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Academic Responding During Instruction and Reading Outcomes for Kindergarten Students At-risk for Reading Difficulties

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Abstract

The purpose of this study was to investigate the academic responding of students at-risk for reading difficulties in beginning reading instruction. Opportunities for kindergarten students at-risk for reading difficulties to respond academically during teacher-facilitated reading instruction in the general education classroom were examined in relation to student reading achievement as well as social behaviors. Student academic responding during teacher-facilitated instruction significantly predicted end of year reading achievement. Teacher perceptions of students' social skills (positive correlation) and problem behaviors (negative correlation) were significantly correlated with academic responding. When academic responding and teacher perceptions of social behaviors were examined together, only teacher perceptions of academic competence and problem behaviors predicted spring outcomes.

The beginning reading stage is perhaps the most pivotal point in a young child's school career. During the earliest grades, students build the foundation for reading and establish learning trajectories that are remarkably stable throughout schooling (Fletcher & Foorman, 1994; Juel, 1988; Roberts, Mohammed, & Vaughn, 2010). Once children fall behind in reading, intensive reading interventions are often required (Allington & McGill-Franzen, 1989; Vaughn, Denton, & Fletcher, 2010). A large body of research regarding validated early reading instructional practices is currently available, pointing to the need for student mastery of the foundation skills, such as phonemic awareness, along with integration of text fluency, vocabulary, and comprehension across a variety of texts (Adams, 1990; National Early Literacy Panel, 2009; National Reading Panel, 2000; Snow, Burns, & Griffin, 1998).

In recent years, research and policy have directed resources towards enhancing these critical areas of reading instruction in general education as one means to prevent reading difficulties and better identify students who are in need of specialized, intensive intervention based on their insufficient response to initial levels of evidence-based instruction (Fuchs & Fuchs, 1998; Gresham, 2002; Individuals with Disabilities Education Act, Part B, 2004). These response to intervention (RTI) models and policies are based on knowledge that increasing the effectiveness of general education instruction, particularly in the early grades and in the area of reading, can lead to improved achievement for students at-risk for reading

difficulties (Al Otaiba et al., 2008; Juel & Minden-Cupp, 2000; Pressley et al., 2001). In the early elementary grades, RTI models have often consisted of three tiers of instruction (Gersten et al., 2008), with high quality, core classroom reading instruction identified as the first tier for preventing future reading difficulties (Johnson, Mellard, Fuchs, & McKnight, 2006; Vaughn, Wanzek, & Fletcher, 2007). However, a review of the literature noted the need for more research on differentiated instruction in Tier I classroom lessons related to students' reading levels (Gersten et al., 2008). In the present study, we observed children identified as at-risk for reading difficulties during this Tier I, general education, reading instruction. We focused on the opportunities for these students to practice or academically respond to instruction during the teacher-facilitated instructional time.

Instructional Context

It is clear from the extensive research on reading instruction and intervention that a focus on effective instruction in phonological awareness, phonics and word recognition, fluency, oral language and vocabulary, and comprehension can positively affect student reading outcomes even in the earliest grades (National Early Literacy Panel, 2009; National Reading Panel, 2000). In addition to this instructional content, instructional context may also be pertinent to student achievement (Chatterji, 2006; Hughes, Luo, Kwok, & Loyd, 2008; Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008; Pianta & Stuhlman, 2004; Ponitz, Rimm-Kaufman, Grimm, & Curby, 2009; Rimm-Kaufman, La Paro, Downer, & Pianta 2005). The relevance of instructional context in relation to students' academic growth is built on a systems theory with the classroom setting seen as a dynamic, multidimensional system that regulates student behavior and learning (Gump, 1969). Contextual variables such as student engagement in relevant tasks, student interactions with the teacher, and student opportunities to respond compose part of the classroom climate within which students learn content (Curby, Rimm-Kaufman, & Ponitz, 2009; Fish & Jain, 1989; Ponitz et al., 2009).

A large amount of research in classroom context comes from the effective teaching literature and focuses on student engagement and its positive relationship to student outcomes (Brophy, 1983; Guthrie & Wigfield, 2000; Stallings, Johnson, & Goodman, 1986). Student engagement has been defined and studied in a variety of ways, with early research providing evidence that specific engagement behaviors (e.g., volunteering, reading print) were significantly related to student outcomes and often demonstrated stronger relationships, and more concrete implications for intervention, than global indicators such as on task behavior (Cobb, 1972). Notably, there is evidence that student opportunities to learn, actively engage in instructional tasks, and apply newly learned skills in practice are relevant factors in students' learning (Berliner, 1988; Denham & Lieberman, 1980; Gettinger, 1985; Greenwood, Delquadri, & Hall, 1989; Greenwood, Terry, Arreaga-Mayer, & Finney, 1992). For students with academic or behavioral difficulties, increasing the number of opportunities students have to respond can engage the student in the instruction, decrease off-task or inappropriate behaviors, and, in turn, increase the students' facility or mastery of the material being taught (Bulgren & Carta, 1983; Cooper & Speece, 1990; Sutherland, Adler, & Gunter, 2003; Sutherland & Wehby, 2001).

Greenwood, Horton, and Utley (2002) defined one aspect of student engagement as *academic responding* and included a set of behaviors that comprised writing, participating in instructional tasks, reading aloud, reading silently, talking about academics, and asking and answering questions. Across the school day, student engagement in these academic responding behaviors mediated the effects of instruction on students' academic achievement (reading, math, and language) in grades 1-3, accounting for 27% of the variance in student outcomes (Greenwood, Terry, Marquis, & Walker, 1994). In addition, previous research suggests that increases in these types of academic responding behaviors can lead to

increased student academic outcomes even for students with academic or behavioral difficulties (Greenwood, Delquadri, & Hall, 1984; Stichter, Lewis, Richter, Johnson, & Bradley, 2006).

Academic Responding During Teacher-Facilitated Reading Instruction

For students with reading difficulties, explicit and systematic instruction provided prior to independent practice is an important aspect of the teaching-learning process and results in the highest student learning of new skills (Fletcher, Lyon, Fuchs, & Barnes, 2007; Rupley et al., 2009; Swanson, Hoskyn, Lee, 1999). As part of this teacher-directed and facilitated instruction, teacher-student interactions occurring through integration of frequent student responses with opportunities for feedback can be a powerful means for teachers to monitor students' understanding of instruction, help students refine and master new skills, provide support for students' learning, and promote early engagement in reading (Curby et al., 2009; Guthrie & Knowles, 2001; Hattie & Timperley, 2007; Paris & Carpenter, 2004; Pianta et al., 2002; Vaughn et al., 2000). Early practice with the phonological structure of the English language with application to print-related tasks such as decoding words is also vital to successful early reading achievement (Hatcher, Hulme, & Ellis, 1994; National Early Literacy Panel, 2009; Smolkowski & Gunn, 2011). Thus, during early reading instruction, teachers play a significant role in providing opportunities for academic responding during instruction, by regulating guided activities for students to practice and engage in the instruction as well as apply their reading skills to print (Hoffman, 1991; Pressley, Rankin, Yokoi, 1996). However, in a typical general education classroom, the teacher must distribute these academic responding opportunities during instruction among many students of various levels in order to skillfully meet student learning needs and facilitate mastery of the content.

