related to improved outcomes (Foorman & Torgesen, 2001; Gersten et al., 2008; National Reading Panel, 2000; Snow et al., 1998; Swanson, 1999; Torgesen, 2004; Wanzek & Vaughn, 2007). Students with reading difficulties benefit from instruction that is *purposeful* and *targeted at important objectives* that students need to learn, progressing logically from easier to more challenging skills. Within such a program, students' *mastery of key skills and strategies is carefully monitored* so that reteaching can be provided if needed. Students with reading difficulties also benefit from (a) *explicit instruction* in which skills are clearly modeled and key concepts are directly taught, so that students are not left to infer these critical concepts and skills; (b) *extended opportunities for guided and independent practice* with both *corrective and positive feedback*, including copious amounts of *engaged practice in reading and responding to connected text*; and (c) instructional formats that promote *active student involvement* and provide *many opportunities to respond*. Students who are easily confused are more likely to be successful when they receive instruction with these characteristics.

A study by Mathes et al. (2005) demonstrated that other instructional characteristics are less essential for effective reading intervention. The researchers experimentally compared two first grade small-group intervention programs and a typical practice comparison group. Both interventions provided explicit instruction in phonemic awareness, phonics, and fluency with integrated instruction in vocabulary and comprehension, but they differed in other ways. One was a fully scripted direct instruction program that provided systematic instruction and extended decontextualized

practice in synthetic phonics with application in fully decodable text. The other program provided more flexibility within a consistent framework. Teachers planned lessons by selecting from a list of instructional activities to address students' needs determined through diagnostic assessment and provided explicit instruction in both synthetic and analogy phonics with application in non-decodable text at students' instructional reading levels. Students in the more flexible program spent a relatively larger portion of each lesson reading and responding to connected text and less time in decontextualized phonics and word-reading practice. Mathes et al. found that both interventions resulted in significantly higher performance on multiple reading indicators relative to the comparison group.

Although there is considerably less research investigating the characteristics of effective reading instruction for English language learners (ELLs), there is evidence that, just as native English speakers, ELLs benefit from explicit, well-organized early reading instruction that addresses their needs in phonemic awareness, phonics, reading fluency, vocabulary, and comprehension (August & Shanahan, 2006; Vanderwood & Nam, 2007). In addition, effective instruction for ELLs who are learning to read in English includes a focus on the development of oral language, including purposeful vocabulary instruction with extended opportunities to practice newly learned words in speaking and listening, as well as in reading and writing (Crosson & Lesaux, 2010; Pollard-Durodola, Mathes, Vaughn, Cardenas-Hagan, & Linan-Thompson, 2006). Crosson and Lesaux (2010) found that the strong relationship often noted between reading fluency and comprehension in native English readers is moderated by ELLs' oral language development.

Tier 1: Evidence-Based Differentiated Instruction

Researchers have demonstrated that quality evidence-based classroom reading instruction is sufficient for most students who are at risk for reading difficulties to learn to read at average levels (e.g., Foorman, Francis, Fletcher, Mehta, & Schatschneider, 1998). Effective Tier 1 instruction in the early grades includes explicit instruction in phonemic awareness, phonics, and automatic recognition of high-frequency irregular words; instruction in making meaning from text, including an emphasis on vocabulary and the development of background knowledge; and many opportunities to read and respond to connected text to promote reading fluency and comprehension (Chard, Vaughn, & Tyler, 2002; Ehri, 2004; Jitendra, Edwards, Sacks, & Jacobson, 2004; National Reading Panel, 2000; Snow et al., 1998).

Evidence-based core instructional programs. The high-quality implementation of an evidence-based published core reading program may help ensure that students have an adequate opportunity to learn in Tier 1 classroom instruction (Al Otaiba, Kosanovich-Grek, Torgesen, Hassler, & Wahl, 2005). Using a core program may help ensure that instruction is evidence based and addresses key objectives. When classroom teachers do not follow core programs, they assume responsibility for ensuring that children are taught the critical content using effective instructional approaches, with an instructional sequence that progresses from easier to more challenging skills and concepts. Although a quality evidence-based core reading program can provide the foundation for effective Tier 1 instruction, teachers typically need to adapt or supplement the program to meet the needs of students with reading difficulties (Stein, Johnson, & Gutlohn, 1999). For example, published programs may introduce skills at a rapid rate and may not provide enough opportunities for practice for struggling readers, particularly cumulative practice over time (Stein et al., 1999).

