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A Short-Term Longitudinal Study of the Relationship between Motivation to Read and Reading Fluency Skill in Second Grade

Matthew Quirk, Ph.D., **Paula J. Schwanenflugel, Ph.D.**, and **Mi-young Webb, MA**

Abstract

This short-term longitudinal study investigated the relationships between students' reading self-concept, goals for reading, and reading fluency skill over the course of the second grade year. Second grade children (N=185) were administered the Test of Word Reading Efficiency, the second grade Dynamic Indicators of Basic Early Literacy Skills, and an adapted version of Motivation to Read Profile at the beginning, middle, and end of the school year. Results showed that students' goals for reading were related to reading self-concept, but unrelated to reading fluency. In addition, reading self-concept was significantly related to reading fluency at each time point. Latent-variable path analysis was used to test four potential relationships between students' reading self-concept and reading fluency skill: (a) an independence model; (b) a skill development model; (c) a self-enhancement model; and (d) a reciprocal effects model. Support for a reciprocal model was found between students' reading fluency skill and reading self-concept over the second grade year. This finding also indicated that students' reading self-concept begins to influence their reading achievement earlier than previous research had indicated. Implications for educational practice and future research will also be discussed.

Keywords

motivation to read; reading fluency skill; fluency instruction; reading self-concept

Teachers and researchers who work with young children generally agree that motivation plays an important role in the process of becoming a proficient reader (Sweet, Guthrie, & Ng, 1998; Morgan & Fuchs, 2007). Previous research has documented the importance of practice in becoming a better reader (Stanovich, 1986). Good readers read approximately five times as many minutes per day as average readers and nearly 200 times as much as poor readers (Anderson, Wilson, & Fielding, 1988). While it is not surprising that there is a connection between how much children read and their reading skill, it should be noted that one potentially important variable linking the two is students' motivation to read. Wigfield and Guthrie (1997) found children's motivation to read to be a predictor of the amount of reading that children do outside of school and accounts for as much as 14% of the variance in the amount that third and fifth grade students read (Guthrie, Wigfield, Metsala, & Cox, 1999). Further, motivated readers tend to choose more challenging reading materials, persevere when reading is difficult, cognitively process reading materials more deeply and comprehend them better (Anderson et al., 1988; Grolnick & Ryan, 1987; Hidi, 1990; Morrow, 1992; Schiefele, 1991; Taylor, Frye, & Maruyama, 1990; Tobias, 1994; Wigfield, 1997).

A recent comprehensive review of research on the relationship between reading motivation and reading skill by Morgan and Fuchs (2007) described a number of correlational studies and

Correspondences regarding this manuscript should be directed to: Matthew Quirk, University of California, Santa Barbara, Gevirtz Graduate School of Education, Santa Barbara, CA 93106-9490, phone: 805-893-5914, fax: 805-893-7264, mquirk@education.ucsb.edu.

theories that have suggested a bidirectional relationship between motivation to read and reading skill development; however, only a few studies have used appropriate research designs and data analytic strategies that might shed light on the directionality of these relationships (Aunola et al., 2002; Chapman & Tunmer, 1997; Lepola et al., 2005; Onatsu-Arvilommi & Nurmi, 2000). Therefore, the directionality of the relationship between the development of reading skill and motivation to read remains unclear, especially for children in the primary grades whose attitudes and skills regarding reading are being formed.

Theories regarding the Relationship between Academic Self-Beliefs and Academic Achievement

Longitudinal designs are one way to learn about the direction of the relationships between reading motivation and achievement. Several studies have examined relationships between general academic self-beliefs and general academic achievement longitudinally (Guay, Marsh, & Boivin, 2003; Helmke & van Aken, 1995; Kurtz-Costes & Schneider, 1994; Marsh, 1990; Marsh, Byrne, & Yeung, 1999; Marsh, Craven, & Debus, 1998; Marsh & Koller, 2004; Marsh & Yeung, 1997; Muijs, 1997; Newman, 1984; Shavelson & Bolus, 1982; Skaalvik & Hagtvet, 1990; Skaalvik & Valas, 1999; Valentine & DuBois, 2005; Valentine, DuBois, & Cooper, 2004). These studies have generally tested one of four theoretical models. The “skill development” model (Calsyn & Kenny, 1977) describes the relationship between academic achievement and self-beliefs as one where academic achievement impacts subsequent academic self-beliefs; however, these self-beliefs are not said to have further impact on subsequent academic achievement. By contrast, the “self-enhancement” model (Calsyn & Kenny, 1977) posits the opposite. In this model, self-beliefs are said to predominate over subsequent academic achievement, which in turn has no subsequent impact on self-beliefs. More recently, a growing body of research evidence has supported a “reciprocal effects” model (Marsh, 1990), where a cross-lagged relationship exists between academic self-beliefs and academic achievement. That is, changes in one factor are said to effect further change in the other. Finally, many of these studies have used a “null model” as a point of comparison. The null model represents the null hypothesis whereby there is no unidirectional or cross-lagged relationship between academic achievement and academic self-beliefs, indicating that these constructs operate independently of one another.

Studies carried out by Skaalvik and Hagvet (1990), Helmke and van Aken (1995), and Skaalvik and Valas (1999) have found evidence to support a skill development model for children in the early to mid elementary grades. In those studies, academic achievement significantly contributed to subsequent academic self-concept, but self-concept did not make a significant contribution to subsequent achievement. However, as children progress through school, Skaalvik and Hagvet (1990) found that by 6th grade, a reciprocal relationship begins to emerge suggesting the possibility of developmental change. Presumably, this developmental trend towards a reciprocal relationship emerges because children’s academic self-concept became more veridical as they accrue academic experiences, which would then cause their self-concept to exert a more powerful influence on subsequent experiences.

More recently, a growing body of research has supported the reciprocal effects model regardless of age (Guay, Marsh, & Boivin, 2003; Kutrz-Costes & Schneider, 1994; Marsh, 1990; Marsh & Koller, 2004; Marsh & Yeung, 1997; Muijs, 1997; Valentine & DuBois, 2004). These findings reiterate that children’s academic self-concept is influenced by prior achievement, but they also emphasize that children’s academic self-concept has a significant impact on their subsequent academic achievement, above and beyond what might be expected controlling for previous academic achievement.

Recent research has also suggested that there is considerable domain specificity in the relationship between academic self-beliefs and academic achievement. Self-concept and achievement variables in matching domains are more strongly correlated than self-concept and achievement variables in non-matching domains (Marsh & Craven, 2006; Valentine & DuBois, 2005). Thus, it seems that, as the level of specificity of measurement increases, the better we are able to discern the various relationships that exist between self-belief and achievement variables. Therefore, examining the relationship between reading self-concept and reading achievement is likely to be more powerful than simply examining the relationship between general academic self-beliefs and general academic achievement.