Given the demands of the general education classroom coupled with the differentiated learning needs of students with reading difficulties, we were interested in the distribution of these academic responding opportunities for students at-risk for reading difficulties during teacher-facilitated reading instruction in the general education classroom. Although little research has examined the opportunities for individual student academic responding specifically during teacher-facilitated instructional reading time for students with reading difficulties at the beginning reading stage, Patrick, Mantzicopoulos, Samarapungavan, and French (2008) found evidence that kindergarten students who struggled or who were less motivated felt less support from teachers. Additionally, there are data to suggest there are students who do not interact with the teacher at all during classroom instruction (Jones, 1990), as well as students who do not receive opportunities to apply reading skills to print during instruction (Chard & Kame'enui, 2000; Kent, Wanzek, & Al Otaiba, 2012); though it is not known whether these limited opportunities during instruction are significantly related to student outcomes at the earliest grades.

Kindergarten Reading Instruction

Kindergarten often represents the first opportunity schools have to provide preventative reading instruction for students to achieve and maintain adequate reading growth. The importance of kindergarten reading instruction on the early literacy outcomes of students at-risk for reading difficulties has been well-documented (Cavanaugh, Kim, Wanzek, & Vaughn, 2004; National Early Literacy Panel, 2009; Vaughn et al., 2008). In particular, code-focused instruction and practice with print are key elements of effective reading instruction in today's kindergarten classrooms, demonstrating positive relationships with students' literacy outcomes (Al Otaiba et al., 2008). Achievement in kindergarten has also been shown to uniquely predict future reading outcomes (Al Otaiba et al., 2011; McClelland, Acock, & Morrison, 2006). Thus, the ways in which teachers structure

academic learning opportunities in the classroom may have a profound effect on student learning even as early as kindergarten. Based on the previous research, it is clear that effective general education instruction relates not only to the content of instruction but the context of instruction. We were particularly interested in the context of reading instruction in general education, specifically opportunities for academic responding during teacher-facilitated instruction, for students at-risk for reading difficulties at the onset of formal reading instruction, kindergarten.

Student Behavioral Characteristics

Even at the beginning reading stage, students at-risk for reading difficulties who demonstrate cooperative or enthusiastic engagement in academics outperform students who demonstrate resistive or disaffected engagement on reading tasks (Luo, Hughes, Liew, & Kwok, 2009). A large body of research exists examining student behavioral characteristics and their relationship to student learning outcomes (e.g., Benner, Nelson, Ralston, & Mooney, 2010; Levy, & Chard, 2001; Ponitz, Rimm-Kaufman, Brock, & Nathanson, 2009; Rice & Yen, 2010). Student behavior may partially regulate the classroom environment and impact teachers' responses in the teaching-learning paradigm. For example, Alexander, Entwisle, and Dauber (1993) found that students' adaptive behaviors in the classroom environment related not only to their achievement but to teacher perceptions of academic performance. Even as early as kindergarten, students who frequently display learning related behavior problems tend to have lower initial levels of reading achievement and show slower growth across the elementary years (Morgan et al., 2011; Rabiner, Coie, & the Conduct Problems Prevention Research Group, 2000). Elementary teachers are unique in that they often guide students in a variety of academic and nonacademic (e.g., recess) activities throughout the day, allowing them to develop a broad knowledge of their students' learning and achievement. Teacher perceptions of student competence have a long history of significant correlations with student achievement (Chard et al., 2008; Hoge & Coladarsi, 1989). Thus, we posited that teacher perceptions of student social behaviors (academic competence, social skills, and problem behaviors) may be related to the teacher's regulation of academic responding opportunities during instruction in the classroom as well as to end of the year student outcomes.

Purpose

Given the shifts in policy and practice over the last decade to enhance general education classroom reading instruction and prevent reading difficulties in the earliest grades, models of literacy achievement that consider contextual factors for students at-risk for reading difficulties in early general education reading instruction are important. In this study, we sought to investigate the opportunities available for individual students at-risk for reading difficulties to academically respond specifically during teacher-facilitated instruction in general education classroom reading instruction. We examined the percent of total time individual students were provided opportunities to academically respond, reading-related responses and reading print responses, during teacher-facilitated reading instruction for two observation periods (fall and spring) to estimate a latent factor of student academic responding. We then sought to investigate (a) the relationship of student academic responding and reading performance in the fall and spring, and (b) the relationship of teacher perceptions of student social behaviors to student academic responding and student reading performance.

We hypothesized that more opportunities for academic responding during teacher-facilitated reading instruction for an individual student at-risk for reading difficulties would predict higher reading outcomes at the end of the kindergarten year. However, we considered that a

student's initial levels of early literacy could dictate the opportunities for academic responding provided by the teacher. Hence, teachers may allocate time differentially depending on the needs students bring to the classroom. Finally, we hypothesized that teacher perceptions of student social behaviors would relate to opportunities for academic responding (higher academic competence, higher social skills, or lower problem behaviors resulting in more opportunities for academic responding during instruction), and continue to predict student reading achievement as in previous research.

This study extends the previous literature in three important ways: (a) examining academic responding specifically during teacher-facilitated instructional time in general education classroom (Tier I) reading instruction for students at-risk for reading difficulties; (b) providing complete, individual data on opportunities for academic responding during teacher-facilitated instruction through continuous coding of each individual student experience; and (c) examining the relation of teacher perceptions of student social behaviors with academic responding opportunities.

Method

Participants

The participants for this study were drawn from a larger study investigating approaches for defining, classifying, and preventing learning disabilities in reading and related areas (Al Otaiba et al., 2011). As part of this larger study, kindergarten students at-risk for reading difficulties from 14 schools (41 classrooms) in one large urban district were identified in the fall of kindergarten based on their rapid letter naming abilities. Chall (1967) identified letter naming as a predictor of later reading development, and research continues to support this position (Adams, 1990; Joshi & Aaron, 2000; O'Connor & Jenkins, 1999; Stage, Sheppard, Davidson, & Browning, 2001). All students who scored at the risk level (less than eight letters correct per minute) on the Dynamic Indicators of Basic Early Literacy Skills letter naming fluency subtest (Good & Kaminski, 2002) were selected. One hundred nine kindergarten students were identified as at-risk for reading difficulties in the fall of kindergarten based on this criterion. Sixty-seven percent of the sample was Black, with 26% Caucasian, and 7% other ethnicities (Hispanic, Asian, Multiracial, unknown). Eighty-one percent of the students were enrolled in the free or reduced-price lunch programs. All schools and classrooms provided full day kindergarten with an academic emphasis and implemented either the *Open Court Reading* (Bereiter et al., 2002) or the *Reading Mastery Plus* (Engelmann & Bruner, 2002) core reading curriculum in district-required daily, 90-minute reading instructional blocks.

Measures

In addition to the letter naming screening measure, data from standardized measures of student reading skill achievement (letter-word identification, word attack, and comprehension) were collected at the beginning and end of the school year, and data on teacher perceptions of student social behaviors (academic competence, social skills, and problem behaviors) were collected in the fall after the first quarter report card period. Observational data on students' opportunities for academic responding during teacher-facilitated instruction were collected in the fall and spring of the school year.

Dynamic Indicators of Basic Early Literacy Skills (DIBELS; Good & Kaminski, 2002) Letter Naming Fluency—The DIBELS targets early literacy skills and includes subtests of letter recognition and tasks related to phonological awareness and the alphabetic principle. The letter naming fluency (LNF) data from the beginning of kindergarten were used for identifying students at-risk for reading difficulties (less than eight letters correct per

minute). The LNF subtest is a brief, individually administered, standardized, timed assessment. During LNF administration, students are asked to name as many letters as they can in a minute when presented a page of random upper- and lowercase letters. The one-month, alternate form reliability for LNF is reported as .88 in kindergarten (Good, Simmons, & Kame'enui, 2001). The predictive validity of kindergarten LNF with first grade Woodcock-Johnson Psycho-Educational Battery-Revised Reading Cluster standard score is .65.