Differentiated instruction. Effective Tier 1 instruction is differentiated, meaning that children receive instruction targeted to meet their needs as readers (Connor et al., 2009). Teachers can effectively differentiate instruction based on data from screening, diagnostic, and progress monitoring assessments, including assessments that accompany a published reading program, informal inventories of sight word or letter-sound knowledge, curriculum-based measures of early reading skills and oral reading fluency, and other assessments. The results of these assessments can be used to form small, flexible groups of students with similar needs and to plan their instruction (Gersten et al., 2008). Students at risk for reading difficulties are more likely to make progress if instruction addresses content and strategies they need to learn and if text they are asked to read is neither too easy nor too difficult.

Supplemental Intervention at Tiers 2 and 3

A substantial body of converging evidence supports the effectiveness of instructional reading interventions provided to students at risk for reading difficulties in the primary grades (Al Otaiba & Torgesen, 2007; Benner, Nelson, Ralston, & Mooney, 2010; Cavanaugh, Kim, Wanzek, & Vaughn, 2004; Ehri, Nunes, Stahl, & Willows, 2001; Elbaum, Vaughn, Hughes, & Moody, 2000; Torgesen, 2004; Wanzek & Vaughn, 2007). Reviews and meta-analyses have revealed larger effects for reading interventions provided in the early stages of reading acquisition than for those provided in Grades 3 and higher. For example, Wanzek and Vaughn (2007) found larger effects for intervention provided in Grades K–1 than in Grades 2–5. Although the reading difficulties of students in Grades 3–5 can be remediated through intensive small group or one-on-one intervention, this is typically more challenging than providing intervention in the earlier grades (Torgesen, 2004; Wanzek, Wexler, Vaughn, & Ciullo, 2010).

A small number of studies have investigated early reading interventions for ELLs, typically finding that word reading is improved, but reading comprehension is more difficult to remediate. For example, Vaughn et al. (2006) provided first grade ELLs with a small-group supplemental oral language and literacy intervention in either English or Spanish, matching the language of instruction of the regular classroom reading programs. They reported significant differences favoring the treatment groups in phonological and word-level skills but not in reading comprehension. However, in a one-year follow-up of the same students with no further researcher-provided intervention, the effects of the first grade intervention had become stronger and included significant differences in reading comprehension and oral language (Cirino et al., 2009). Further research is needed to confirm and extend these findings and to validate instructional programs for students who are not native English speakers.

Studies of multitiered interventions. A growing number of experimental and quasi-experimental studies have evaluated outcomes across two or more tiers of reading intervention (e.g., Berninger et al., 2002; Coyne, Kame'enui, Simmons, & Harn, 2004; Kamps et al., 2008; Mathes et al., 2005; McMaster, Fuchs, Fuchs, & Compton, 2005; O'Connor, Harty, & Fulmer, 2005; Simmons et al., 2008; Vadasy, Sanders, Peyton, & Jenkins, 2002; Vaughn et al., 2009). In these studies, interventionists provided standard protocol reading interventions individually or to small groups of at-risk readers. They generally report effects favoring treatment groups and a reduction in the percentages of children who remain at risk for reading difficulties. For example, O'Connor et al. (2005) provided Tier 1 and Tier 2 intervention to 31 children in kindergarten and Grade 1, moving students with inadequate response to Tier 3 in January of Grade 1; both Tier 2 and Tier 3 continued into Grades 2 and 3 for a few children who needed it. In this model, Tier 2 was offered throughout the study for students who required ongoing support but not the intensity of Tier 3 interventions, and it was possible for students to enter and exit Tiers 2 and 3 and then reenter at a later time if needed. The researchers reported that all students who received Tier 2 and about 40% of the students who were assigned to Tier 3 intervention performed in the average range in Grade 3 on measures of word reading and oral reading fluency.

Tier 3 intervention. Studies of reading interventions provided to students with identified reading disabilities have demonstrated that it is possible to intervene successfully with these students (Swanson, 1999). For example, Torgesen et al. (2001) showed that students in Grades 3–5 with severe reading impairments can be remediated through highly intensive intervention; however, the students in this study had not demonstrated low response to previous evidence-based interventions. Few researchers have evaluated the effectiveness of Tier 3 intervention provided in Grades 2–5 to students who experienced low responsiveness in earlier Tier 2 intervention. In studies of this type, group outcomes have been generally positive, but some students have remained very poor readers following even highly intensive Tier 3 intervention (e.g., Denton, Fletcher, Anthony, & Francis, 2006). As these are ostensibly the kinds of students who would be served in special education in an RTI model, there is a need for research examining effective instruction for students with reading difficulties that are demonstrably resistant to evidence-based remediation.

