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Reading Recovery: Exploring the Effects on First-Graders' Reading Motivation and Achievement

Celeste C. Bates[a], Jerome V. D'Agostino[b], Linda Gambrell[a], and Meling Xu[b]

[a]Department of Education and Human Development, Clemson University; [b]Department of Educational Studies, The Ohio State University

ABSTRACT

This study examined the effects of Reading Recovery on children's motivational levels, and how motivation may contribute to the effect of the intervention on literacy achievement. Prior studies concluded that Reading Recovery was positively associated with increased student motivation levels, but most of those studies were limited methodologically. The achievement and motivation levels before and after the intervention of Reading Recovery students and similarly low-performing first-grade students were compared using structural equation modeling. It was found that Reading Recovery had a .31 treatment effect on achievement after controlling for baseline achievement and motivational differences among the treatment and comparison students. Reading Recovery also was associated with greater average levels of posttest motivation, and motivation was found to mediate the treatment-achievement relationship. This study highlights how important it is for early reading interventions to consider the role motivation plays in literacy acquisition.

Motivation plays a powerful role in children's literacy growth and development. In fact, research shows that motivated students choose to read, read more, and become better readers than their less motivated peers (Guthrie & Wigfield, 2000; Malloy, Marinak, & Gambrell, 2010). The choices motivated readers make contribute to an ever widening gap between less proficient and more proficient readers, a phenomenon often referred to as the *Matthew Effect* (Stanovich, 1986). In an effort to close this gap, attention to motivating children to read is perhaps as important as the instruction they receive.

This study explores the role of motivation in the literacy development of struggling readers in first grade. The participants in the study were 1,334 children who received the Reading Recovery intervention in the fall of first grade, and a comparison group of 472 children who were similar in reading proficiency but did not receive the Reading Recovery intervention. Reading Recovery is a short-term early intervention for first-grade students who have the lowest achievement on measures of literacy outcomes. In the Reading Recovery intervention, students meet individually with a specially trained teacher for 30 min each day for a period of 12–20 weeks. The goal during this period is for children to develop a network of reading and writing strategies so they may independently perform within the average range of their peers.

Reading Recovery uses the *Observation Survey of Early Literacy Achievement* (OSELA; Clay, 2013) as a screening and instructional tool. OSELA adheres to accepted standards of assessment, including attention to content and construct validity and reliability (Denton, Ciancio, & Fletcher, 2006) and uses

CONTACT Jerome V. D'Agostino dagostino.22@osu.edu College of Education and Human Ecology, The Ohio State University, 29 W. Woodruff Avenue, Columbus, OH 43210.

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six subtasks to measure letter identification, word reading, phonemic awareness, writing vocabulary, concepts of print, and text reading level. The assessment does not include a measure of children's motivation to read.

In most schools in the United States, first grade is the period when students begin the journey of learning to read. Motivation to read, however, begins to develop well before first grade (Saracho & Dayton, 1991). In a study examining children's perceptions about reading, Lever-Chain (2008) found that male pre-K students already have ideas about what it means to be a proficient reader and that, by the end of kindergarten, they may develop perceptions about the difficulty of reading. As students transition into first grade, instructional factors also begin to influence reading proficiency and motivation (Foorman, Francis, Fletcher, Schatschneider, & Mehta, 1998). First grade becomes a pivotal time not only for students' reading acquisition, but for the ways in which motivation contributes to reading development. Because reading proficiency and motivation appear to be inextricably linked, it is important to provide early intervention for a child that jointly addresses both constructs. Therefore, the primary purpose of this investigation was to test the hypothesis that an instructional intervention based on principles of motivation is likely to support both reading achievement and motivation to read.

Theoretical frameworks

This study draws on a number of theoretical frameworks for reading motivation including expectancy-value theory (Wigfield & Eccles, 2000), engagement theory (Guthrie & Wigfield, 2000), and sociocultural theory (Vygotsky, 1978). The expectancy-value theory of motivation posits that motivation is influenced by the students' perceptions, whether they perceive that they will be successful in performing the reading task (expectancy) and whether they perceive the reading task to be relevant and important (value). A central goal of reading instruction is to support and nurture the development of reading engagement. Guthrie and Wigfield's engagement theory is based on the premise that motivation to read is a precursor for reading engagement (Bogner, Raphael, & Pressley, 2002). Moreover, students who are inherently interested, or intrinsically motivated, choose to read (Ryan & Deci, 2000). Guthrie (2004) found that intrinsically motivated students also spend more time reading and are more engaged while reading. As students engage in literacy tasks, their reading abilities are more likely to improve. With this success, children are further motivated to engage with text as they read and extend their knowledge (Guthrie, 1999).