The Relationship between Reading Motivation and Reading Skill

Motivation to read has been described in a variety of ways. For example, Wigfield and Guthrie (1997) view motivation to read as a constellation of eleven constructs ranging from reading self-efficacy, reading challenge, to reading avoidance. Others have developed a narrower conceptualization of reading motivation which they view to be central to impacting reading achievement (Baker & Scher, 2002; Chapman & Tumner, 1995; Gambrell, Palmer, Codling, & Mazzoni, 1996; McKenna & Kear, 1990). To a great extent the measurement of motivation to read has lagged behind theory, particularly with regards to measuring emergent reading motivation in young readers. Just how broad the construct of reading motivation needs to be to capture the development of reading skill is unclear.

In the current study, we focused on three constructs that we believed had the greatest potential for influencing the development of reading skill in the early elementary school years. The first is *reading self-concept*, which refers to children's global beliefs of their competence in reading formed on the basis of past mastery experiences, social comparisons with peers, and feedback from others (Bong & Skaalvik, 2003). A second is *value of reading* which relates to the interest, importance, or utility children place on reading. With a value for reading, a child with a high self-concept is more likely to engage in reading (Eccles et al., 1983). Finally, a third key aspect is *goals for reading*. Goals have been shown to direct children's activities and regulate their effort and persistence (Locke & Latham, 1994). For example, a child may be motivated to move from reading shorter picture books to chapter books. At the same time, she may wish to outperform her friend in the number of books she reads. Each of these goals helps her engage in the level of reading that improves skill (Morrone & Schutz, 2000).

There has been limited longitudinal research examining the relationships between reading motivation and reading skills. For example, studies by Aunola et al. (2002) and Chapman and Tunmer (1997) examined longitudinal relationships between reading self-concept and reading achievement and found evidence to support a partial skill development model. That is, children's emergent reading skills began to significantly contribute to subsequent reading self-concept in the middle of their 1st grade year (6–7 years old), but neither study found evidence to suggest that children's reading self-concept had any further impact on subsequent reading skill level. However, Chapman and Tunmer also found evidence that children's reading self-concept begins to stabilize sometime between their second and third years of schooling, which may help to explain why self-concept might not have made consistent contributions to reading skill development over that time period. By contrast, Lepola et al. (2005) found that students' goal orientation for reading predicted subsequent reading skill level and that their reading skill level predicted subsequent reading task orientation, suggesting a reciprocal effects model of the relationship between reading motivation and reading skill for children as young as ages 5–7.

It should be noted that, in the studies conducted by Chapman and Tunmer (1997) and Lepola et al. (2005), the definition of the motivational construct remained constant across the

longitudinal timeframe, but the definition of the reading skill construct most likely changed. Reading skills assessed in kindergarten and first grade are different than the skills assessed in third grade. It is possible that the varying effects of motivation on reading skill found across studies are partly attributable to changes in the definition reading skill itself. In this respect, the study by Onatsu-Arvilommi and Nurmi (2000) stands out as an exception. That study found a negative, reciprocal effect between task avoidance and reading skill development for children across their 1st grade year. However, in that study, the inter-correlations among the reading assessment subscales were sometimes quite low (<.25), with little information provided regarding the measures' reliability and validity. Moreover, the definition of reading motivation was quite different in each of these studies, making direct comparisons difficult.

Implications for the Current Investigation

The purpose of the current study is to evaluate the relationship between reading motivation and reading skill by focusing on a specific reading skill, reading fluency, across children's 2nd grade year. Reading fluency was selected because it is the key developmental task of second grade reading. Reading fluency is fundamental to the development of reading skill as a whole as children move from word-by-word to fluent, expressive reading (Miller & Schwanenflugel, 2006; Schwanenflugel et al., 2004; Kuhn & Stahl, 2003). Reading fluency provides an important bridge from simple word decoding to good comprehension (Schwanenflugel et al., 2006). The ability to read fluently allows children to read complex texts such as chapter books, which better capture the intents and purposes for reading than simpler texts do. Moreover, fluency is a public skill because children are often asked to read aloud in second grade classrooms (Kuhn & Schwanenflugel, 2006). Although reading fluency continues to develop after second grade, it is during this period that children make considerable progress in reading in a word-by-word fashion to more fluent, expressive reading (Miller & Schwanenflugel, 2008). Indeed, changes in reading fluency during the second grade year are predictive of later reading comprehension (Schwanenflugel et al, in press). Thus, it is important to understand how learning to read fluently during the second grade year impacts the development of children's reading motivation.

Despite the fact that there are important educational outcomes related to the ability to read fluently, the construct of fluency has been criticized for lacking a clear definition. Kame'enui and Simmons (2001), for example, characterized fluency as "a term so broad and unsatisfactory in meaning that little insight and understanding are gained beyond mere use of the term" (p. 204). Furthermore, they contend that at present the exact cognitive mechanisms and processes that index oral reading fluency, and the manner in which they do so, remain theoretically unsettled and experimentally uncertain (Kame'enui & Simmons, 2001; National Reading Panel, 2000; Miller & Schwanenflugel, 2006; Stanovich, 2000). However, there is little disagreement regarding what fluent reading looks like. Fluent reading is often described as reading which is quick, accurate, and expressive (Kuhn & Stahl, 2003). In practice, however, because of the difficulty of reliably measuring expressiveness independent of reading errors (Bear, 1992), measurement of reading fluency in schools, classrooms, and standardized assessments tend to focus on reading rate using either word reading efficiency or text fluency measures. Indeed, expressiveness tends to change concomitantly with changes in reading rate (Miller & Schwanenflugel, 2006). Thus, in the current study, we too focus on fluency using reading rate measures.

The current study examined the possible relationships between three reading motivation variables (reading self-concept, reading task-value, and goals for reading) and reading fluency skill over the second grade year. Predictions of the four theoretical models of the relationship between academic motivation and academic achievement described earlier were tested. Each of the hypothesized models can be found embedded in Figure 1 referring to path labels A, B,

C, D, E, F, G, and H regarding paths included in each model. The hypothesized models to be tested include: a reciprocal effects model where reading fluency skill and reading motivation are viewed as having a cross-lagged effect on one another over time (includes all paths in Figure 1), a skill-development model where reading fluency skill is viewed as having a significant impact on subsequent reading motivation but reading motivation has no impact on subsequent reading fluency skill (includes paths A, B, E, F, G, and H), a self-enhancement model that proposes reading motivation has a significant impact on subsequent reading fluency skill but that reading fluency skill has no impact on reading motivation (includes paths C, D, E, F, G, and H), and an independence model that posits reading motivation and reading fluency skill operate independently of one another (includes paths E, F, G, and H). The current study aimed to address the following research questions:

1. What is the relationship between various aspects of motivation to read (self-concept, value, and goals) and reading fluency skill?
2. Does students' reading fluency skill level impact their subsequent motivation to read across their second grade year?
3. Does students' motivation to read impact their subsequent reading fluency skill level across their second grade year?
4. Is there a cross-lagged relationship between motivation to read and reading fluency skill across students' second grade year?

Method

Participants

Participants were 185 second grade students from four elementary schools located in a rural area of the southeastern United States, who were randomly selected from a larger sample of 337 students participating in a study on the development of reading fluency. Based on the state report cards for the participating schools, approximately 41% of the enrolled students were eligible for free/reduced lunches (Georgia Office of Student Achievement, 2004). Of the participating students, 78.6% were Caucasian, 9.5% African American, 8.3% Hispanic, 1.8% Asian, and 1.2% multiracial; 54% were female. Participants ranged in age from 7–9 years old (M = 7 years, 8 months; SD = 5 months). All had received parental permission to participate and verbally assented to their own participation.