It has been argued that, particularly in Grades 2 and higher, students identified with serious reading difficulties who are performing substantially below grade level may need to be immediately provided with intensiveintensive intervention (e.g., Tier 3) rather than progressing through less intensive tiers (e.g., Tiers 1 and 2) (Vaughn, Denton, & Fletcher, 2010). It is both intuitive and supported by research evidence that students with the lowest preintervention performance levels require more intensive interventions to close the gap with typically developing students (Torgesen, 2004; Vaughn, Linan-Thompson, & Hickman, 2003). Delaying the provision of intensive interventions may substantially decrease the likelihood that seriously impaired readers will learn to read adequately.

The Implementation of Tier 2 and Tier 3 Reading Interventions

Providing quality supplemental reading intervention to all students who require it can be challenging, given the realities associated with limited time, personnel, and funding in schools. This has led to questions related to qualifications of interventionists, where interventions should be provided, group size, and the timing and duration of interventions.

Interventionists and Locations

Tier 2 interventions are typically provided by (a) general education classroom teachers who provide regularly scheduled small-group instruction within their own classrooms, (b) reading specialists or other certified teachers who deliver small-group lessons within the regular classroom setting or in a setting outside the classroom, or (c) paraprofessionals who receive training and sustained coaching from an experienced teacher. There is a lack of experimental research directly contrasting models in which classroom teachers provide Tier 2 small-group interventions in the classroom setting and those in which other interventionists provide intervention in a location outside the regular classroom. Although having classroom teachers provide intervention may be more feasible than providing a staff of trained interventionists, classroom teachers may lack classroom management skills that would be necessary to allow the teacher to provide focused, consistent intervention to small groups of at-risk readers during the regular school

day while also ensuring that the other students in the class are actively involved in purposeful independent practice activities that do not waste valuable instructional time (Oliver & Reschly, 2007). If classroom teachers are to provide effective Tier 2 intervention during the school day, they will likely need substantial professional development and ongoing support in the implementation of scientifically validated reading intervention programs and in effective classroom management strategies.

Tier 2 supplemental reading interventions can be effective when provided by well-prepared and well-supported paraprofessionals (Grek, Mathes, & Torgesen, 2003; Vadasy, Sanders, & Peyton, 2006; Vadasy, Sanders, & Tudor, 2007). Studies such as these have suggested that paraprofessional-provided early reading intervention is effective when (a) interventionists are carefully selected (e.g., able to pass a test of phonemic awareness), (b) group sizes are kept very small to support effective instruction and behavior management, (c) highly structured reading intervention programs are implemented, and (d) an experienced teacher prepares and coaches the paraprofessionals, spending extended amounts of time observing lessons, modeling effective instruction, and problem solving when students fail to make adequate progress.

Gersten et al. (2008) recommended that Tier 3 interventions be provided by well-qualified teachers. As a group, students who demonstrate inadequate progress in Tier 2 interventions have been found to have relatively severe deficits in phonological processing, processing speed, and verbal working memory, and they commonly have challenging behaviors and/or attention deficits (Al Otaiba & Fuchs, 2002; Fletcher et al., 2011; Nelson, Benner, & Gonzalez, 2003). Providing effective, individualized intervention to these most difficult-to-remediate students places large demands on teachers' knowledge and skills and requires the capacity to make quick instructional decisions to respond appropriately to struggling learners. Given the challenges faced by students in Tier 3, it may be best to provide their interventions in a quiet location outside of the regular classroom.