According to Morgan and Fuchs (2007), given sufficient print resources (Neuman & Celano, 2001), there are two factors that explain how often a child chooses to read. The first factor is initial success in developing reading skills and the second is motivation (Cunningham & Stanovich, 1997). Guthrie (1999) concluded that motivation is the preeminent predictor of students' frequent engagement in reading. Thus, poor readers' lack of motivation to read is thought to be an underlying cause of reading difficulties. Morgan and Fuchs (2007) contend that understanding why struggling readers are poorly motivated may have implications for early intervention. They suggest the importance of understanding how poor reading skills and low motivation interrelate when addressing these aspects of reading development.

In a review of the research on the relationship between students' reading proficiency and reading motivation, the results supported the conclusion that reading skill correlates with reading motivation (Morgan & Fuchs, 2007). In addition, the results tentatively supported the hypothesis that reading achievement and reading motivation predict each other over time. Morgan and Fuchs's findings offer support for the notion of a bidirectional relationship between reading proficiency and reading motivation. Thus, reading skills and motivation appear to influence each other, indicating interventions for struggling readers should target both aspects.

The principles of Reading Recovery and the instruction students receive focuses on increasing reading skills and reading motivation. Because Reading Recovery teachers recognize motivational factors as a crucial part of a student's reading journey, the social context in which instruction takes place is always considered. This includes the ways in which teacher–student interactions take shape in a socially constructed environment (Fullerton & Forbes, 2014). *Sociocultural theory* states that a child's

cognitive development must be viewed individually and socially (Vygotsky, 1978). A major tenet of sociocultural theory, the zone of proximal development, has been addressed in Reading Recovery through the use of *scaffolding* (Wood, Bruner, & Ross, 1976). Scaffolding involves providing support for a child's thinking through teacher prompting and questioning. As a result of this support, the child internalizes the experience on the intrapsychological plane and later uses this to solve problems independently.

Review of related research on motivation and Reading Recovery

This review of the research focuses on two areas of interest related to the current study. First, our review examines the research conducted on young children's motivation to read. Second, we review research on reading motivation that has been conducted with students who have participated in Reading Recovery.

Research on dimensions of motivation

Much focus has been given to dimensions of motivation including intrinsic and extrinsic motivation, motivational goals, self-efficacy, and social motivation (Gambrell & Morrow, 1996; Wigfield & Guthrie, 1997). For this article, motivational studies conducted in the last 15 years were reviewed to examine how the instructional components of motivation were represented in the literature on early reading. The review yielded four components: interest, challenge, collaboration, and self-efficacy.

Interest. Student interest has been shown to positively affect student engagement (Bogner et al., 2002). Capturing interest can be accomplished in a variety of ways, including matching books to students' curiosities as a means of motivating and engaging students. Furthermore, Nolen (2007) found that books by the same author helped students develop an ongoing interest in certain genres. In addition to developing these types of interests, students can also form an interest in the act of reading. Joint storybook reading that yields affective reading interactions can contribute to student interest (Sonnenschein & Munsterman, 2002) if the interactions are enjoyable and rich in conversational interchange (Guthrie, 1999). Creating a pleasant context and using appealing text builds interest that furthers motivation to read.

Reading Recovery teachers focus on establishing a relationship with the child to build on the student's interests (Lyons, 2003). Through conversations during the reading and writing components of the lesson, teachers learn about students' interests, likes, and dislikes (DeFord, 1994). Teachers carefully select texts, which not only support the child's literacy processing system, but also build upon his or her interests. Additionally, at times during the lesson, students have the opportunity to select books they find appealing.

Challenge. When students are motivated, they are drawn to challenges (Gambrell & Morrow, 1996). Bogner and colleagues (2002) found when teachers supported risk-taking while providing and encouraging challenging opportunities, students' motivation increased. Challenge can also be moderated by a teacher's ability to scaffold students' performance (Wood et al., 1976). Scaffolding is the way in which a teacher demonstrates, guides, and adjusts the level of challenge to meet students' needs (Rodgers, 2004). Creating the appropriate level of challenge during scaffolding keeps the learner engaged without frustrating them (Powell, McIntyre, & Rightmyer, 2006). Scaffolding should account for the student's strengths and should be lifted over time as students take on tasks independently. Scaffolded interactions are supported by the collaborative relationship between teacher and child (Lyons, 2003).