Woodcock-Johnson III Tests of Achievement (WJ-III; Woodcock, McGrew, & Mather, 2001)—The WJ-III is a nationally standardized, individually administered battery of achievement tests (McGrew & Woodcock, 2001). The beginning and end of the year Letter Word Identification, Word Attack, and Passage Comprehension subtests were obtained for the targeted students. Letter Word Identification assesses the ability to read real words. Word Attack measures the ability to decode nonsense words of varying difficulty. Passage Comprehension utilizes a cloze procedure to assess sentence level comprehension by requiring the student to read a sentence or short passage and fill in missing words based on the overall context. Median split-half reliabilities for the Letter Word Identification, Word Attack, and Passage Comprehension subtests are reported as .94, .95, and .88 respectively.

Social Skills Rating Scale (SSRS; Gresham & Elliot, 1990)—The SSRS is an instrument designed to assess a broad range of socially validated behaviors (academics, social competence, and behavior) from a variety of perspectives. The teacher completed version of the SSRS contains three scales of social behavior: Academic Competence (9 items), Social Skills (30 items constituting three subscales: cooperation, assertion, and self-control), and Problem Behavior (18 items constituting three subscales: externalizing, internalizing, and hyperactivity). Teachers rate each student on a 3-point scale of never, sometimes, or very often. Internal consistency reliability estimates range from .82-.95 across the three subtests. Test-retest correlations range from .84-.95. The Problem Behavior subscale correlates .81 with the Child Behavior Checklist-Teacher Report Form (Achenbach & Edelbrock, 1986). A negative correlation of $-.68$ is reported for the Social Skills subtest and the Social Behavior Assessment Inventory (Stephens & Arnold, 1992).

Classroom Observations—Data on opportunities for academic responding during teacher-facilitated reading instruction were collected from existing videotapes of the targeted students during their core reading instruction block at two time points (November and April). Each student was individually videotaped within the classroom with multiple cameras. Academic responses were responses to academic situations, commands, and instructions (Greenwood et al., 2002). Academic responses were only recorded during teacher-directed or facilitated instruction (modeling, guided practice, group or independent work with teacher assistance, etc.). Responses related to independent practice (e.g., completing a worksheet) without teacher assistance were not coded. Two sub-areas of academic responding during teacher-facilitated instruction were coded: (a) reading-related response, and (b) reading print responses. Reading-related academic responding was defined as the student responding to a reading-related question, request, or command from the teacher or instructor (e.g., answering a question, selecting a picture to match the word named by the teacher, segmenting the phonemes in an orally presented word after receiving feedback from the teacher, etc.). Responding to nonacademic requests such as behavioral cues, or classroom routine directions were not coded as academic responding. The total amount of time the student was engaged in reading-related academic responding during the teacher-facilitated reading instruction was recorded in the system. Reading print academic responding was defined as the target student orally reading print. Observers also coded the

type of print being read including sounds or word parts, words, or sentences. The total amount of time the student was academically responding by reading print during the teacher-facilitated reading instruction was recorded in the system. Each observational category included exhaustive codes to allow for continuous coding throughout the reading instructional block and to capture all academic responding instances for each individual student.

Observer Training—Three observers were trained on the indicators for each code. The training consisted of four parts: (a) instruction on the meaning of each code and indicator with several examples provided, (b) modeling by the trainer (first author) of the coding process with a short segment of video (10-15 minutes) while thinking aloud about the coding categories, (c) practice coding using videotapes of kindergarten instruction from a previous study with discussion, and (d) a videotape reliability test with the first author. Interrater reliability averaged 99.2% for reading-related academic responding and 99.97% for reading print academic responding across the three coders (agreements divided by agreements plus disagreements). Cohen's kappa coefficients were also calculated and ranged from .94-1.0. To further ensure continued reliability of coding observations, 20% of the videotaped instructional periods were coded by two observers.

Procedures

Students who met selection criteria were observed twice during the school year. Using multiple cameras, each student in the sample was videotaped by trained graduate students during the reading instructional block in the fall and the spring. Each videotape consisted of a complete reading instructional period for the students' classroom ($M_{\text{Length}} = 91$ minutes, $SD = 11.6$). To capture opportunities for academic responding for individual students at-risk for reading difficulties, the amount of time each targeted student was academically responding, reading-related responses and reading print responses, was coded. Noldus software (Noldus, 2001) was custom-designed and utilized to view videotapes and code the academic responding for the targeted students. The Noldus software specifically tracks the time between the start and end of each coded segment in seconds, allowing for total time in the activity to be calculated. The software allows for observers to start and stop the videotape at any point, review any section of a given videotape, and change to a different videotape of the same instructional period from a different camera angle.

As part of the larger study, the identified students were assessed on measures of decoding, word recognition, and comprehension in the fall and spring of kindergarten (see *Measures*). In addition, teachers rated each student on each of the social behaviors in the fall.

Data Analysis

We calculated the percent of total time of academic responding, for each student for each of the two observation occasions (fall and spring). The academic responding codes from the fall and spring observations were log transformed and used to estimate a latent factor for academic responding. We also estimated latent variables for student reading performance in the fall and for student reading performance in the spring as a two-factor multilevel measurement model using students' performance (W-scores) on the Letter-Word Identification, Word Attack, and Passage Comprehension subtests of the WJ-III as indicators. Nonindependence of nested data in these two confirmatory models was addressed by fitting separate equations to the within- and the between-clusters covariance matrices (i.e., multilevel modeling). The multilevel approach in MPLUS (i.e., TYPE = TWOLEVEL) parses the total variance into cluster-specific components, providing a basis for fully explicating the structure of the academic responding and reading performance factors, and evaluating the extent to which each explains patterns in the observed data.

Interrelationships among student academic responding, student reading performance, and teacher perceptions of the social behaviors of academic competence, social skills, and problem behavior were evaluated by fitting models to the total covariance structure (TYPE=COMPLEX in MPLUS 6) and adjusting standard errors and fit indices according to the nested nature of the data (i.e. students nested in classrooms). We replicated the earlier factor models for academic responding and reading performance and modeled variation in spring reading performance as a function of fall performance, academic responding, and the social behaviors of academic competence, social skills, or problem behavior using structural equations. This more parsimonious approach (compared to the fully multilevel model) was warranted given the small, statistically nonsignificant residual variances for academic responding and student reading performance in the fall and spring. The single-level model with adjusted standard errors and fit indices also aided model identification and interpretation. We applied traditional fit criteria to model evaluation, with relative fit indices of at least .95 and RMSEA of .05 or less as standards (Bovaird, 2007), treated missing data as missing at random (MAR), and used the full information maximum likelihood estimator in MPLUS 6.

Results

Table 1 presents the average number of seconds in the fall and spring for reading instruction observed in the participating classrooms, and the average number of seconds that students were academically responding, reading-related responses and reading print responses, during the observations. The table also provides the percentage of total observed reading instruction time that students were academically responding during the fall and spring observations. During teacher-facilitated reading instruction, students at-risk for reading difficulties were engaged in reading-related academic responding for approximately 3 - 4 minutes, or about 3-4% of the reading instructional block, on average across the observations. These same students were engaged in academic responses of reading print for approximately 1 min, or about 1% of the reading instructional block, in each observation.