Group Size

As a general rule, groups should be small enough so that active student involvement is maximized and the teacher is able to monitor and respond appropriately to each student. Providing one-on-one (1:1) instruction to at-risk readers has been associated with positive outcomes (Elbaum et al., 2000), but this is often not considered feasible in school settings, particularly if many children are at risk for reading problems. In a synthesis of studies that evaluated extensive reading interventions (i.e., those provided for more than 100 sessions) for students in kindergarten through Grade 3, Wanzek and Vaughn (2007) found that higher effects were demonstrated in studies in which intervention was provided 1:1 or in very small groups than by those that provided intervention in larger groups. A small number of researchers have systematically investigated the relative effects of group size on students' outcomes in early reading intervention, generally finding that Tier 2–type interventions are as effective when delivered in groups of two or three as when delivered individually (Iversen, Tunmer, & Chapman, 2005; Vaughn et al., 2003). Some students who receive Tier 3 intervention may require 1:1 instruction, although there are examples in the literature of effective Tier 3 interventions provided in very small groups (e.g., groups of two; Denton et al., 2006). The size of the group through which Tier 3 intervention is provided may be best decided on an individual basis by RTI problem-solving teams that consider factors related to the nature and extent of students' impairment in reading, as well as difficulties with attention, and behavior.

The Timing of Tier 2 Intervention

There is insufficient research guidance about the ideal time to begin Tier 2 intervention. Researchers have tested models in which Tier 2 begins in kindergarten (e.g., O'Connor et al., 2005; Simmons et al., 2008), in the fall of first grade (e.g., Mathes et al., 2005), and in the winter of first grade (e.g., Denton et al., 2011). Kindergarten may represent a window of opportunity during which intervention is most likely to prevent reading difficulties for many children. Several researchers have provided Tier 2 intervention in kindergarten and subsequently monitored students' progress to determine the need for additional intervention (Coyne et al., 2004; Kamps et al., 2008; O'Connor et al., 2005; Simmons et al., 2008; Vadasy et al., 2002). Some have found that significant percentages of students who receive kindergarten intervention also required intervention in subsequent grades (e.g., O'Connor et al., 2005), whereas others have report that most students who respond well to kindergarten intervention delivered with at least moderate intensity do not require further intervention to maintain performance in the average range (Coyne et al., 2004; Simmons et al., 2008).

Although kindergarten intervention may prevent future reading difficulties, it can be challenging to accurately identify the children who require supplemental reading intervention at this stage, often resulting in a high rate of false positive errors (i.e., identifying children as at risk when they would actually learn to read adequately without additional intervention; Jenkins, Hudson, & Johnson, 2007). Compton et al. (2010) found that the accuracy of identification of at-risk readers was improved when a reading screen administered at the beginning of first grade was followed by 5 weeks of progress monitoring using a word identification fluency task. It may be advisable to implement a two-stage

screening process that includes early screening followed by a period of progress monitoring assessment; however, this would delay the onset of intervention for all students. Practitioners will need to evaluate their priorities and resources while keeping in mind the trade-off between the potential benefits of very early intervention and the possibility that this intervention will be provided to some students who do not actually need it. Longitudinal research on the long-term effects of beginning intervention at various points in kindergarten or Grade 1 would be useful, as would continued work to develop accurate screening procedures that are feasible for use in schools (Jenkins et al., 2007).

Duration and Frequency

Based on evidence from early reading intervention studies, the What Works Clearinghouse recommended that Tier 2 intervention be provided three to five times per week for 20 to 40 min "for a reasonable amount of time before providing a more intensive daily Tier 3 intervention" (Gersten et al., 2008, p. 26). Wanzek and Vaughn (2007) found in their synthesis of reading intervention studies that providing small-group intervention for at least 20 weeks was feasible in school settings and that students with reading difficulties and disabilities benefitted from these interventions.

Few studies have directly examined intervention dosage and scheduling in the primary grades, and results have been mixed. Al Otaiba, Schatschneider, & Silverman, (2005) randomly assigned kindergarten students to receive the same small-group intervention two or four times per week or to a control condition, finding that those who received intervention more frequently significantly outperformed controls in word reading and comprehension, with large effect sizes, whereas those in the twice per week condition performed significantly better than controls only on one phonemic awareness measure. In contrast, Denton et al. (2011) found no differences in reading outcomes when first grade students at risk for reading difficulties were randomized to receive small group Tier 2 intervention in 30-min sessions (a) four times per week for 16 weeks (32 hr), (b) four times per week for 8 weeks (16 hr), or (c) two times per week for 16 weeks (16 hr). All three groups received the same intervention beginning in January of Grade 1 in groups of three, provided outside of the regular classroom. There were no posttest differences in rates of adequate intervention response; however, across all groups, the percentage of students with adequate response to the intervention was smaller than has often been reported for more extensive first grade reading interventions. Similarly, Hatcher et al. (2006) reported a lack of differential outcomes when Year 1 British students were randomized to receive 33 hr versus 16.5 hr of small-group intervention, although outcomes were weak for both groups. Although both Denton et al. and Hatcher et al. reported generally weak effects for relatively brief interventions delivered in small groups, D. Fuchs, Compton, Fuchs, Bryant, and Davis (2008) reported that first grade students who received a 9-week Tier 2 intervention in 45-min sessions, four times per week (about 27 hr of instruction), in groups of one to four outperformed control students on progress monitoring assessments and on some standardized reading tests.