The ongoing assessment and close observation of children in Reading Recovery (Clay, 2001) provides teachers with formative information to plan lessons that support students in reading increasing challenging text. Observation affords the teacher with the opportunities to carefully note how a child responds to prompts or other scaffolded interactions. Close observation of the child, coupled with anecdotal records of the observation, allows the teacher to reflect on the interactions and modulate the support the child needs (Clay & Cazden, 1990). For example, a teacher may recognize that supportive

comments may be needed to assist the child in constructing meaning, particularly as the child moves from one page to another. Such scaffolding provides additional support and assists in mediating the child's understanding of the text. As part of the assessment cycle, teachers note the child's response to the provided support, determine if it is beneficial, adjust the level of support if needed, and eventually lift the scaffold as the child gains independence (Rodgers, 2004).

Collaboration. Collaborations allow opportunities for students to further learning and increase motivation to read. Teachers play a large role in a child's motivation to read and their deliberate and conscious actions are necessary in order to motivate students. "Not all instructional tasks are equally motivating to young learners, nor are they equally empowering" (Powell et al., 2006, p. 24). According to Bogner and colleagues (2002), an overwhelming amount of positive motivation is needed to empower students, particularly struggling learners. In addition to a positive atmosphere, teacher–student collaborations are key to helping students grow as readers. During teacher–student collaborations, scaffolding becomes especially important to building positive changes in motivation and cognitive processes (Lyons, 2003).

Reading Recovery builds on the importance of teacher–student collaboration. Teacher–student collaboration in Reading Recovery is reflected in the way the teacher responds to and follows the lead of the student. This is sometimes viewed as a collaborative dance. This collaboration takes place during the lesson and is reflected in the scaffolded interactions between the teacher and child. It is also evident following the lesson as the teacher continues to follow the lead of the child to plan subsequent instruction. This process allows the teacher to build on what the child knows instead of relying on scripted instruction (Clay, 2001).

Self-efficacy. Research indicates a strong correlation between self-efficacy and perceived competence for literacy tasks (Wilson & Trainin, 2007). Although highly correlated, self-efficacy and competence are separate constructs. Students with higher literacy achievement credit internal aspects like effort, while lower achievers credit external factors (Bogner et al., 2002). High achievers believe their abilities change with effort and teachers who encourage this changeable intelligence help develop self-efficacy in their students (Dweck, 2006).

The gradual release of responsibility allows students' ownership of their reading and supports independence and self-efficacy (Lyons, 2003). Because Reading Recovery teachers are trained to closely observe children, they are continually aware of how students are responding to instruction. As a result, once children have demonstrated control of a particular reading behavior, the scaffold is lifted, thus increasing feelings of independence and self-efficacy.

Research on motivation in Reading Recovery

Increasing students' motivation to read is a key principle of Reading Recovery instruction and a number of studies have investigated the reading motivation of students who have participated in the Reading Recovery intervention (Cohen, McDonnell, & Osborn, 1989; Fullerton & Forbes, 2014; Townsend, Townsend, & Seo, 2001; Wade & Moore, 1998). Cohen and colleagues (1989) compared students in Reading Recovery to higher achieving students using an attribution scale and a self-efficacy scale. At posttest, the two groups' average motivation levels did not differ significantly, suggesting the Reading Recovery students became more like the higher achieving students (yet the results were inconclusive because pretest group differences were only assumed by the authors rather than being factored into their statistical analyses).

A study by Wade and Moore (1998) examined the reading motivation of students 5 years after completing the Reading Recovery intervention. They compared the former Reading Recovery students in the same year with students who had average or below average reading skills. Although the comparison group had higher reading ability in the first year, 5 years later the former Reading Recovery students had better reading comprehension and were more positive about reading than the non-Reading Recovery students.

In a retrospective study, Townsend and colleagues (2001) explored the motivational effects of Reading Recovery on self-concept and task value. One group of students received Reading Recovery, a second group consisted of students who were eligible for Reading Recovery but did not receive the intervention, and a third group consisted of participants who did not qualify for Reading Recovery. Motivation was assessed using the Motivation to Read Profile (MRP; Gambrell, Palmer, Codling, & Mazzoni, 1996) and comprehension assessments. Overall findings revealed that mean reading scores were higher for Reading Recovery students than the non-Reading Recovery group with a statistically significant difference on comprehension in favor of the Reading Recovery group. With respect to reading motivation, Reading Recovery children's responses were all in positive directions on the MRP but there were no statistically significant differences among the groups. Across all three of these studies, motivation was higher for Reading Recovery students following the intervention.

In a more recent study, Fullerton and Forbes (2014) investigated whether there was a change in students' motivational responses from entry to exit point in Reading Recovery using the Children's Reading Motivation Survey (Mazzoni, Gambrell, & Korkeamaki, 1999). This study documented a substantial increase in motivation from the time the students entered the Reading Recovery program to the end of the intervention. This finding held for both girls and boys. Fullerton and Forbes concluded that after the intervention, "the Reading Recovery children's motivational responses were significantly more positive than prior to the intervention" (p. 49).