Assessments

Assessments were carried out by testers trained by a school psychologist with extensive knowledge of reading fluency assessment. Testers were trained to have complete adherence to the testing protocol described by the assessment developers and they achieved 100% agreement with their trainer on several pilot participants prior to testing participants and during the first week of testing.

Motivation to Read—An adapted version of Gambrell et al.'s (1996) *Motivation to Read Profile- Adapted* (referred to as the *MRP-A*) was used to assess students' motivation to read. The adapted version of the MRP was chosen over more commonly used instruments, such as Wigfield, Guthrie, and McGough's (1996) MRQ, because it was designed to be used with younger students (grades 2–6). In addition, Gambrell et al. (1996) suggested that the MRP could be used repeatedly over the course of a single school year to monitor growth/changes in students' motivational profiles (p. 531). The MRP-A consisted of three subscales including 10 items assessing reading self-concept (from the original MRP), 10 items assessing value for reading (also from the original MRP), and 8 items we developed for assessing goals for reading. The items from the *goals for reading* subscale were written based on theory from the

achievement goal literature in relation to reading and were broadly defined as the purposes for engaging in an activity (Maehr, 1989); therefore, items on the goals subscale were designed to assess whether students had a purpose for engaging in reading activity and what those purposes might be. The items were also written to reflect a wide variety of possible goal orientations that young students may have for reading, including items reflecting a mastery goal orientation as well as items reflecting a performance-approach goal orientation (Elliot, 1999). Despite recent debate on the issue (see Brophy, 2005), items characterizing both mastery and performance-approach goal orientations were created because of research suggesting that they are both positively correlated with academic achievement (Van Yperen, 2003).

All items on the MRP-A used a 4-point Likert scale response format identical to the original MRP (see the Appendix). Although children completed all 28 items on the initial MRP-A, each subscale was revised to maximize its psychometric properties before it was included in further analyses. The revised reading self-concept subscale was comprised of 9 items (one item was removed due to a very low correlation with other items on the subscale). The items from the original 10-item value for reading subscale had extremely low inter-item correlations, which resulted in extremely low reliabilities across all three time points. Our attempt to improve the reliability of this subscale resulted in eliminating all but 4 items; however, the internal consistency of the revised scale remained unacceptably low (ranging from .52 to .64). Thus, the entire value for reading subscale was dropped from all analyses. Finally, one item from the original goals for reading subscale was dropped due to a low inter-item correlation with the other items on the subscale. Subscale internal consistency varied slightly across the three time points with alphas for the reading self-concept subscale ranging from .73–.76 and alphas for the goals for reading subscale ranging from .67–.70.

Reading Fluency Skill—The importance of fluent reading as a skill is that it enables freed cognitive resources to focus on comprehension rather than word decoding (Logan, 1997; Schwanenflugel et al., 2006). We focused on those aspects of reading fluency which prior research indicated were most important for good reading comprehension; word reading efficiency and skilled oral reading of text (Schwanenflugel et al., 2006; Miller & Schwanenflugel, 2006). Although some definitions of reading fluency also include reading expressiveness, studies by Schwanenflugel et al., 2004 and Miller & Schwanenflugel, 2006 have shown expressiveness is the direct outcome of quick and accurate reading and, by itself, contributes to reading comprehension in only a minor way. Thus, we focused on word reading efficiency and text reading fluency.

a. *Word Reading Efficiency*. Students' ability to fluently read isolated words was assessed using the two subtests of the Test of Word Reading Efficiency (TOWRE; Torgesen, Wagner, & Rashotte, 1999), which measure children's ability to fluently (i.e. quickly *and* accurately) read both real words and non-words. The first subtest of the TOWRE is comprised of a list of sight words that get progressively more difficult. Students are asked to read as many of the words on the list as they can in 45 seconds. The total number of words read accurately indicates their sight word reading efficiency. The second subtest is designed to assess students' phonemic decoding efficiency by having them read list non-words using the same procedure. The TOWRE reports test-retest reliabilities between .90 and .97, and validity estimates with other decoding measures between .91 and .94. Our own analysis of test-retest reliabilities based on our own data ranged from .83–.90. The two subtest scores served as observed indicators for the reading fluency skill latent variable at each time point in the longitudinal models tested. Normatively, at the beginning of the year, the children scored on average at the 61st percentile according to the test manual (range: 21st 98th percentile) on this assessment.

b. *Oral reading fluency of text.* The DIBELS Oral Reading Fluency (Kaminski & Good, 1998) is a standardized, criterion referenced test of oral reading fluency that was used to assess students' fluency in reading text. At each time point, children were asked to read three grade-level passages, of similar difficulty, aloud for one minute. The examiner recorded all the oral reading errors including words omitted, substituted, and hesitations of more than three seconds. Misread words that were self-corrected within three seconds, repeated words, and inserted words were scored as accurate. The number of words read correctly in one minute (cwpm) for each passage was calculated by counting the number words correctly read by the child. The median cwpm of the three passages was used to identify children's benchmark level at each time point. The DIBELS Oral Reading Fluency reports alternate-form reliability between .89 and .96 and criterion-related validity estimates ranging from .91 to .96 for second grade students. Our own test-retest reliabilities for the DIBELS were .87 and intercorrelations between the DIBELS and TOWRE subtests ranged from .77 to . 89. It is currently the most widely used assessment of reading fluency. At the beginning of the year, 79% of the children could be classified as at "low risk" according to the instructional recommendations issued by the test manual.

Procedure

Children were brought to a quiet location in their school and were administered the adapted version of the *Motivation to Read Profile (MRP-A)* and two reading fluency assessments (TOWRE and DIBELS). The two fluency assessments were counterbalanced with the motivation to read measure (the MRP-A) to control for fatigue, so that if one student received the MRP-A first, the next received the reading fluency skill assessments first. Following the completion of their assessment battery, each child was given a sticker. At the final assessment, children were given a book for their participation. All assessments were administered to each participating student three times over the course of their second grade year, with testing dates at each school spaced approximately 60 instructional days apart. The assessment battery was administered to students individually by the first author and five specially trained research assistants. Testing took approximately twenty minutes per student at each time point.

Results

Correlations between Motivational and Fluency Variables

Correlational analyses were carried out to provide a preliminary look at the relationships between the motivational variables (reading self-concept and reading goals) and fluency skill variables (TOWRE sight word efficiency, TOWRE phonemic decoding efficiency, and DIBELS Oral Reading Fluency). See Table 1 for the full correlation matrix between variables. The data were univariately normally distributed across all variables with the largest skew and kurtosis equaling 0.74 and −0.89, respectively. A perusal of these correlations reveals several important points. First, as might be expected, each variable significantly correlated with itself across all three time points (correlations ranging from .52–.90, $p < .01$), indicating the relative stability of the constructs across students' second grade year and moderate to excellent test-retest reliabilities. In addition, all of the correlations between self-concept and goals were significant at the $p < .01$ level indicating that students' reading self-concepts and reading goals were significantly related both within and across time points over their second grade year. The reading fluency variables were also all significantly intercorrelated both within and across time points at the $p < .01$ level providing evidence to support their usage as indicators of a unified fluency latent variable in the subsequent latent-variable path analyses.