To inform the question of intervention dosage, Vaughn et al. (2003) examined the instructional response of second grade students with reading difficulties within a model in which the duration of supplemental intervention was contingent on attaining predetermined benchmarks based primarily on oral reading fluency (ORF). Progress toward the benchmarks was evaluated after 10, 20, and 30 weeks of intervention, and students who met criteria at each assessment point exited intervention. All students received daily 30-min intervention in groups of three outside of the regular classroom. Roughly 25% met the criteria after 10 weeks of intervention, another 25% after 20 weeks, and 25% after 30 weeks (the entire school year), and about 25% never met the criteria. Students with the highest preintervention ORF scores required less time in intervention, whereas more severely impaired readers required more extensive intervention. Some students continued to make acceptable growth with regular classroom instruction after exiting intervention at 10 and 20 weeks, but others did not.

Gersten et al. (2008) recommended that Tier 3 reading intervention consist of individualized, "concentrated instruction" delivered in "multiple and extended instructional sessions daily" (p. 10). The number of weeks—or months—spent in Tier 3 will depend on the needs of the students and the level of intensity with which intervention is delivered. In a seminal study by Torgesen et al. (2001) researchers delivered 1:1 intervention for about 2 hr per day in a reading clinic to students in Grades 3–5 who had identified LDs and severe reading problems. After only 8 weeks, the students had made large standard score gains in word reading and comprehension, maintained 2 years later, although outcomes in reading fluency were weaker. Other researchers have provided interventions to students with severe reading difficulties for 50 to 60 min per day over a longer period of time with generally positive group outcomes (e.g., Blachman et al., 2004; Vaughn et al., 2009).

Evaluation of Instructional Response

Monitoring Progress

Implementation of RTI models requires the use of progress monitoring assessment data for determining whether students are making adequate progress toward instructional goals as well as outcome assessments to evaluate whether

these goals are attained. In most cases, progress is monitored using curriculum-based measures (CBMs) that are closely aligned with instructional content. In early reading interventions these measures may assess phonemic awareness, letter knowledge, word identification, phonemic decoding, word reading fluency, and ORF in connected text. There is evidence that brief measures of ORF are good indicators of growth in general reading ability in the primary grades, reflecting the development of quick and accurate word identification, and scores from ORF assessments are highly predictive of outcomes on standardized tests of reading comprehension for young readers. (L. S. Fuchs, Fuchs, Hosp, & Jenkins, 2001). The use of well-designed CBMs to inform instruction is well established (e.g., L. S. Fuchs, Deno, & Mirkin, 1984; Stecker, Fuchs, & Fuchs, 2005); however, questions have been raised related to the reliability of repeated ORF measurement for evaluating student progress over time, primarily because of concerns about the equivalence of alternate forms, unless the forms are statistically equated (Francis et al., 2008).

Informing Decisions About Instructional Response

Researchers and practitioners have used a variety of approaches to identify students with adequate and inadequate levels of intervention responsiveness. Such judgments are crucial to the implementation of RTI models, as they inform decisions to place children in more or less intensive interventions and serve as a source of data for special education evaluation (L. S. Fuchs, 2003). Methods of determining instructional response differ across four dimensions: (a) whether they apply summative benchmarks or scores as criteria for adequate response (i.e., final level or status), evaluate students' rates of growth (i.e., slope), or consider a combination of slope and level; (b) whether they compare at-risk students' scores directly to preestablished score criteria or apply a discrepancy formula to compare the performance of at-risk students to that of other groups of students such as their classmates; (c) what reading domain or domains are evaluated (e.g., timed or untimed word reading, phonological decoding, ORF, comprehension); and (d) what specific score cut points, benchmarks, or slope criteria are used in the evaluation of adequate and inadequate response (D. Fuchs et al., 2008). Approaches that differ on these dimensions are likely to identify different students as adequate and inadequate responders, and there may be little or no overlap in the identified groups (Barth et al., 2008; D. Fuchs et al., 2008).