Though a number of studies have examined motivation and Reading Recovery, the inferences drawn from the studies are tenuous due to methodological limitations. The major drawback of the reviewed studies was the lack of a proper counterfactual because the studies relied on pretest-posttest motivation gains alone, or a nonequivalent comparison group without pretest adjustments. Fullerton and Forbes (2014) suggested that future research should include a comparison group not receiving the intervention so causal connections could be explored.

In this study, as suggested by Fullerton and Forbes (2014), we compared the pre- and post- achievement and motivation levels of Reading Recovery students to a comparison group of the next lowest band students, which allowed us to better isolate the role of motivation in Reading Recovery. We examined the effects of Reading Recovery on student achievement and motivation, and the degree to which each variable potentially mediated the effect of Reading Recovery on the other variable. Using structural equation modeling, we first examined the direct effect of the Reading Recovery intervention on students' posttest achievement and motivation levels after controlling for their initial levels of achievement and motivation. We hypothesized that Reading Recovery would have significant and positive effects on both variables with covariate adjustments. Yet because Reading Recovery is designed to primarily affect achievement, we assumed the treatment effect would be stronger for achievement than for motivation.

After addressing direct treatment effects, we examined the mediating roles of both motivation and achievement within the latticework of effects. Treating posttest achievement as the outcome, we expected that the intervention would have a direct positive effect on student's motivation levels, and that increased motivation levels would in turn affect students' achievement levels. Thus, we expected to find that Reading Recovery would improve students' motivation and achievement directly, but additionally, that improvements in motivation would also lead to increased levels of achievement. Due to the bidirectional nature of motivation and achievement, we also assumed that Reading Recovery would have a significant and positive effect on motivation, with achievement mediating the relationship. We particularly focused on which pattern of effects (motivation mediating achievement or achievement mediating motivation) fit the data best.

Method

Participants

Data from 1,806 students in 225 schools throughout South Carolina were used for the analysis in this study. Students in Reading Recovery ($n = 1{,}334$) during the first part of the 2012–2013 school year

served as the treatment group. In each participating school, Reading Recovery teachers were asked to identify between four to ten students in the next achievement tier who potentially were eligible or were near eligible for Reading Recovery but who did not receive the intervention. Those students served as the comparison group ($n = 472$), and represented a subgroup of children who were slightly more proficient than Reading Recovery students at the beginning of the school year, and thus, were the closest students (achievement-wise) at each school to the treatment children. The demographic profiles of the two student groups reflected this comparability with slightly greater proportions of conventionally used indicators of need. The percentage of boys in the treatment group was 61% compared to 56% among comparison students, and 53% of treatment students and 55% of comparison students were ethnic minorities. The groups also were comparable in terms of free or reduced-price lunch eligibility, with 70% and 72% of treatment and comparison students qualifying, respectively. Nine percent of comparison students were English Language Learners (ELL), whereas 12% of treatment students were classified as ELL.

Measures

There were two primary measures used in this study, the Me and My Reading Profile (MMRP; Marinak, Malloy, Gambrell, & Mazzoni, 2015), and the Observation Survey of Early Literacy Achievement (OSELA; Clay, 2013). Reading Recovery and comparison children were administered both measures in the fall before the intervention (Time 1) and midyear after the treatment period (Time 2).

Based on the expectancy-value theory (Wigfield & Eccles, 2000), the MMRP consists of 20 affective questions about reading that children answer using a three-option response scale. The MMRP was designed for children in Grades 1–3. To determine validity, exploratory factor analysis (using a varimax orthogonal rotation) was used to examine the interfactor correlations. Factor analysis revealed that the 20 items contributed to the two subscales of self-concept and value of reading in keeping with value-expectancy theory. However, a third factor (Literacy Out Loud) was identified related to interactions about literacy such as listening, speaking, and reading aloud to others. This factor reflects the social aspects of literacy commonly seen and heard in primary classrooms. Reliability analyses (Cronbach, 1951) revealed scale alphas ranging from .86 (self-concept) to .87 (value and Literacy Out Loud) with all items contributing to the over-all scale reliability.