The results of the correlation analyses between the reading motivational variables and reading fluency variables were revealing regarding which elements of reading motivation might be

relevant for predicting reading fluency. Reading self-concept was significantly and positively correlated ($p < .05$) with each contemporaneous measure of reading fluency with the single exception of the TOWRE phonemic decoding efficiency subscale in the fall. By stark contrast, the reading goals subscale was not significantly correlated with *any* of the reading fluency subscales for contemporaneous assessments and all these correlations were very close to zero. Moreover, none of the correlations between goals and reading fluency measures across time points were significant ($p > .05$). Thus, it appears that, at least as measured here, goals for reading is unrelated to reading fluency.

Based on these initial findings, two tentative conclusions for our theoretical models might be drawn. First, reading self-concept and goals for reading are related. Children who have high self-concept as a reader tend to be those who set goals for reading. Second, despite this relationship between the two constructs, only one aspect of reading motivation, reading self-concept, has reasonable potential to explain the development of reading fluency (or vice versa). Thus, henceforth, our modeling related to the development of fluency focused only on the short-term longitudinal relationship between reading self-concept and reading fluency. However, it is important to keep in mind that our findings here equally show that *goals for reading* is not related to reading fluency.

The Relationship between Reading Self-Concept and Reading Fluency over the Second Grade Year

All latent-variable path analyses were conducted using the LISREL 8.80 (Jöreskog & Sörbom, 2006). (LISREL is an acronym for LInear Structural RELations.) PRELIS 2.80 (Jöreskog & Sörbom, 2006) was used to conduct tests of univariate and multivariate normality and to generate the covariance matrix. (PRELIS is an acronym for PRE-processor for LISrel.) The data appeared to be approximately univariately and multivariately normally distributed (relative multivariate kurtosis = 1.09). Thus, fit of the various models and models' parameters were estimated using maximum likelihood estimation. Model fits are important for discerning whether data supports the theoretical model proposed. If the data do not fit the hypothesized model, then the model needs to be modified or other models need to be developed (Schumaker & Lomax, 2004, p. 3). It is traditional to present the model χ^2 fit index, which tests the discrepancy between the sample covariance matrix and the hypothesized model-implied covariance matrix. A non-significant χ^2 ($p > .05$) indicates an acceptable fit. However, this is generally not the preferred fit index for various reasons (e.g., confounded by sample size) and needs to be supplemented with other more preferred indicators of model fit. Thus, we evaluated the overall fit of each model tested in terms of the root mean square error of approximation (RMSEA) and comparative fit index (CFI). The RMSEA and CFI were chosen due to the fact that they take two different perspectives on assessing model fit (RMSEA as a stand-alone fit that assesses how well the model reproduces sample matrix in an absolute sense and CFI as an incremental fit that evaluates fit by comparing the model to the fit of a null model); therefore, they compliment one another well when interpreting a model's overall fit to the observed data. Using both Kline (2005) and Hu and Bentler's (1999) guidelines for evaluating overall model fit, an RMSEA $< .05$ and a CFI $> .95$ indicated an adequate model fit to the observed data.

Each of the four latent-variable path models tested contained one latent variable (reading fluency skill) and one observed variable (reading self-concept) at each of the three time points of data collection. A latent variable is a variable that is not directly observed, but rather inferred through other variables that are directly measured. The reading fluency skill latent variable was defined by three observed variables at each time point: the TOWRE sight word efficiency subtest, the TOWRE phonemic decoding efficiency subtest, and the DIBELS Oral Reading Fluency scale. The measurement error of the reading self-concept variable at each time point was taken into account by directly setting the measurement error variance (one minus the

reliability of the reading self-concept multiplied by the variance of the observed score); thus, reading self-concept was treated as a latent variable. Attrition was relatively low (9% of sample, or 17 out of 185 students); in cases where there was missing data for students, maximum likelihood via expectation maximization (EM) algorithm (Dempster, Laird, & Rubin, 1977) was used to include them in the final analyses. The EM algorithm is used to obtain estimates of population means and covariances which LISREL then uses to obtain starting values for the maximum likelihood (ML) procedure. This procedure has been shown to work well under a variety of conditions (e.g. small sample size). Further, characteristics of our data, such as approximate multivariate normality (described previously), suggest that ML is the appropriate estimation procedure. It is recommended over other approaches to missing data treatment such as list-wise and pair-wise deletion which have been shown to create biases from the elimination of subject data (Schumaker & Lomax, 2004, pp. 25–26). The means for each observed variable as well as the covariance matrix used in the analyses of the measurement and latent-variable path models can be found in Table 1, with each scale's variance on the diagonal. For example, on Table 1, it can been seen that Reading Self-Concept (RSC) at time 1 had a mean score of 28.65, a variance of 16.08, a covariance of 8.48 with Goals for Reading (GR) at time 1, and a correlation of $r = .56$ with GR at time 1.

The measurement model was tested first to examine how well the three observed fluency subtests measured the reading fluency latent variable over all three time points and to assess the magnitude of the associations among the latent variables. Once the measurement model was tested, the reciprocal model was tested to examine how well the least restrictive model fit the observed data. The reciprocal model was also tested next because all of the other hypothesized path models are nested within the reciprocal model; therefore, we were able to examine all of the hypothesized paths from all possible models within a single model (see Figure 1). The models nested within the reciprocal effects model include: the skill-development model (paths A, B, E, F, G, and H), the self-enhancement model (paths C, D, E, F, G, and H), and the independence model (paths E, F, G, and H). A directional test of path significance was used given that negative paths would be deemed theoretically nonsensical. After the reciprocal model was tested, the independence model was tested to allow for comparisons between the hypothesized models and the model representing the null hypothesis stating that motivation and fluency operate independent of one another. All models tested included correlated measurement errors for each subscale at all time points (not included in Figure 1), which assumed that the measurement error for repeated measures of each subtest at adjacent time-points were correlated for reasons outside of the model (Kline, 2005). Comparisons between the hypothesized models and the independence model were conducted using the chi-square difference statistic (χ^2_{diff}), which allowed for an examination of which model best fit the observed data.

Measurement Model—The first model tested was the full measurement model, which examined the relationship between the reading self-concept variable, the latent fluency variable, and the three reading fluency subtests at all three time points. The full measurement model had a χ^2 (33) = 37.49 ($p = .27$), an RMSEA = .02, and a CFI = 1.00. The insignificant chi-square, RMSEA of .02 and CFI of 1.00 all indicated excellent fit of the measurement model to the observed data. The factor loadings of the fluency subtests on the latent fluency variable at each time point were all statistically significant at the alpha level .05 with *t*-values of greater than |1.66|, indicating that they were significantly related to the fluency factor that they were designed to assess. The variance explained in each of the fluency subtests by the reading fluency latent factor were substantial, with R^2 ranging from .68 to .92, indicating that almost all of the variance in these subtests was explained by the reading fluency skill factor. The standardized factor loadings, *t*-values, their standard errors, and all of the R^2 values from the measurement model are summarized in Table 2. Also, correlations between the reading self-concept latent

variable and the reading fluency latent variable from all three time points are reported in Table 3. Overall, the general measurement model fit very well to the observed data.