D. Fuchs et al. (2008) described a longitudinal study in which they evaluated the utility of various approaches and measures for the evaluation of responsiveness to first grade reading intervention. Four approaches met their criteria for classification accuracy in predicting end-of-Grade-2 status. Students were most accurately identified as inadequate responders based on (a) low preintervention status on a CBM of word identification fluency (WIF), (b) failure to achieve final normalization as defined by a standard score less than 90 on the *Test of Word Reading Efficiency* Sight Word Efficiency subtest, (c) WIF slope at least 1 *SD* below a normative sample, or (d) a dual discrepancy with a normative sample in both ORF level and WIF slope.

The examination of slope, or growth over time, is often considered a necessary component of the determination of adequacy of intervention response. Schatschneider, Wagner, and Crawford (2008) examined this assumption in a 2-year longitudinal study in which they analyzed an extensive statewide database from first grade students who attended Reading First schools in Florida. They compared the use of final achievement status (i.e., postintervention performance level), growth (i.e., slope), and the combination of status and growth as predictors of later reading achievement. Schatschneider et al. found that ORF status at the end of Grade 1 made a large contribution to both the concurrent and future prediction of reading comprehension but that slope made little independent contribution to prediction accuracy beyond status. In contrast, Compton et al. (2010) reported that the addition of slope on a timed measure of word identification as a component of screening procedures at the beginning of Grade 1 added significantly to the accuracy of identification of at-risk readers.

Since one of the goals of RTI frameworks in early reading is to close the performance gap between at-risk and typically developing readers, one typical approach focuses on postintervention performance in domains of interest (e.g., decoding, comprehension, fluency) in relation to preestablished benchmarks indexed to national, local, or classroom norms. However, Barth et al. (2008) noted that the use of a cut point on a single measure to dichotomize a continuous distribution results in lower agreement across methods because scores near the cut point fluctuate above and below thresholds with repeated testing, partly as a function of the reliability of the assessment. Barth et al. suggested the application of confidence intervals and use of multiple criteria to determine responder status, particularly when RTI frameworks are used as a source of data for special education eligibility. They pointed out that single "test performance cannot be the sole determinant of special education status. It would be tragic if the determination of responder status became formulaic and was used in schools in the same way as approaches based on ability–achievement discrepancy" (p. 305).

Another important consideration in judging instructional response is what domain(s) of reading to measure. As a primary objective of early reading instruction is the development of accurate and fluent reading, scores in decoding and text reading fluency are often applied to evaluate

instructional response. Reading fluency is predictive of reading comprehension in the primary grades (L. S. Fuchs et al., 2001), but researchers have typically found that fluency is more difficult to bring to grade-level performance than decoding (e.g., Denton et al., 2010; D. Fuchs et al., 2008; Simmons et al., 2008; Torgesen et al., 2001). Fletcher et al. (2011) applied both year-end fluency and decoding criteria to identify inadequate responders to Tier 2 first grade reading intervention and examined the cognitive characteristics of typically developing readers, adequate responders, low responders in fluency alone, and low responders in both fluency and decoding. They found that the three groups of at-risk readers were impaired on the same cognitive indicators but that there was a continuum in the severity of impairment, with the least impaired being the adequate responders, followed by low responders based on fluency alone and then by students who met criteria for low response in both decoding and fluency. Students with low postintervention scores in both decoding and fluency were more severely impaired in reading performance compared to those identified on the basis of fluency criteria alone, with cognitive skills closely associated with reading development (i.e., phonological awareness and rapid letter naming) accounting for the most unique variance.

Although the field has not yet agreed on a performance level that is a "gold standard" representing adequate intervention response (Barth et al., 2008; D. Fuchs et al., 2008), decisions concerning special education eligibility and/or the provision of intensive intervention should be based on multiple criteria and be made by teams of qualified professionals who evaluate a student's performance in previous Intervention, along with the quality and intensity of that intervention, the context in which it was provided, and the nature of the higher-intensity intervention that is being considered.

A Research Agenda

Scientific evidence grows incrementally over time, and small numbers of studies rarely result in clear-cut "answers" that can be easily applied. It is the convergence of findings that best informs practice. For some questions related to RTI models a preponderance of research evidence provides reliable guidance, for others there is an emerging research base, whereas for others there is a lack of scientific evidence.