The small-sized mean scores and the limited range of observed values suggested a positively skewed leptokurtic distribution (i.e. data clustered towards the lower end and were highly concentrated around the mean), which subsequent analyses confirmed. The four skewness indices exceeded the critical value ($g^3 = .50$) for a two-sided test and a p -value less than .05, indicating positively skewed distributions of statistical significance. For kurtosis (g^4), all but one of the four values exceeded the critical threshold (approximately 1.2 for a two-tailed test and $p < .05$). Reading-related academic responding in the spring ($g^4 = .059$) was the exception. However, a log-normal transformation of the four distributions provided moment coefficients for skewness and kurtosis typical of a sample drawn from a normally distributed population of values.

Student Academic Responding

A model with the academic responding data from fall and spring as indicators on the within and between levels (i.e., multilevel) and with x-variable residual variances constrained as equal across indicators on the between-groups level fit the data well ($\chi^2 = 2.04$, $df = 2$, $p = .35$, CFI = .98, TLI = .94, RMSEA = .02). There were 41 clusters and the average cluster size was 2.65 students. The p -value for the constrained between-group residuals was .233. When the between-group residuals were allowed to freely estimate (i.e., the saturated model), p -values for the observed indicators were greater than .05. Accordingly, we treated student academic responding as a single-level construct.

Student Reading Performance

Table 2 summarizes fall and spring reading performance on the three subtests of the WJ-III. Standard scores and W-scores are presented (W-scores were used for modeling the latent variables). Table 3 presents the bivariate correlations of the observed variables. A two-factor multilevel model for student reading performance in the fall and for student reading performance in the spring ($\chi^2 = 30.46$, $df = 20$, $p = .07$, CFI = .99, TLI = .98, RMSEA = .07) represents the model for student reading ability in the fall and spring. Residuals for the observed variables were constrained as equal on both levels for both the fall and spring reading performance estimates. Also, Letter Word Identification was allowed to covary with Word Attack and Passage Comprehension for the fall reading ability estimate both within and between clusters to maximize model fit. The model-based between-clusters residuals for the observed WJ-III reading variables did not differ statistically for the three subtests (Letter Word Identification, Word Attack, and Passage Comprehension) in fall and in spring. Therefore, like the student academic responding variable, student reading performance in the fall and student reading performance in the spring were each treated as single-level constructs.

Student Academic Responding and Reading Performance

Given the nonsignificance of the between-cluster variation in the latent factors and our desire for parsimony and interpretability, we used single-level models, with adjusted standard errors and fit indices, to estimate the relationship of student academic responding and student reading performance. The measurement models for student academic responding and for student reading performance in the fall and spring were refit in the single-level model. Student reading performance in the spring was regressed on student reading performance in the fall and on student academic responding. The structural model (see Figure 1) fit the data fairly well, $\chi^2 = 49.36$, $df = 26$, $p = .004$, CFI = .95, TLI = .94, RMSEA = .09 (90% CI [.04 – .13]). Although the RMSEA point estimate is higher than popular cut scores (e.g., .05 – .08), the study's small-sized sample and the arbitrariness of these commonly cited thresholds should be considered (see Chen, Curran, Bollen, Kirby, & Paxton, 2008). Further, because the scaling of the latent variables in the single-group case is arbitrary (mean of 0 and standard deviation of 1 by default), and because we elected not to back transform the academic responding construct from log normal, p -values for the coefficients of interest are reported rather than the associated regression weights.

The p -value for the regression of spring reading performance on student academic responding was significant ($p = .048$). The values for student academic responding regressed on fall reading performance ($p = .383$) and for spring reading performance regressed on fall reading performance ($p = .686$) did not differ statistically from zero. The indirect effect from fall reading performance through student academic responding was also not statistically significant ($p = .467$). We are not proposing student academic responding as a mediator of the relationship of fall and spring reading performance. The non-experimental design precludes the causal assumptions necessary for mediational analysis. Instead, the path model implied by this analysis represents student academic responding according to its temporal relationship with the fall and spring measures, and the reported indirect effects offer a basis for extending theory and identifying areas for further inquiry.

Student Academic Responding, Social Behaviors, and Reading Performance

Figure 2 incorporates the social behaviors into the academic responding model from Figure 1, with student academic responding represented as a correlate with teacher perceptions of academic competence, social skills, and problem behaviors. As before, the models represent temporal relationships among the variables; a causal mechanism is not assumed or implied. The fit for the academic competence/student academic responding model was marginal, $\chi^2 =$

71.50, $df = 35$, $p = .0003$, CFI = .92, TLI = .90, RMSEA = .10 (90% CI [.07 – .13]). Academic competence predicted spring reading performance ($p < .001$) with the other interrelationships simultaneously modeled; however the path from student academic responding to spring reading performance was no longer significant. The correlation between academic competence and student academic responding did not differ from 0 ($p = .06$). The social skills/academic responding model fit was similar; the indices were $\chi^2 = 71.86$, $df = 35$, $p = .0002$, CFI = .92, TLI = .90, RMSEA = .10 (90% CI [.07 – .13]). The correlation of social skills and academic responding was the only path to differ significantly from zero ($p = .022$). Finally, the problem behaviors/academic responding model was also marginal, $\chi^2 = 73.18$, $df = 35$, $p = .002$, CFI = .92, TLI = .90, RMSEA = .10 (90% CI [.07 – .13]). Problem behaviors and academic responding were significantly negatively correlated ($p = .005$). The path from fall reading performance to problem behaviors was statistically significant (and positively signed) with the other interrelationship simultaneously modeled. The path from problem behaviors to spring reading performance also differed significantly from zero, and the coefficient was negatively signed, yielding a negative and statistically significant indirect effect on spring reading performance from fall reading performance through problem behaviors ($p = .029$).

Discussion

The purpose of this study was to examine the opportunities for academic responding during teacher-facilitated instruction for kindergarten students at-risk for reading difficulties during classroom, Tier I, reading instruction. Our first aim was to document the amount of time individual students were academically responding during teacher-facilitated reading instruction. We found students at-risk for reading difficulties were academically responding to reading-related tasks for small amounts of time (approximately 3-4% of the instructional block). Even less time was spent academically responding by reading print (approximately 1% of the instructional block). These data suggest that, on average, students in our sample who were at-risk for reading difficulties spent the majority of their time in passive learning tasks (e.g., listening to the teacher or peers) and/or independent tasks without teacher assistance during Tier I instruction. The data also provide a picture of part of the instructional context under which these kindergarten students at-risk for reading difficulties were learning content during the Tier I reading instruction.

Academic Responding During Instruction and Student Achievement

Our second aim was to examine this instructional context within the teaching-learning process more thoroughly by investigating the relationship of student academic responding during instruction with student reading performance in the fall and spring of kindergarten. We hypothesized that students at-risk for reading difficulties with more academic responding during teacher-facilitated reading instruction would also have higher end of the year reading achievement. We found the percent of instructional time spent academically responding did predict end of the year reading achievement above and beyond initial reading levels for these students. Kindergarten students at-risk for reading difficulties who spent more time interacting and responding with the teacher during instruction had higher end of year reading outcomes. Although not causal in nature, these data suggest student academic responding during teacher-facilitated instruction may be a meaningful variable to consider in the context of early reading instruction for students demonstrating risk for reading difficulties. Some of the students in the sample did not interact or respond with the teacher or print during the entire reading block, indicating all of their learning for those lessons was passive.