Reciprocal Effects Model—The first latent-variable path model tested examined the possibility of a cross-lagged effect between students' reading self-concept (RSC) and their reading fluency skill level (FLU) at each subsequent time point, which reflects the hypothesis implied by the reciprocal effects model. This model was tested first because it was the least restrictive model to be tested and had all of the other hypothesized models nested within it. In this model, the paths between students' RSC at time 1 and their RSC at time 2, their RSC at time 2 and their RSC at time 3, their FLU at time 1 and their FLU at time 2, and their FLU at time 2 and their FLU at time 3 were all significant ($p < .05$). Importantly, only the cross-lagged parameter estimates from students' FLU at time 1 on their RSC at time 2 and their RSC at time 2 on their FLU at time 3 were significant ($p < .05$), indicating a partial reciprocal effect where students' reading fluency skill at the beginning of the year impacted their reading self-concept at the middle of the year and, in turn, their reading self-concept at the middle of the year impacted their reading fluency skill at the end of the year. A summary of all the parameter estimates, *t*-values, their standard errors, and R^2 for the reciprocal model can be found in Table 4. All of the fit indices indicated an excellent fit of the model to the observed data, χ^2 (39) = 39.73 ($p = .44$); RMSEA = .00 and a CFI = 1.00. The finding that two of the four cross-lagged parameter estimates were significant indicated some support for the autoregressive view of skill and self-concept taken by this model.

Independence Model—Next, the independence model was tested to examine the possibility that students' reading self-concept (RSC) and their reading fluency skill level (FLU) operated independently of one another over time. This model was tested second because it represents the null hypothesis and was the benchmark used in all subsequent model comparisons. Not surprisingly, all of the paths in this model were significant (all $p < .05$), indicating that RSC at each time point had a significant impact on RSC at the subsequent time point and FLU at each time point also had a significant impact on FLU at the subsequent time point. All parameter estimates, their standard errors, and R^2 for the independence model are summarized in Table 4. Overall, all of the fit indices for the independence model showed good fit to the observed data with a χ^2 (43) = 48.00, ($p = .28$); RMSEA = .02 and a CFI = 1.00.

Partial Reciprocal Effects Model—Because only the paths from FLU at time 1 to RSC at time 2 and RSC at time 2 and FLU at time 3 were significant in the original test of the reciprocal effects model, a third model was tested so that a comparison could be made to the results from the independence model. This third model tested the possibility of a partial reciprocal effect where only the significant paths from the original reciprocal effects model were included. Further, all the paths between RSC at each subsequent time point and FLU at each time point were included. The results of the partial reciprocal effects model showed excellent fit to the observed data with a χ^2 (41) = 40.10 ($p = .51$); RMSEA = .00 and a CFI = 1.00. As was the case with the test of the full reciprocal model, FLU at time 1 significantly contributed to RSC at time 2 with a standardized coefficient of .16 ($t = 2.15$, $SE = .26$, $p < .05$), in turn RSC at time 2 significantly contributed to FLU at time 3 with a standardized coefficient of .05 ($t = 1.88$, $SE = .01$, $p < .05$). These results indicate that students' reading fluency skill level at the beginning of the year significantly impacted their reading self-concept at the middle of the year, which in turn significantly impacted their reading fluency skill level at the end of the year. Further, FLU at time 1 had a significant indirect effect on RSC at time 3, with standardized indirect coefficient of .14 ($t = 2.06$, $SE = 0.25$, $p < .05$), and RSC at time 1 had a significant indirect effect on FLU at time 3, with standardized indirect coefficient of .04 ($t = 1.90$, $SE = 0.01$, $p < .05$). These indirect effects provide further evidence of the reciprocal relationship

between reading self-concept and reading fluency skill development across students' second grade year.

Because the independence model also fit well to the observed data, it was necessary to conduct a chi-square difference test to examine whether the significant paths from the partial reciprocal effects model significantly improved the fit of the model given the cost in degrees of freedom. This comparison with the independence model revealed a significant difference, with a χ^2_{diff} (2) = 7.90, p = .02, indicating that the partial reciprocal effects model fit significantly better than the baseline independence model, given the cost in degrees of freedom. This finding provided further evidence that fluency skill level at the beginning of students' second grade year significantly contributed to their reading self-concepts at the middle of the year and indirectly to the end of the year, above and beyond what was contributed by prior reading self-concept. It also provided further evidence that students' reading self-concepts at the middle of their second grade year significantly contributed directly to their reading fluency skill level at the end of the year and indirectly from the beginning of the year.

Discussion

One important finding of this study was that reading self-concept and reading fluency skill level are reciprocally related to one another across students' second grade year. Thus, students who started the year with a higher fluency skill level tended to have higher reading self-concepts both in the middle and at the end of their second grade year, controlling for prior reading self-concept. In addition, students who had a relatively high reading self-concept at the beginning of their second grade year tended to develop their reading fluency skills across their second grade year more rapidly than those students who started the year with a lower reading self-concept, controlling for prior reading fluency skill level. Conversely, students who began the year with relatively low reading fluency skill levels tended to have lower reading self-concept at the middle of the year. Low reading self-concept at the middle of the year contributed to continued stagnation in students' reading fluency skill growth at the end of their second grade year.

The relationships found between reading self-concept and reading fluency are particularly important when one considers the plight of a struggling reader. In a recent review of research on the relationship between reading motivation and reading achievement, Morgan and Fuchs (2007) described low reading motivation as both "a consequence of limited skill acquisition" and "a cause of later reading failure" (p. 166). This description was drawn from research showing the negative impact that early struggles with reading can have on student motivation (see Chapman & Tunmer, 2003; Wigfield et al., 1997) and Stanovich's (1986) Matthew Effects in reading which, in part, describe the behavioral/cognitive/motivational consequences of students' reading difficulties and the reciprocal impact that early reading difficulties have on subsequent reading development. The findings of the current study support these previous claims, showing that students who began the year with relatively low levels of reading fluency skill tended to have lower reading self-concepts at the middle of the year which negatively impacted their reading fluency growth at the end of the year. The fact that our study focused on students' reading self-concept is particularly important given that reading related self-perceptions have been found to be particularly sensitive to previous performance experiences (Chapman & Tunmer, 1995; Chapman, Tunmer, & Prochnow, 2000; Spear-Swerling & Sternberg, 1994).