Because reliability and validity for the MMRP (2015) was established based on students in Grades 1–3, the sample reflected a broad range of reading-proficiency levels. The present study focused on first-grade struggling readers, so we conducted an internal structural analysis based on the MMRP data in fall or midyear (Table 1). Table 1 presents the results of the internal structural analysis based on the data in fall and midyear. The items are ordered from the least fitting to most fitting items. There are absolute threshold values on the three indices that would indicate whether the item fit or did not fit a unidimensional scale, but common factor loadings below about .30, Rasch fit values above 2.00, and item-total point biserial correlations below about .25 indicate misfitting items. As can be seen, Items 2 and 20 have fit values that are near these commonly used thresholds, but the fit values for both items, and the remaining 18, reveal the MMRP questions appear to fit a unidimensional scale. The factorial structure also was maintained from pretest to posttest.

The alpha coefficients of the pretest and posttest data were .87, which also indicated that together the items create a single-dimension scale and yielded total MMRP values that were sufficiently reliable at both time points. As a final check on the unidimensionality of the MMRP both before and after treatment, we conducted a confirmatory factor analysis with latent variables at each time point. The covariance between the two latent variables was estimated freely. Weighted least square with mean- and variance-adjusted (WLSMV) estimation method provided by Mplus 7.2 was adopted with the assumption that the MMRP response scales were ordinal. Model fit indices were yielded as follows: χ^2 (739) = 3,272.786 ($p < .001$), RMSEA (Root Mean Square Error of Approximation) of 0.044 with a 90% confidence interval of (0.042, 0.045). CFI (comparative fit index) was .916, TLI (Tucker Lewis Index) was .911, suggesting that the measurement model fit the data reasonably well.

Table 1. Me and My Reading Profile (MMRP) dimensionality analysis of before and after treatment data ($n = 1{,}806$).

	Before Treatment			After Treatment		
Item #s for the MMRP*	Factor Loading	Rasch Misfit	Point Biserial	Factor Loading	Rasch Misfit	Point Biserial
2	.31	1.40	.30	.36	1.26	.29
20	.42	1.18	.39	.42	1.18	.32
5	.44	1.20	.48	.45	1.18	.48
9	.53	1.17	.55	.57	1.11	.58
7	.50	1.08	.50	.51	1.01	.50
8	.48	1.15	.49	.51	1.11	.49
1	.56	1.11	.52	.47	1.26	.45
6	.55	.96	.54	.52	.94	.56
19	.55	.99	.51	.50	1.01	.47
3	.57	.98	.53	.50	.99	.45
10	.55	1.02	.47	.53	1.10	.44
14	.54	1.05	.46	.59	1.00	.45
18	.54	.92	.49	.48	.94	.44
4	.56	.97	.51	.52	1.08	.47
16	.68	.92	.58	.62	1.03	.52
13	.64	.91	.58	.62	.92	.56
17	.65	.84	.57	.63	.86	.53
15	.66	.80	.57	.68	.79	.53
12	.67	.74	.60	.60	.78	.53
11	.73	.74	.61	.70	.77	.55

*See Marinak, Malloy, Gambrell, & Mazzoni (2015) for a description of the items on the MMRP.

The OSELA consists of six tasks, including Letter Identification, the Ohio Word Test, Concepts About Print, Writing Vocabulary, Text Reading Level, and Hearing and Recording Sounds in Words. Each of the six tasks alone has certain methodological limitations, such as floor effects or non-interval scales, so scores from the individual tasks were not used in this study. Instead, a total score based on Rasch measurement procedures was used to represent students' beginning and after-treatment literacy achievement (see D'Agostino, 2012, for the psychometric properties of the OSELA total score).

Analytic procedures

In order to test our hypotheses, we conducted structural equation modeling (SEM) using Mplus 7.2. SEM was suitable for our analytic purposes because it allows one to examine both direct effects and the role of mediating factors. Three primary models were fit to the data, one per research hypothesis. The three models are depicted in Figure 1. The first model examined the direct effect of Reading Recovery on posttest OSELA total scores and posttest MMRP scores while controlling for baseline OSELA achievement and MMRP motivation. The second model tested the direct effect of the intervention on achievement and the mediating effect of motivation, and the third model considered the direct treatment effect on motivation with a mediating effect of achievement.

The treatment and achievement variables are represented in the diagrams as rectangles because they are observed variables. Treatment was coded "*1*" for Reading Recovery students and "*0*" for comparison students. The achievement variables are students' OSELA total scores before (A1) and after (A2) the treatment. Pretest and posttest motivation (M1 & M2) are depicted with ellipses in the diagrams indicating that each was treated as a latent variable and measured with the twenty MMRP items at each of the two test time points. For all SEM models tested in this study, cut-off criteria for model fit indices were based on strategies suggested by Hu and Bentler (1999), giving: $> .90$ for comparative fit index (CFI) and Tucker-Lewis indices (TLI), and $\leq .08$ for the root mean square error of approximation (RMSEA).