There are several possible reasons that increased academic responding during teacher-facilitated reading instruction significantly predicted increased spring outcomes. Practice opportunities during teacher-facilitated instruction may allow for students to receive feedback during the learning process an important feature of effective instruction that can lead to improved outcomes (Hattie & Timperley, 2007). Students at-risk for reading difficulties who have these practice opportunities during instruction may also be better prepared for successful independent practice opportunities that often follow teacher-facilitated instruction. It is also possible that teachers may change their instruction to meet the needs of students at-risk for reading difficulties more effectively when they have more input on student understanding from additional responding opportunities. However, few would question the difficulty teachers have in distributing these reading practice opportunities among large groups of students with a variety of reading levels, particularly in Tier I settings. General education teachers must skillfully plan instruction and academic responding opportunities during reading instruction among many students with a range of abilities to facilitate mastery of the content. Therefore, examination of academic responding during teacher-facilitated instruction may also be an important consideration in supplemental reading interventions as a way to increase the intensity of intervention for students at-risk for reading difficulties over and above what is available in the general education classroom.

Notably, the sample overall ended the year with standard scores in letter word recognition, word attack, and passage comprehension that were within the average range, though comprehension levels were in the low average range. In fact, teachers in these classes were providing generally effective reading instruction (Al Otaiba et al., 2011). The findings of this study reveal that students at-risk for reading difficulties who engaged in more academic responding during teacher-facilitated reading instruction had the highest end of year outcomes within the sample even in these generally effective classes, underscoring the potential of the academic responding variable in the Tier I instructional context.

In considering the relationships of academic responding and student reading achievement we also hypothesized fall reading achievement would predict the amount of academic responding during reading instruction due to the teacher differentiating learning and providing practice opportunities based on student needs. Contrary to our hypothesis, initial reading level was not significantly related to the amount of student academic responding during teacher-facilitated instruction suggesting no systematic differences in opportunities for academic responding based on initial skill levels. However, this study only considered the experiences of students at-risk for reading difficulties so the range of initial reading achievement was by definition restricted. It is also possible that other skills not measured in these assessments could more systematically relate to the variance seen in academic responding. Nonetheless, student academic responding during teacher-facilitated instruction explained more of the variance in end of the year outcomes than initial reading skill for these kindergarteners at-risk for reading difficulties.

Teacher Perceptions of Student Social Behaviors

Our third aim in this study was to examine the relationship of teacher perceptions of student social behaviors to student academic responding and student reading performance, providing additional insight into the instructional context of Tier I reading instruction for students at-risk for reading difficulties. Specifically, we examined teacher perceptions of student academic competence, social skills, and problem behavior. We hypothesized that teacher perceptions of these student social behaviors would significantly relate to opportunities for academic responding as well as reading achievement with higher academic competence, higher social skills, or lower problem behaviors each resulting in more opportunities for academic responding during instruction and higher student outcomes.

However, we found teacher perceptions of academic competence were not correlated with amount of academic responding. This finding does provide additional evidence that the amount of academic responding during reading instruction was not systematically manipulated by teachers based on achievement levels, at least within this restricted sample. Teacher perceptions of student academic competence did predict spring reading outcomes. Importantly, teacher perceptions of academic competence predicted kindergarten spring outcomes above and beyond the percent of time in student academic responding. Teacher judgment has been demonstrated to have a moderate correlation with student outcomes in previous research as well (Begeny, Krouse, Brown, Mann, 2011; Chard et al., 2008; Gerber, 2005; Hoge & Coladarci, 1989). It has been difficult to disentangle the extent to which teachers have good judgment of their students' abilities, or whether teacher perceptions cause changes in instruction that ultimately affect student outcomes. However, in the case of these data, teacher perceptions were not significantly correlated with academic responding, suggesting there was no systematic change in opportunities for academic responding based on teachers' perceptions of student competence. Thus, on the one hand, students perceived as having lower competence were not provided fewer opportunities to academically respond with the teacher or print during reading instruction. On the other hand, students with lower competence were also not provided additional opportunities to academically respond with the teacher or print, a relationship we might see if teachers were using these student achievement perceptions to make instructional decisions that affect responding opportunities.

Surprisingly, we did not find a relationship between initial reading achievement and teacher perceptions of student academic competence. It appears that these kindergarten teachers developed their reported perceptions of student academic competence from factors other than the beginning of the year skills as measured on these assessments. Perhaps, the daily interactions teachers had with these students in the classroom across various instructional areas, including student response to instruction in the first quarter of the kindergarten year, provided the data that led to their perceptions of competence.

Unlike academic competence, teacher perceptions of students' social skills and problem behaviors were each significantly correlated with the amount of academic responding students experienced during reading instruction. As hypothesized, students who were perceived to have higher social skills experienced higher amounts of academic responding during teacher-facilitated reading instruction while students perceived to have higher levels of problem behaviors demonstrated lower amounts of academic responding. However, social skills and problem behavior exhibited differing relationships on end of year reading outcomes. Teacher perceptions of students' social skills did not predict end of year reading achievement; however, once perceptions of social skills was put in the model, academic responding no longer significantly predicted student reading achievement at the end of kindergarten. As has been noted in previous research (Benner et al., 2010; Ponitz, Rimm-Kaufman, Brock, et al., 2009; Rice & Yen, 2010), problem behavior did predict spring outcomes. Students who were perceived to have greater problem behaviors also demonstrated lower end of the year reading achievement in the spring, and, as with academic competence and social skills, once problem behavior was entered into the model academic responding no longer predicted spring reading achievement.

Our findings support previous research noting problem behavior, including attention, as one of the strongest predictors of nonresponse to reading intervention in the early grades (Al Otaiba & Fuchs, 2002; Nelson, Benner, & Gonzalez, 2003). Teacher ratings of problem behavior are based on a range of behaviors (e.g., fights with others, is easily embarrassed) and a range of academic and nonacademic experiences with students. To shed some light on the relationship of these perceptions with academic responding and reading achievement, we

conducted observations on a random subsample of students during the reading instructional block. Although we did not see any disruptive, fighting, bullying, talking back, temper tantrum, or arguing behaviors from any students during the reading instructional block, student off-task/distracted behavior for these students occurred on average for 21% (range = 9 - 41%) of the reading instruction block and was significantly correlated with teacher ratings of hyperactivity (distraction, impulsivity, fidgeting) on the SSRS ($r = .46$). As a result, it is possible that students with problem behavior were engaged more in nonacademic interactions with the teacher (i.e., feedback on behavior) which took away from additional opportunities for academic responding, or that a lack of academic responding for these students led to more off-task, distracted behaviors. The significant relationship of teacher perceptions of problem behavior with academic responding suggests an area for further investigation in relation to intervention implementation for these students. Small group interventions that supplement Tier I instruction may be a place for students with problem behaviors to increase their academic responding with the smaller instructional group size providing a more structured environment to reduce distractions and problem behavior as well as increase opportunities for practice and feedback during instruction.

Fall reading achievement related significantly to teacher perceptions of problem behaviors but not in expected ways. Within our sample of at-risk students, those with relatively higher reading scores were perceived as having higher problem behaviors. Although it is theoretically possible that students with higher initial scores are not challenged by the instruction and may demonstrate problem behaviors in relation to this boredom, this is unlikely within a sample of students at-risk for reading difficulties who are all performing below kindergarten expectations at least at the beginning of the year. Therefore, we are cautious to avoid overinterpreting this finding without a solid theoretical basis related to the finding and to students at-risk for reading difficulties in kindergarten. Instead, we argue that the finding requires replication and warrants further investigation.