The findings of the current investigation also make an important contribution to our emerging understanding of when students' reading self-concept begins to have a direct impact on their subsequent reading skill development. Our findings support Chapman and Tunmer's (1997) view that students' reading skill begins to impact their reading self-concept as early as the

beginning of their second grade year. This is important because it emphasizes the role of children's early experiences in acquiring reading skills on their emerging self-beliefs as readers (see Chapman & Tunmer, 2003). However, the current study also found a significant direct effect of students' reading self-concept in the middle of their second grade year and a significant indirect effect from the beginning of the year impacting their reading fluency skill level at the end of their second grade year. What this means is that children with poor initial reading fluency develop negative ideas of their own reading skills and capabilities. These negative self-concepts ultimately have the devastating consequence of impeding children from developing better reading fluency later. Alternatively, children with good initial reading fluency go on to think of themselves as good readers which, in turn, has fortuitous consequences for later reading fluency development. This finding is different from previous research that has suggested a reciprocal relationship between students' academic self-beliefs and academic achievement does not emerge until later elementary school, somewhere between grades 3–5 (Kurtz-Costes & Schneider, 1994; Helmke & van Aiken, 1995). Our ability to detect the emergence of these relationships earlier than previous research may be due to the fact that we investigated them at a domain-specific level. It is possible that previous research was unable to detect the reciprocal relationship between achievement and self-concept before the third grade because their investigations examined these relationships using the more broadly defined constructs of academic self-concept and academic achievement. This hypothesis is supported by more recent research that has found examining the relationship between self-beliefs and achievement at a domain specific level to be more powerful than doing so at a more general level (Marsh & Craven, 2006; Valentine & DuBois, 2005).

In their study, Chapman and Tunmer (1997) reported that children's reading self-concepts began to stabilize sometime during their third year of schooling (their second grade year). However, this previous work only examined the relationship between students' reading self-concept and their reading skill development through the middle of their second grade year. The current study found positive direct benefits of reading self-concept on subsequent reading fluency over the second half of the students' second grade year, but also small, significant indirect effects that could be traced from the beginning of the year. Overall then, it seems that students' early experiences in the acquisition of reading fluency and reading self-concept have significant reciprocal impacts which grow stronger in benefiting reading skill once these students' reading self-concepts have begun to stabilize sometime in the middle of their second grade year.

A third set of important findings were that students' goals for reading were significantly related to their self-concept as a reader; however, goals for reading did not have a direct impact on reading fluency skill. The finding that students' goals for reading were positively related to their reading self-concept supports the view that reading motivation is a multidimensional and interrelated system of constructs (Wigfield & Guthrie, 1997; Wigfield, 1997). Thus, children who have good reading self-concepts are more likely to set goals for their reading; whereas those with lower reading self-concepts are less likely to do so. The finding that reading goals and reading fluency are not directly related was somewhat surprising; however, previous research has found mixed results regarding the relationship between goals and achievement (see Harackiewicz, Barron, Pintrich, et al., 2002). As Schunk (2003) suggests, goals themselves "do not automatically enhance motivation and learning (p.163)." Rather, it is students' reactions to periodic self-evaluations of their goal progress (whether they are making progress toward reaching their goals) that lead to behaviors such as increased effort, revision of their original goal, or possibly avoidance behaviors. Each of these reactions would have a different impact on behaviors related to reading, which may moderate the relationship between students' goals for reading and their reading achievement.

Given the fact that reading is too a multi-faceted behavior, it may be that goals are relevant to other aspects of reading, such as the development of reading comprehension. Taking children's goals and interests for reading into account and setting reading goals are often recommended practices for improving reading comprehension (Geiger & Millis, 2004; Yudowich, Henry, & Guthrie, 2008). Indeed there is much about advanced reading that emerges as children obtain fluency that seem goal related. For example, students come to use a number of goal-related comprehension strategies to glean information from expository text, focus on author point of view, re-read poorly understood information from key segments of text, or strategically skim a text, to name a few (McKeown, Beck, & Sandora, 1993; Rosenblatt, 1982). Additionally, cognitive resource models of reading skills claim that children may need to be fluent before they have the cognitive resources to engage in such goal-directed strategies (Authors, 2006; Samuels & Flor, 1997). While children who believe that they are good readers (high reading self-concept) may feel encouraged to carry out the extensive reading practice that enables them to become fluent readers, having specific goals for reading may only increase or focus students' engagement with text once enough fluency has been attained. Thus, it may be that, although goals for reading are not related to reading fluency, they remain an important aspect of motivation to read in general.

Implications for Educational Practice

These findings that students' reading self-concept and fluency are reciprocally related over their second grade year have implications for reading instructional practice. More specifically, the fact that children's fluency skill level early in their second grade year has a significant impact on their subsequent reading self-concept points to the profound impact that early reading success (or lack thereof) has on the development of students' self-concept as a reader. While this may not be surprising to those who have watched a young child struggle to learn to read, considering the potential impact that a student's reading self-concept has on her subsequent reading skill development, preventing or reversing this negative cycle takes on increased importance in early schooling. In the current educational climate, heavily influenced by the pressure of high stakes assessment, it is easy for educators to lose sight of the role that reading motivation plays in the process of developing skilled readers. Instructional approaches that focus solely on developing reading skill, without considering their impact on students' motivation for reading, may not capitalize as much as they need to on the added influence that students' motivation for reading may have on their overall reading achievement.

While this study did not focus specifically on struggling readers, the findings of the current investigation do show the potential added negative impact that low reading self-concept might have on subsequent reading skill development for those students who struggle with reading early in their academic careers. Unfortunately, as Quirk and Schwanenflugel (2004) described, many of the current approaches to remediating the reading difficulties of young students do not address children's motivational needs; rather they focus only on improving specific reading skills. Such a narrowly focused approach to early reading intervention may miss out on the added influence that improving students' motivation for reading might have on their long term development as skilled readers.

Finally, it is not uncommon to encounter elementary schools/classrooms where reading fluency is currently being emphasized as the "end all and be all" of reading assessment/instruction. While the current study does not contribute to our knowledge of the role that reading fluency plays in students' overall reading development, it does speak to the potential impact that a blind emphasis on the number of words that children can read correctly might have on their emerging self-concepts as readers. Within this context, it is important that we focus student attention on becoming better readers, and not just reading machines that are driven to read faster than the student sitting next to them. Rather, the significant relationship between reading goals and

reading self-concept found in the current investigation suggests that we carefully consider the potential motivational implications of the types of goals we set for our students.

Limitations and Future Directions

The original goal of this study was to determine how three different reading motivation constructs (reading self-concept, value for reading, and goals for reading) impact second grade students' reading fluency development over this important developmental phase. Previous research on the relationship between reading motivation and reading skill development had focused on a single motivational factor such as reading self-concept or reading goal orientation (Aunola et al., 2002; Chapman & Tunmer, 1997; Lepola et al., 2005; Onatsu-Arvilommi & Nurmi, 2000). Other research has established that student's reading motivation is comprised of a system of interrelated motivational constructs (Wigfield & Guthrie, 1997). Thus, we felt it was important to evaluate how a broader range of reading motivational variables related to the development of a fundamental reading skill (reading fluency).