Effective Instruction and Interventions

There is a continued need for experimental studies designed to evaluate programs for primary-grade students with reading difficulties with reading difficulties, particularly programs targeting vocabulary development and reading comprehension difficulties, but there is also a need for research investigating the implementation conditions under which these interventions are most effective. In particular, research might examine the consequences of decisions related to the timing, location, duration, and providers of interventions within the context of RTI frameworks.

Research is needed to assess the consequences of providing Tier 2 interventions delivered at various levels of intensity. In the models most frequently evaluated by researchers, Tier 2 intervention consists of small-group instruction provided using a standardized instructional protocol for 30 to 40 min daily over 20 weeks or more (Gresham, 2007). In practice, however, Tier 2 interventions vary considerably in intensity across RTI implementations. If time is spent on interventions that are not sufficiently intensive to accelerate the reading development of at-risk students, these students' reading difficulties may become more difficult to remediate. This question can be empirically addressed.

Intervention for students with limited English proficiency. There is currently insufficient research investigating the effects of early reading interventions for ELLs and native English speakers who have limited oral language development. Although it is recommended that early reading interventions target vocabulary, listening comprehension, and reading comprehension (Gersten et al., 2008), published programs for kindergarten and Grade 1 may prioritize phonemic awareness and phonics instruction but lack sufficient emphasis on vocabulary and comprehension. Researchers can address this need through the evaluation of early reading programs that emphasize both word-level and text-level skills. In addition, outcomes of early reading intervention studies can be disaggregated to show the effects on subgroups of students such as ELLs. Finally, there is a need for research specifically addressing the effects of interventions provided in RTI frameworks for ELLs.

Instruction for students with inadequate response. There have been few studies examining Tier 3 interventions for students with limited responsiveness in Tiers 1 and 2, and there is even less research examining effective instruction for students who make inadequate progress in Tier 3. Even in studies that provided highly intensive Tier 3 intervention, some individual students have demonstrated little or no growth (e.g., Denton et al., 2006). It will be necessary to go beyond conventional approaches for some of these students or to investigate interventions provided over the course of years rather than weeks. This question is critical for special education; in schools with RTI implementations, teachers of students with LDs would likely be asked to provide instruction to students with reading difficulties that are demonstrably intractable.

Examining Intervention Responsiveness

Research has provided converging evidence that many children respond positively to early reading intervention. To

continue to build this body of knowledge, reading intervention researchers can routinely provide descriptive statistics illustrating the proportions of students in their studies who meet postintervention benchmarks in decoding, fluency, and reading comprehension. In studies conducted over the past decade, researchers have commonly applied benchmarks at the 25th or 30th percentiles on norm-referenced assessments; these benchmarks might be standardized, for example, at the 25th percentile, to facilitate comparisons across studies. Confidence intervals could also be applied to indicate the percentage of students who scored within the margin of error on each benchmark. Knowledge of the proportions of students who meet such normative benchmarks across treatment and comparison groups in various intervention conditions could provide evidence to guide expectations when these interventions are applied within RTI systems.

There is also a need for continued research examining the consequences of applying various criteria and approaches, separately or in combination, for the determination of adequate instructional response at each tier. Longitudinal research that examines the long-term consequences of decisions based on different criteria would inform this important question.

Research Conducted Within Full RTI Models

It will be important to examine many of these questions within the context of fully implemented RTI models. The kind of large-scale longitudinal research necessary to examine these questions may be expensive and difficult to implement, but piecemeal evaluations of RTI components may not produce the information needed to guide policy and practice. The high cost of such an initiative should be weighed against the cost of continued failure to teach a large percentage of students in our schools to read adequately. For many years, researchers, lawmakers, and practitioners have pointed to the unacceptably high rates of reading failure among students in the United States, a condition that is related to school dropout (Alliance for Excellent Education, 2002), delinquency (Center on Crime, Communities, and Culture, 1997), and even suicide (Daniel et al., 2006). RTI models have the potential to address this situation in a systematic way, but support will be needed both for research investigating these models and for schools that implement them—both in terms of funding and in terms of flexibility allowed in the utilization of existing funding sources. Doing what we have always done, on the other hand, is likely to result in the outcomes that have been consistently observed.

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