Overall, when student academic responding and teacher perceptions of social behavior variables were examined in the same model, student academic responding no longer predicted kindergarten spring outcomes; however teacher perceptions of academic competence or problem behaviors did predict reading outcomes for these students at-risk for reading difficulties. Indeed, descriptively, the relationship between the social behaviors and reading outcomes ($Z_r = .25$) was stronger than the relationship for academic responding and reading outcomes ($Z_r = .14$). Thus, social behaviors, or at least teacher perceptions of student social behaviors, seem to play an important role in the teaching-learning process. The significant relationship with academic responding suggests teacher perceptions of social behaviors may regulate some of the teaching process; the significant relationship of some social behaviors with end of year academic outcomes ultimately demonstrates a direct relationship with the learning process. Although both social skills and problem behaviors were related to the amount of academic responding students at-risk for reading difficulties experienced, the social behaviors seemed to be more significant in relation to student end of the year reading achievement than amount of academic responding or incoming levels of reading achievement when it comes to kindergarten students at-risk for reading difficulties.

Limitations and Future Research

The relatively small sample size available in this study prevented examination of a model including all of the social behaviors together. Thus, we were unable to examine the relative strength of teacher perceptions of each of the social behaviors in relation to student reading achievement. However, in addressing the main research question regarding academic responding, it is clear that teacher perceptions of student social behaviors were correlated with the opportunities students had to academically respond during teacher-facilitated

instruction, and in some cases these perceptions were a strong predictor of student reading achievement.

We were specifically interested in the academic responding experiences and outcomes of students at-risk for reading difficulties. Thus, it is not possible to describe the academic responding experiences and relationship to outcomes for students who screened as “not at-risk” at the beginning of the kindergarten year, and the data from this study should not be generalized to this population. Future research could examine the academic responding of students who are on track in reading development as well as students with reading difficulties to compare student experiences in the same classroom. Examination of academic responding in other grade levels, and the consistency of responding within children across grade levels, would also provide important information regarding student experiences and the importance of this variable. In addition, we observed a very small amount of academic responding during the teacher-facilitated reading instruction. Intervention research examining increased opportunities for academic responding during teacher-facilitated instruction could provide valuable information to inform classroom practice and professional development efforts.

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References

- Achenbach, TM.; Edelbrock, CS. Manual for the teacher's report form and version of the child behavior profile. University of Vermont; Burlington, VT: 1986.
- Adams, MJ. Beginning to read: Thinking and learning about print. Massachusetts Institute of Technology; Cambridge, MA: 1990.
- Alexander KL, Entwisle DR, Dauber SL. First-grade classroom behavior: Its short- and long-term consequences for school performance. *Child Development*. 1993; 64:801–814. doi: 10.1111/j.1467-8624.1993.tb02944.x. [PubMed: 8339696]
- Allington RL, McGill-Franzen A. School response to reading failure: Instruction for Title I and special education students in grades two, four, and eight. *Elementary School Journal*. 1989; 89:529–541.
- Anderson RC, Wilson PT, Fielding LG. Growth in reading and how children spend their time outside school. *Reading Research Quarterly*. 1988; 23:285–303. doi: 10.1598/RRQ.23.3.2.
- Al Otaiba S, Folsom JS, Schatschneider C, Wanzek J, Greulich L, Meadows J, Connor C. Predicting first grade reading performance from kindergarten response to tier I. *Exceptional Children*. 2011; 77:453–470. [PubMed: 21857718]
- Al Otaiba S, Connor C, Lane H, Kosanovich ML, Schatschneider C, Dyrland AK, Wright TL. Reading first kindergarten classroom instruction and students growth in phonological awareness and letter naming--decoding fluency. *Journal of School Psychology*. 2008; 46:281–314. doi:10.1016/j.jsp.2007.06.002. [PubMed: 19083361]
- Al Otaiba S, Fuchs D. Characteristics of children who are unresponsive to early literacy intervention: A review of the literature. *Remedial and Special Education*. 2002; 23:300–316. doi: 10.1177/07419325020230050501.
- Begeny JC, Brown HE, Krouse KG, Mann CM. Teacher judgments of students' reading abilities across a continuum of rating methods and achievement measures. *School Psychology Review*. 2011; 40:23–38.
- Benner GJ, Nelson JR, Ralston NC, Mooney P. A meta-analysis of the effects of reading instruction on the reading skills of students with or at risk of behavioral disorders. *Behavioral Disorders*. 2010; 35:86–102.

- Bereiter, C.; Brown, A.; Campione, J.; Carruthers, I.; Case, R.; Hirshberg, J.; Treadway, GH. Open court reading. SRA McGraw-Hill; Columbus, OH: 2002.
- Bovaird, JA. Multilevel structural equation models for contextual factors. In: Little, TD.; Bovaird, JA.; Card, NA., editors. Modeling contextual effects in longitudinal studies. Routledge; Mahwah, NJ: 2007. p. 149-182.
- Brophy J. Research on the self-fulfilling prophecy and teacher expectations. *Journal of Educational Psychology*. 1983; 75:631–661. doi: 10.1037/0022-0663.75.5.631.
- Cavanaugh CL, Kim A, Wanzek J, Vaughn S. Kindergarten reading intervention for at-risk students: Twenty years of research. *Learning Disabilities: A Contemporary Journal*. 2004; 2:9–21.
- Chall, JS. Learning to read: The great debate. McGraw-Hill; New York, NY: 1967.
- Chard DJ, Kame'enui EJ. Struggling first-grade readers: The frequency and progress of their reading. *Journal of Special Education*. 2000; 34:28–38. doi: 10.1177/002246690003400103.
- Chard D, Stoolmiller M, Harn BA, Wanzek J, Vaughn S, Linan-Thompson S, Kame'enui EJ. Predicting reading success in a multi-level school-wide reading model: A retrospective analysis. *Journal of Learning Disabilities*. 2008; 41:174–188. doi: 10.1177/0022219407313588. [PubMed: 18354936]
- Chatterji M. Reading achievement gaps, correlates, and moderators of early reading achievement: Evidence from the Early Childhood Longitudinal Study (ECLS) kindergarten to first grade sample. *Journal of Educational Psychology*. 2006; 98:489–507. doi: 10.1037/0022-0663.98.3.489.
- Chen F, Curran P, Bollen K, Kirby J, Paxton P. An empirical evaluation of the use of fixed cutoff points in RMSEA test statistic in structural equation models. *Social Methods Research*. 2008; 36:462–494. doi:10.1177/0049124108314720.
- Cobb JA. Relationship of discrete classroom behaviors to fourth-grade academic achievement. *Journal of Educational Psychology*. 1972; 63:74–80. doi: 10.1037/h0032247.
- Curby TW, Rimm-Kaufman SE, Ponitz CC. Teacher-child interactions and children's achievement trajectories across kindergarten and first grade. *Journal of Educational Psychology*. 2009; 101:912–925. doi: 10.1037/a0016647.
- Denham, C.; Lieberman, A. Time to learn: A review of the beginning teacher evaluation study. National Institute of Education; Washington, DC: 1980.
- Engelmann, S.; Brunner, E. Reading mastery plus. SRA/McGraw-Hill; Columbus, OH: 2002.
- Fish MC, Jain S. Using systems theory in school assessment and intervention: A structural model for school psychologists. *Professional School Psychology*. 1989; 3:291–300. doi: 10.1037/h0090569.
- Fletcher, JM.; Foorman, BR. Issues in definition and measurement of learning disabilities: The need for early intervention. In: Fletcher, JM.; Foorman, BR., editors. Frames of reference for the assessment of learning disabilities: New views on measurement issues. Brookes; Baltimore, MD: 1994. p. 185-200.
- Fuchs LS, Fuchs D. Treatment validity: A unifying concept for reconceptualizing the identification of learning disabilities. *Learning Disabilities Research & Practice*. 1998; 13:204–219.
- Gerber MM. Teachers are still the test: Limitations of response to instruction strategies for identifying children with learning disabilities. *Journal of Learning Disabilities*. 2005; 38:516–524. doi: 10.1177/00222194050380060701. [PubMed: 16392693]
- Gersten, R.; Compton, D.; Connor, CM.; Dimino, J.; Santoro, L.; Linan-Thompson, S.; Tilly, WD. Assisting students struggling with reading: Response to intervention and multi-tier intervention for reading in the primary grades. National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education; Washington, DC: 2008. (Report No. NCEE 2009-4045)
- Good RH, Simmons DC, Kameenui EJ. The importance and decision-making utility of a continuum of fluency-based indicators of foundational reading skills for third-grade high-stakes outcomes. *Scientific Studies of Reading*. 2001; 5:257–288. doi: 10.1207/S1532799XSSR0503_4.
- Good, RH.; Kaminski, RA. Dynamic Indicators of Basic Early Literacy Skills. 6th ed. Institute for the Development of Educational Achievement; Eugene, OR: 2002.
- Greenwood CR, Horton BT, Utley CA. Academic engagement: Current perspectives on research and practice. *School Psychology Review*. 2002; 31:328–349.