Despite our original intent, scale reliability issues forced us to drop the value for reading subscale from further consideration, making it impossible to determine its potential relationship to reading fluency. While we maintain that a student's value for reading remains a potentially important contributor to reading skill development, simply having young children self-report their feelings on the importance and value for reading within a school setting may not be able to get past the social desirability pressure to indicate that reading is important. In fact, mean scores on the value for reading subscale suggest that this is indeed what may have happened in this study. Restricted variance in students' responses to our value questions contributed to the subscale's low reliability, which prevented us from being able to validly examine the role that value for reading plays both within the larger construct of motivation to read and for determining how value for reading might be relevant regarding their reading fluency development.

It should also be noted that the current study was conducted with a predominantly Caucasian, English speaking sample of students. More research is needed to examine similar relationships between motivation and reading skill development with ethnically and linguistically diverse student populations. Previous research has suggested that reading motivation may function differently within various ethnic and linguistic groups of students (Unrau & Schlackman, 2006); therefore, it is quite possible that the relationship between reading motivation and reading achievement may also differ along these lines. Given the increasing diversity of our classrooms, research examining these relationships with diverse student populations could make an important contribution to this line of research.

Finally, the current study ignored the effects that classroom contexts and practices might have had on children's motivation to read. That is, we learned about the relationships between goals for reading and reading self-concepts to reading fluency, but not about how classroom practices might have impacted the development of motivation to read. Future research should take a comprehensive approach to classrooms to better determine how practices teachers use to foster reading fluency in the classrooms may impact children's motivation to read as well.

Conclusions

Our conclusions are two: First, there is a positive reciprocal relationship between second grade students' reading self-concept and reading fluency skill level, such that children who have better initial fluency are more likely to have better reading self-concepts and even better fluency later. The importance of such work is clear in that it suggests that teachers need to focus on strategies designed to improve both fluency and reading self-concept. Second, children with good reading self-concept report having more goals for their reading, but having these goals

does not seem to have a direct impact on later fluency by themselves. Continuing research on the various relationships between motivational and achievement variables has the potential to make important contributions to our understanding of how to best address the needs of struggling readers. Because self-beliefs have a significant impact on subsequent skill development as early as the beginning of second grade, it is clear that future attempts to remediate early reading difficulties need to attend to students' reading motivational needs in addition to their reading skill needs.

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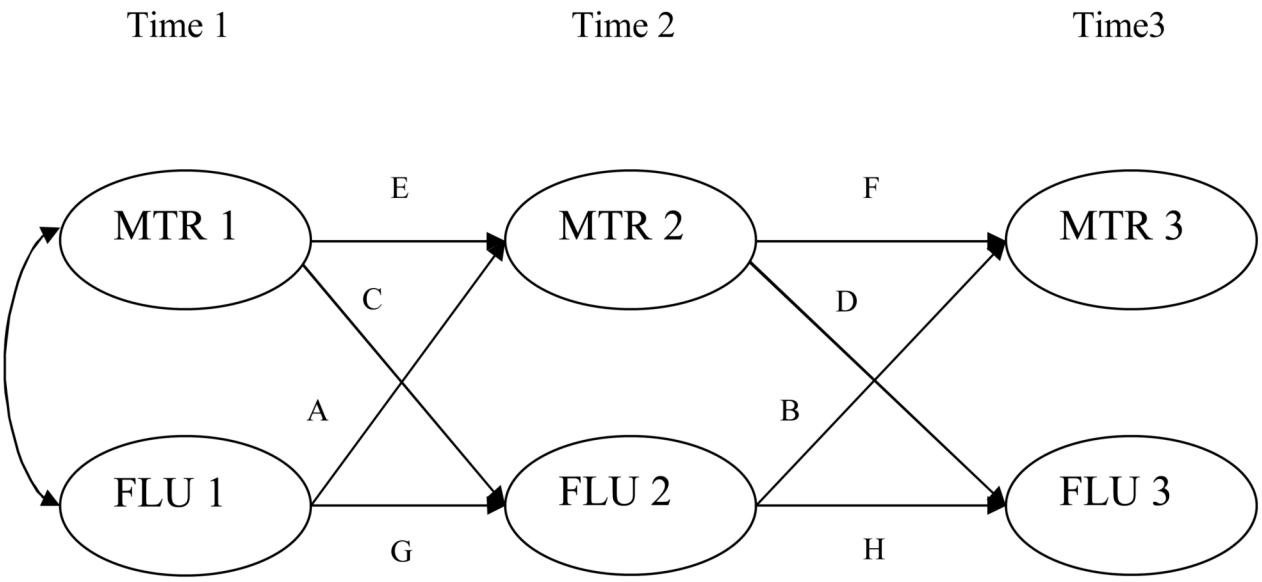

Figure 1.
Hypothesized Path Models Tested to Examine the Relationship between Reading Fluency Skill and Reading Motivation. *Note*. MTR = motivation to read variable, FLU = reading fluency skill,; numbers following variable names represent the time point of data collection; the letters next to each path should be used to identify each of the nested models; paths are labeled by letters A–H in reference to the various hypothesized models.