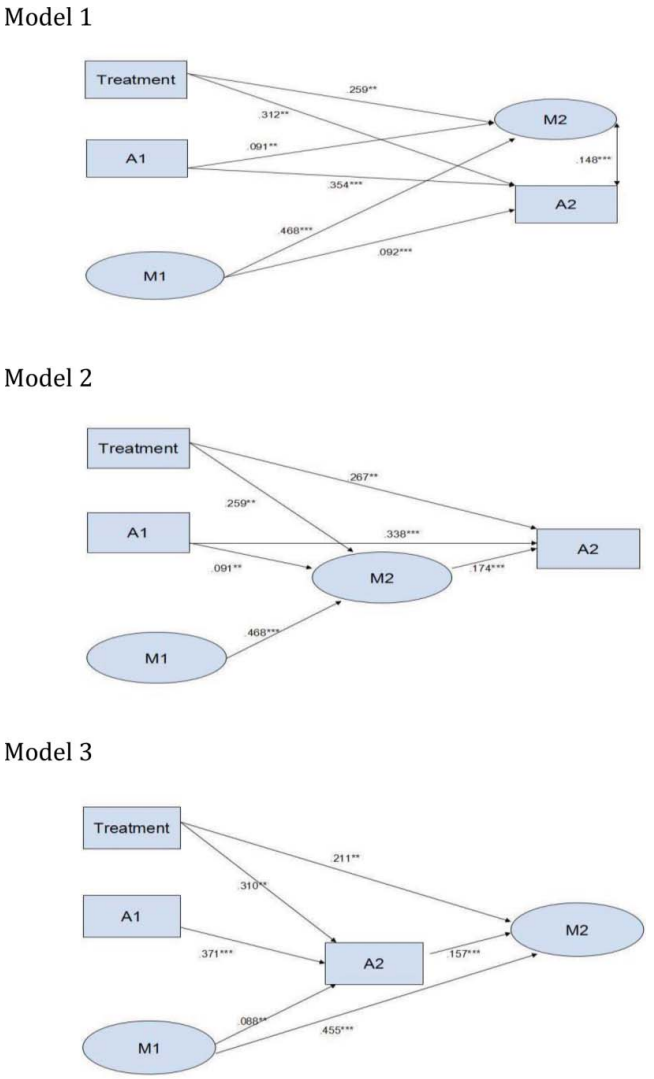

Figure 1. Final Tested Models in the study. Model 1 tests the direct effects of Reading Recovery on posttest achievement (A2) and motivation (M2) while controlling for pretest achievement (A1) and pretest motivation (M1). Model 2 tests the direct effect of Reading Recovery on A2 and the mediating effect of M2 while controlling for A1 and M1. Model 3 tests the direct Reading Recovery effect on M2 and the mediating effect of A2 while controlling for A1 and M1. *Note.* $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Results

Before testing the three SEM models, we examined the means and standard deviations of the key variables, as well as the correlations between the treatment variable (coded "*1*" for students who received Reading Recovery) and achievement and motivation at pretest and posttest. In order to provide the descriptive statistics for motivation at pretest and posttest, we computed the average raw score for each student across the 20 items at each time point. Reading Recovery students had a slightly lower motivation average at pretest (M = 2.37, SD = 0.43) than comparison students (M = 2.42, SD = 0.42), but at posttest, the treatment students had a larger average motivation score (M = 2.61, SD = 0.35) than their counterparts (M = 2.52, SD = 0.37). The same pretest to posttest differences were found for achievement. Reading Recovery students, on average had a 371 OSELA scale score (SD = 35.20), whereas the comparison students, on average had a

392 (SD = 33.93) scale score at the first time point. At posttest, the treatment students (M = 488, SD = 43.24) had a larger average scale score than the comparison students (M = 485, SD = 33.78). Besides the fact that students were not assigned randomly to receive Reading Recovery, the nonequivalent pretest means confirmed the need to control for initial group differences.

Table 2 provides the correlations among the variables. As can be seen from the table, Treatment was negatively related with pretest achievement (A1), and to a lesser extent pretest motivation (M1), which was expected given the pretest mean differences between the two groups. At posttest, treatment students had higher motivation scores and comparable achievement levels, on average, than comparison students as revealed by the positive correlation with posttest motivation (M2) and the non-significant association with posttest achievement (A2). Motivation and achievement were modestly correlated at baseline (0.11) and at posttest (.20), yet the two strongest correlations were between the two sets of variables over time; A1 and A2 (.33) and M1 and M2 (.48) with motivation having slightly greater consistency over time. This may say less about the consistency of the constructs and more about the primary purpose of the treatment, which is to spoil the prediction of later achievement.