- Greenwood CR, Terry B, Marquis J, Walker D. Confirming a performance-based instructional model. *School Psychology Review*. 1994; 23:652–668.
- Gresham, FM.; Elliott, SN. *Social Skills Rating System*. American Guidance Service; Circle Pines, MN: 1990.
- Gresham, FM. Responsiveness to intervention: An alternative approach to the identification of learning disabilities. In: Bradley, RL.; Hallahan, Danielson D. P., editors. *Identification of learning disabilities: From research to practice*. Erlbaum; Mahwah, NJ: 2002. p. 467-519.
- Gump, PV. Intra-setting analysis: The third grade classroom as a special but instructive case. In: Willems, EP.; Raush, HL., editors. *Naturalistic viewpoints in psychological research*. Holt, Rinehart & Winston; New York, NY: 1969. p. 200-220.
- Guthrie, JT.; Wigfield, A. Engagement and motivation in reading. In: Kamil, ML.; Mosenthal, PB.; Pearson, PD.; Barr, R., editors. *Reading research handbook*. Vol. 3. Erlbaum; Mahwah, NJ: 2000. p. 403-424.
- Hatcher PJ, Hulme C, Ellis AW. Ameliorating early reading failure by integrating the teaching of reading and phonological skills: The phonological linkage hypothesis. *Child Development*. 1994; 65:41–57. doi: 10.1111/j.1467-8624.1994.tb00733.x.
- Hoge RD, Coladarci T. Teacher-based judgments of academic achievement: A review of the literature. *Review of Educational Research*. 1989; 59:297–313. doi: 10.2307/1170184.
- Hughes JN, Luo W, Kwok O, Loyd L. Teacher-student support, effortful engagement, and achievement: A three-year longitudinal study. *Journal of Educational Psychology*. 2008; 100:1–14. doi: 10.1037/0022-0663.100.1.1. [PubMed: 19578558]
- Individuals with Disabilities Education Improvement Act of 2004, 20 U.S.C. 1400 et seq. 2004.
- Johnson, E.; Mellard, DF.; Fuchs, D.; McKnight, MA. *Responsiveness to intervention (RTI): How to do it*. National Research Center on Learning Disabilities; Lawrence, KS: 2006.
- Jones MG. Action zone theory, target students and science classroom interactions. *Journal of Research in Science Teaching*. 1990; 27:651–660. doi: 10.1002/tea.3660270705.
- Joshi RM, Aaron PG. The component model of reading: Simple view of reading made a little more complex. *Reading Psychology*. 2000; 21:85–97. doi: 10.1080/02702710050084428.
- Juel C. Learning to read and write: A longitudinal study of 54 children from first through fourth grades. *Journal of Educational Psychology*. 1988; 80:437–447. doi: 10.1037/0022-0663.80.4.437.
- Juel C, Minden-Cupp C. Learning to read words: Linguistic units and instructional strategies. *Reading Research Quarterly*. 2000; 35:458–492. doi: 10.1598/RRQ.35.4.2.
- Kent SC, Wanzek J, Al Otaiba S. Print reading in general education kindergarten classrooms: What does it look like for students at-risk for reading difficulties? *Learning Disabilities Research & Practice*. 2012; 27:56–65. [PubMed: 23087545]
- Levy S, Chard DJ. Research on reading instruction for students with emotional and behavioural disorders. *International Journal of Disability, Development and Education*. 2001; 48:429–444. doi: 10.1080/10349120120094301.
- Luo W, Hughes JN, Liew J, Kwok O. Classifying academically at-risk first graders into engagement types: Association with long-term achievement trajectories. *Elementary School Journal*. 2009; 109:380–405. doi: 10.1086/593939.
- McClelland MM, Acock AC, Morrison FJ. The impact of kindergarten learning-related skills on academic trajectories at the end of elementary school. *Early Childhood Research Quarterly*. 2006; 21:471–490. doi: 10.1016/j.ecresq.2006.09.003.
- McGrew, KS.; Woodcock, RW. *Woodcock-Johnson III normative update*. Riverside Publishing; Rolling Meadows, IL: 2001.
- Morgan PL, Farkas G, Wu Q. Kindergarten children's growth trajectories in reading and mathematics: Who falls increasingly behind? *Journal of Learning Disabilities*. 2011; 44:472–488. doi: 10.1177/0022219411414010. [PubMed: 21856991]
- National Early Literacy Panel. *Developing early literacy: Report of the National Early Literacy Panel*. National Institute for Literacy; Washington, DC: 2009.
- National Reading Panel. *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction: Reports of the subgroups*. National Institute of Child Health and Human Development; Bethesda, MD: 2000.