Structural equation model findings

Table 3 presents the fit statistics for the three tested SEM models, and Figure 1 displays the path coefficients for the final tested models. We first examined the fit of Model 1, which tested the direct treatment effect on the two outcomes while controlling for baseline levels. The model fit the data reasonably well, as indicated by the fit statistic values. The root mean square error of approximation (RMSEA) was less than .08, and the comparative fit index (CFI) and Tucker-Lewis Index (TLI) both were greater than .90. As displayed in the table, the predictors explained a greater proportion of motivation at Time 2 variance (.23) than posttest achievement variance (.13), but the magnitude of the coefficients presented in the figure indicate that Reading Recovery participation was about equally associated with achievement ($B = .31$, $p < .001$) and motivation ($B = .26$, $p < .001$) at Time 2. Note that M1 explained more M2 variance than A1 explained A2 variance, perhaps leading to more total M2 variance explained than A2. Because the coefficients are interpretable as standardized beta coefficients, the values can be converted into standardized mean difference d values. The effect size of the intervention on achievement and motivation, respectively, was .65 and .54.

The sufficient fit of Model 1 indicated that Reading Recovery had a direct effect on both outcomes, but did not address if one outcome mediated the effect of the other outcome. To address that general question, we fit Models 2 and 3 to the data. After fitting Model 2 as depicted in Figure 1, the path from M1 to A2 was not significant ($p > .05$) so we decided to delete that particular path and recompute the model. The final model with coefficients is presented in Figure 2. As reflected by the fit statistic values (Table 3), Model 2 fit the data reasonably well, with fit values that were comparable to Model 1. The path coefficients reveal that A1 significantly and positively predicted M2 ($B = .09$, $p < .01$) as well as A2 ($B = .34$, $p < .001$), indicating that baseline achievement levels had significant positive effects on both motivation and achievement at Time 2. M1 significantly and positively predicted M2 ($B = .47$, $p < .001$), and M2, in turn, significantly predicted A2 ($B = .17$, $p < .001$), indicating that baseline motivation seemed to exert an effect on achievement indirectly through motivation at posttest. Reading Recovery significantly and positively predicted M2 ($B = .26$, $p < .01$) as well as A2 ($B = .27$, $p < .01$).

Table 2. Correlation matrix between key variables.

	Treatment	A1	A2	M1	M2
Treatment	1				
A1	–0.22***	1			
A2	0.03	0.33***	1		
M1	–0.06*	0.11***	0.12***	1	
M2	0.11***	0.07*	0.20***	.48***	1

Note. *$p < .05$. ***$p < .001$. Treatment coded 0 for comparison, 1 for Reading Recovery. Pretest Achievement (A1), posttest Achievement (A2), pretest Motivation (M1), posttest Motivation (M2).

Table 3. Fit statistics for the three models.

	Model		
	1	2	3
$\chi 2$	3,052.9*(855)	3,035.5*(856)	3,026.4*(856)
RMSEA	.041(.040 −.043)	.041(.039 − .043)	.041(.039 − .043)
CFI	.916	.917	.917
TLI	.911	.912	.913

Note. RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index.

Because M2 predicted A2, the model reveals that M2 apparently mediated the treatment effect on achievement to some extent. Recall from Model 1 that the standardized coefficient indexing the treatment effect on achievement was .312 after controlling for pretest achievement and motivation and without considering the mediating effect of posttest motivation. The inclusion of the mediating motivation variable reduced the direct effect size estimate to .267. The remaining .045 treatment effect can be found in the indirect effect through M2, which also can be computed by multiplying the treatment to M2 coefficient (.259) by the M2 to A2 coefficient (.174). Thus, the mediating effect of motivation accounts for about 14% of the Reading Recovery effect on posttest achievement (.045/.312).

We also fit Model 3 to the data, which allowed us to examine the degree to which achievement mediated the Reading Recovery effect on motivation. As can be seen from Table 3, the fit statistic values for Model 3 were comparable to the values for Models 1 and 2. In terms of the role achievement plays in mediating the treatment effect on motivation, consider from Model 1 that the direct treatment effect coefficient was .267. From Figure 2, it can be seen that, with A2 mediating the relationship, the direct effect coefficient for the intervention on M2 was reduced to .211. The indirect effect through A2 was .049 (.310 times .157). Therefore, the indirect effect through A2 accounted for about 18% of the overall treatment effect on motivation (.049/.267).

Discussion

The primary goal of this study was to investigate the role that motivation may play in accounting for the effect of an early literacy intervention, Reading Recovery, on students' achievement levels. Using a quasi-experimental design and SEM as the statistical analytic tool, we estimated the Reading Recovery effect size to be .65 on achievement and .54 on motivation after controlling for baseline achievement and motivational differences between the Reading Recovery treatment group and comparison group.

We also found that motivation mediated the treatment effect on achievement, and achievement mediated the effect on motivation. In the former mediation model, the indirect effect through motivation explained about 14% of achievement effect, and in the latter model, the indirect effect through achievement explained about 18% of the motivation effect. All three models, whether the direct effects model or mediation models, fit the data equally well. Thus, it was not possible to conclude that one model was superior to the other two in terms of explaining the interplay between motivation and achievement in Reading Recovery. It was possible, based on the SEM results, to support a direct effects model, or one of the two mediation models. There appears to be a bidirectional process by which motivational and achievement changes affect one another in a symbiotic manner, and although Reading Recovery is designed specifically to address children's actual reading processes, it is not possible to ignore the role motivation plays in learning how to read.

Although we set out to examine the role of motivation in Reading Recovery by employing a more rigorous methodological design than found in prior studies, our investigation had limitations. We detected at pretest that the treatment and control groups did not have equivalent achievement and motivation levels, on average, which indicated the need to control for initial group differences. Nonetheless, covariate analysis can over- or under-adjust initial differences, making causal inferences less tenable than more rigorous designs such as randomized trials. Besides the limitations with covariate

analyses, the comparative results between motivation and achievement may have been influenced by restricted variability on the motivation measure at posttest, which could have led to underestimations of its role in the intervention effects. Future studies should address these issues in order to produce stronger inferences regarding Reading Recovery's effect on motivation, and the moderating role motivation may play in explaining achievement gains resulting from the intervention.

Reading Recovery teachers go through an intensive year of university-based training and continue to participate in ongoing embedded professional development in subsequent years. This initial and ongoing learning focuses not only on children's literacy processing, but also on the relationship between emotion and cognition including motivational dynamics. The earlier review of existing motivation literature revealed a number of influencing factors including interest, challenge, collaboration, and self-efficacy. These factors are accounted for in the intervention and could contribute to children in Reading Recovery having a more positive attitude toward reading than their like peers to whom they were compared in this study.

During lessons, Reading Recovery teachers engage students' attention and interest. When selecting new books for a student, teachers consider the opportunities that a text will offer, and carefully match the challenges to the strengths and needs of the child. During the new book selection, teachers also carefully consider the students' personal interests. Many of the books used in the intervention build on familiar characters that reappear across the text level gradient. As noted earlier, books in a series or books by the same author help students develop an ongoing interest in reading (Nolen, 2007). Eventually these books, which were once at the child's instructional level, are read independently. One component of the 30-min lesson involves the rereading of these now independent and familiar texts. The purpose of this portion of the lesson is to have children orchestrate the reading process in a prosodic and fluent manner, in turn bolstering self-efficacy through successful and autonomous engagement with text (Clay, 2001).

In addition to accounting for children's interests, Reading Recovery teachers also recognize the importance of enlisting children's strengths in teaching and learning (Clay, 1990). Identifying what the students know and building on the known are key components. Reading Recovery teachers are versed in keeping it easy to learn (Clay, 2001). This does not mean that children are not challenged. Instead, teachers are trained to provide support through scaffolded interactions with children (Wood et al., 1976). Teachers become close observers of children (Clay, 2001) and through the use of detailed records document the patterns of response between teacher and student in order to modulate the support they provide (Rodgers, 2004). Through this type of contingent instruction, teachers ensure the bar is constantly lifted by releasing more responsibility for the task to the child (Pearson & Gallagher, 1983). As a result of this fine-tuned support, children experience success and are more likely to stay engaged in the task of reading. Teachers' understanding of challenge and the ways in which they support problem-solving help confirm that instruction is within the students' zone of proximal development (Vygotsky, 1978). This reduces the likelihood of children experiencing the type of frustration that can lower motivation. When children are frustrated, they often avoid the task. Frustration is controlled through the collaborative relationship that develops between teacher and child. The relationship motivates the learner as the teacher and child jointly participate in the task (Rogoff, 1990).

Conclusion

Early reading interventions must consider the role motivation plays in literacy acquisition. If motivational factors are taken into account, children will be more successful in an intervention. Guthrie (1999) cautions "when the written code predominates children's consciousness of what it means to be a reader, a serious obstacle to intrinsically motivated reading arises" (p. 154). Reading is a complex process and attention to motivation must be an integral part of instruction. Approaching intervention from this perspective makes it more likely that children not only learn to read, but choose to read.

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