- Nelson JR, Benner GJ, Gonzalez J. Learner characteristics that influence the treatment effectiveness of early literacy interventions: A meta-analytic review. *Learning Disabilities Research & Practice*. 2003; 18:255–267. doi: 10.1111/1540-5826.00080.
- Noldus LPJJ. The Observer: A software system for collection and analysis of observational data. *Behavior Research Methods, Instruments, & Computers*. 1991; 23:415–429.
- O'Connor RE, Jenkins JR. Prediction of reading disabilities in kindergarten and first grade. *Scientific Studies of Reading*. 1999; 3:159–197. doi:10.1207/s1532799xssr0302_4.
- Patrick H, Mantzicopoulos P, Samarapungavan A, French BF. Patterns of young children's motivation for science and teacher-child relationships. *The Journal of Experimental Education*. 2008; 76:121–144. doi:10.3200/JEXE.76.2.121-144.
- Pianta R, Belsky J, Vandergrift N, Houts RM, Morrison FJ. Classroom effects on children's achievement trajectories in elementary school. *American Educational Research Journal*. 2008; 45:365–397. doi: 10.3102/0002831207308230.
- Pianta RC, Stuhlman MW. Teacher-child relationships and children's success in the first years of school. *School Psychology Review*. 2004; 33:444–458.
- Ponitz CC, Rimm-Kaufman S, Brock LL, Nathanson L. Early adjustment, gender differences, and classroom organizational climate in first grade. *Elementary School Journal*. 2009; 110:142–162. doi:10.1086/605470.
- Ponitz CC, Rimm-Kaufman SE, Grimm KJ, Curby TW. Kindergarten classroom quality, behavioral engagement, and reading achievement. *School Psychology Review*. 2009; 38:102–120.
- Pressley M, Wharton-McDonald R, Allington R, Block C, Morrow L, Tracey D, Wu D. A study of effective first-grade literacy instruction. *Scientific Studies of Reading*. 2001; 5:35–38. doi: 10.1207/S1532799XSSR0501_2.
- Rabiner D, Coie JD, the Conduct Problems Prevention Research Group. Early attention problems and children's reading achievement: A longitudinal investigation. *Journal of American Academy of Child and Adolescent Psychiatry*. 2000; 39:859–867. doi: 10.1097/00004583-200007000-00014.
- Rice EH, Yen C. Examining gender and the academic achievement of students with emotional disturbance. *Education & Treatment of Children*. 2010; 33:601–621. doi:10.1353/etc.2010.0011.
- Rimm-Kaufman SE, La Paro KM, Downer JT, Pianta RC. The contribution of classroom setting and quality of instruction to children's behavior in kindergarten classrooms. *The Elementary School Journal*. 2005; 105:377–394. doi: 10.1086/429948.
- Roberts G, Mohammed SS, Vaughn S. Reading achievement across three language groups: Growth estimates for overall reading and reading subskills obtained with the Early Childhood Longitudinal Survey. *Journal of Educational Psychology*. 2010; 102:668–686. doi: 10.1037/a0018983.
- Rupley WH, Blair TR, Nichols WD. Effective reading instruction for struggling readers: The role of direct/explicit teaching. *Remedial and Special Education*. 2009; 25:125–138. doi: 10.1080/10573560802683523.
- Smolkowski K, Gunn B. Reliability and validity of the classroom observations of student-teacher interactions (COSTI) for kindergarten reading instruction. *Early Childhood Research Quarterly*. 2011; 27:316–328. doi:10.1016/j.ecresq.2011.09.004.
- Snow, CE.; Burns, MS.; Griffin, P. Preventing reading difficulties in young children. National Academy Press; Washington, DC: 1998.
- Stage SA, Sheppard J, Davidson MM, Browning MM. Prediction of first-graders' growth in oral reading fluency using kindergarten letter fluency. *Journal of School Psychology*. 2001; 39:225–237. doi: 10.1016/S0022-4405(01)00065-6.
- Stallings J, Johnson R, Goodman J. Engaged rates: Does grade level make a difference? *Journal of Research in Childhood Education*. 1986; 1:20–26. doi:10.1080/02568548609594905.
- Stephens, TM.; Arnold, KD. Social behavior assessment inventory: Professional manual. Psychological Assessment Resources; Odessa, FL: 1992.
- Stichter JP, Lewis TJ, Richter M, Johnson NW, Bradley L. Assessing antecedent variables: The effects of instructional variables on student outcomes through in-service and peer coaching professional development models. *Education and Treatment of Children*. 2006; 29:665–692.

- Sutherland KS, Wehby JH. Exploring the relationship between increased opportunities to respond to academic requests and the academic and behavioral outcomes of students with EBD. *Remedial and Special Education*. 2001; 22:113–121. doi: 10.1177/074193250102200205.
- Vaughn S, Denton CA, Fletcher JM. Why intensive interventions are necessary for students with severe reading difficulties. *Psychology in the Schools*. 2010; 47:432–444. doi: 10.1002/pits.20481. [PubMed: 21072127]
- Vaughn, S.; Linan-Thompson, S.; Woodruff, AL.; Murray, CS.; Wanzek, J.; Scammacca, N.; Elbaum, B. Effects of professional development on improving at-risk students' performance in reading. In: Greenwood, CR.; Kratochwill, TR.; Clements, M., editors. *Schoolwide prevention models: Lessons learned in elementary schools*. Guilford Press; New York, NY: 2008. p. 115-142.
- Vaughn, S.; Wanzek, J.; Fletcher, JM. Multiple tiers of intervention: A framework for prevention and identification of students with reading/learning disabilities. In: Taylor, BM.; Ysseldyke, JE., editors. *Effective instruction for struggling readers, K-6*. Teacher's College Press; New York, NY: 2007. p. 173-195.

Figure 1. Relationship of reading performance to academic responding. Path values represent p -values for the relevant coefficients. Constructs in ovals are latently derived. All path coefficients are positively signed.

Figure 2. Relationships among reading performance, academic responding, academic competence, social skills, and problem behaviors. Path values represent p-values for the relevant coefficients. Constructs in ovals are latently derived. Variables in rectangles are manifest. All path coefficients are positively signed, except that involving *Problem Behaviors* and *Student Reading Performance Spring*, which has a negative direction. The correlation between *Problem Behaviors* and *Academic Responding* is also negatively signed.

Table 1

Summary of Academic Responding Time and Total Observed Time in Seconds

Variable	Reading-Related Responding		Reading Print Responding	
	Fall	Spring	Fall	Spring
Total academic responding time				
<i>M</i>	154.43	223.24	59.36	76.85
<i>SD</i>	191.26	287.05	60.84	94.50
Range	0-818	0-1951	0-316	0-398
Total observed time				
<i>M</i>	4637.26	5067.83	4637.26	5067.83
<i>SD</i>	1285.75	1273.9	1285.75	1273.9
Range	103-7353	345-7360	103-7353	345-7360
Percent time academically responding				
<i>M</i>	.033	.042	.012	.014
Range	0-.17	0-.29	0-.05	0-.06

Note. Time engaged and Total time are reported in seconds. Total time represents the number of observed seconds per student, on average. Percent time academically responding is the ratio of academic responding time to total time.

Table 2

Mean Standard Score Reading Achievement of Students in Fall and Spring (W-Scores in Parentheses)

Measure	Fall		Spring	
	<i>M</i>	<i>s</i> ²	<i>M</i>	<i>s</i> ²
WJIII LWID	83.85 (324.16)	75.66 (257.69)	95.12 (370.88)	119.26 (371.61)
WJIII WA	87.54 (376.27)	129.19 (294.63)	99.29 (422.29)	175.97 (665.82)
WJIII PC	91.62 (389.37)	220.40 (303.59)	90.71 (409.02)	122.72 (232.64)

Note. WJIII LWID = Woodcock Johnson III Letter-Word Identification. WJIII WA = Woodcock Johnson III Word Attack. WJIII PC = Woodcock Johnson III Passage Comprehension.

Table 3

Bivariate correlations for Observed Variables

	WJIII LWID Fall	WJIII LWID Spring	WJIII WA Fall	WJIII WA Spring	WJIII PC Fall	WJIII PC Spring	SSRS SS	SSRS AC	SSRS PB
WJIII LWID Fall	1.00								
WJIII LWID Spring	.43	1.00							
WJIII WA Fall	.46	.36	1						
WJIII WA Spring	.33	.72	.38	1					
WJIII PC Fall	-.01	.03	-.17	.11	1				
WJIII PC Spring	.17	.44	.15	.36	.04	1			
SSRS SS	-.02	.37	.09	.40	.14	.35	1		
SSRS AC	.18	.46	.15	.45	.08	.34	.70	1	
SSRS PB	.12	-.16	.00	-.22	-.04	-.25	-.72	-.53	1

Note. WJIII LWID = Woodcock Johnson III Letter-Word Identification. WJIII WA = Woodcock Johnson III Word Attack. WJIII PC = Woodcock Johnson III Passage Comprehension. SSRS SS = Social Skills Rating Scale Social Skills. SSRS AC = Social Skills Rating Scale Academic Competence. SSRS PB = Social Skills Rating Scale Problem Behavior.