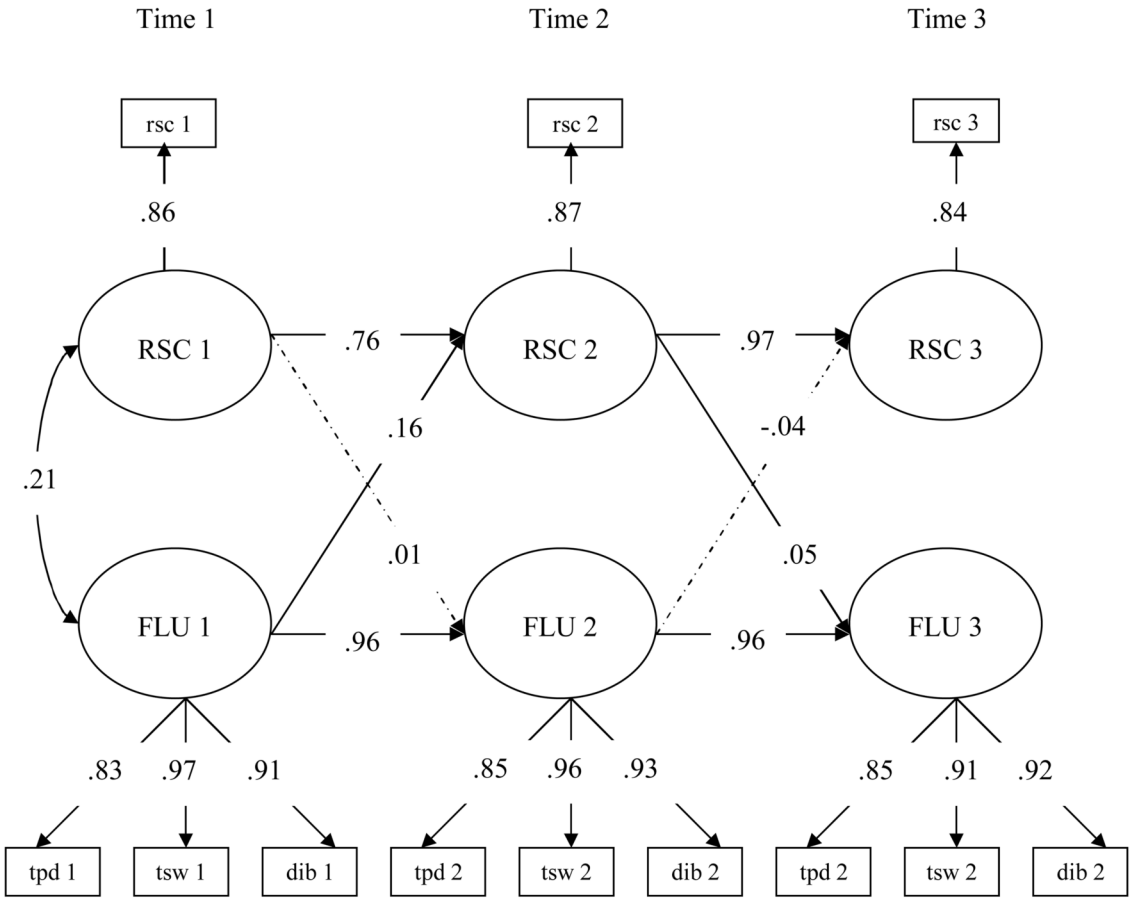

Figure 2.

The Reciprocal Effects Model: Standardized Path Weights and Parameter Estimates. *Note*. Solid lines represent significant paths; dashed lines represent nonsignificant paths. RSC = reading self-concept, FLU = reading fluency skill; numbers following variable names represent the time point of data collection; tsw = TOWRE sight word efficiency, tpd = TOWRE phonemic decoding efficiency, dib = DIBELS oral reading fluency; the correlated measurement error terms for each subscale are not included in this figure.

TABLE 1

Means, Standard Deviations, Skewness, Kurtosis, Reliabilities, Covariance, and Correlations of Reading Fluency and Motivation to Read Variables

Time	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Time 1	1. RSC	16.08	.56	.18	.11	.18	.59	.46	.16	.12	.19	.55	.41	.18	.17	22
	2. GR	8.48	14.14	.04	−.06	.06	.47	.60	.01	−.03	.05	.39	.57	.07	.04	.12
	3. TSW	8.48	1.60	143.72	.80	.88	.27	.03	.88	.80	.87	.21	−.02	.84	.79	.84
	4. TPD	4.18	−2.31	92.86	93.94	.77	.18	−.01	.76	.90	.77	.13	−.01	.71	.84	.75
	5. DIB	18.51	6.14	275.33	193.87	678.96	.27	.05	.82	.75	.88	.27	.01	.78	.74	.87
Time 2	6. RSC	9.67	7.28	13.35	7.18	29.26	16.91	.60	.24	.20	.24	.71	.39	.29	.24	.26
	7. GR	6.56	8.08	1.11	−0.42	4.20	8.78	12.69	.04	−.02	.04	.56	.70	.08	.03	.08
	8. TSW	6.89	0.50	114.75	80.07	231.24	10.78	1.52	117.47	.81	.90	.19	−.02	.89	.79	.87
	9. TPD	5.37	−1.25	106.03	96.42	214.91	8.92	−0.76	97.16	121.15	.80	.15	−.04	.76	.87	.77
	10. DIB	22.53	5.30	302.86	216.78	665.30	28.51	3.86	281.90	254.34	843.78	.24	.04	.82	.76	.91
Time 3	11. RSC	8.21	5.53	9.56	4.82	26.49	10.90	7.47	7.57	6.36	25.98	13.98	.54	.22	.18	26
	12. GR	6.04	7.89	−0.95	−0.34	0.82	5.92	9.15	−0.60	−1.52	4.14	7.49	13.63	.05	.01	.10
	13. TSW	6.98	2.67	96.50	65.99	194.54	11.27	2.58	92.26	79.67	228.29	7.97	1.78	91.43	.78	.84
	14. TPD	6.95	1.67	98.80	85.02	200.95	10.35	1.11	89.54	100.95	230.61	6.95	0.49	78.48	110.04	.77
	15. DIB	26.13	13.14	292.17	212.58	664.67	30.74	8.24	274.24	247.39	772.93	28.64	10.23	243.76	237.19	852.35
	M	28.65	22.01	48.60	21.27	65.17	28.69	21.92	54.49	24.13	89.62	28.06	20.84	58.37	28.61	99.41
	Skewness	−0.17	−0.08	−0.15	0.25	0.74	−0.23	−0.15	−0.24	−0.19	0.45	−0.06	−0.22	−0.55	0.21	0.32
	Kurtosis	−0.58	−0.89	−0.73	−0.48	0.67	−0.73	−0.57	−0.37	−0.85	−0.02	−0.60	−0.02	0.32	−0.23	0.26

Note. N = 185 after multiple imputation via EM algorithm. The covariances are located in the lower off diagonal, the correlations in the upper off diagonal, and the variances are on the main diagonal. RSC = Reading self-concept, GR = goals for reading, TSW = TOWRE sight word efficiency, TPD = TOWRE phonemic decoding efficiency, DIB = DIBELS

Table 2

Standardized Parameter Estimates, t Values, and Standard Errors for the Measurement Model of Reading Self-Concept and Reading Fluency Skill

	Estimate		
Parameter	**Time 1**	**Time 2**	**Time 3**
Factor Loadings *t*-value (SE)			
FLU---> DIBELS 16.21 (1.66)	.91* 15.91 (1.49)	.93* 16.64 (1.63)	.92*
FLU--->TOWRE SWE 15.90 (0.55)	.97* 17.59 (0.66)	.96* 17.36 (0.60)	.91*
FLU--->TOWRE PDE 14.18 (0.62)	.83* 13.77 (0.58)	.85* 14.42 (0.64)	.85*
RSC--->RSC	$.86_{nt}$	$.87_{nt}$	$.84_{nt}$
R^2 of Observed Variables			
FLU---> DIBELS	.83	.87	.85
FLU--->TOWRE SWE	.93	.92	.84
FLU--->TOWRE PDE	.68	.73	.72
RSC--->RSC	.73	.76	.71

Note. RSC = reading self-concept, FLU = reading fluency skill; SE = standard error of the standardized path loading; nt indicates that the path loading was not tested for significance since it was used for scaling;

* $p<.01$

Table 3

Correlations between Motivation to Read and Reading Fluency Skill

Variable	RSC 1	FLU 1	RSC 2	FLU 2	RSC 3	FLU 3
RSC 1	1.00					
FLU 1	**.21**	1.00				
RSC 2	.79	.32	1.00			
FLU 2	.21	.96	**.29**	1.00		
RSC 3	.76	.27	.96	.25	1.00	
FLU 3	.26	.95	.33	.97	**.29**	1.00

Note. RSC = reading self-concept, FLU = reading fluency skill, the number following each abbreviated variable represents the time point of data collection; all boldface correlations were collected at the same time; all underlined correlations were cross-lagged in the reciprocal effects model

Table 4

Standardized Parameter Estimates of the Structural Models Tested Examining the Relationship between Reading Self-Concept and Reading Fluency Skill

Model R^2	Path	Parameter Estimate	*t-value*	*SE*
Reciprocal Effects				
	RSC 1--->RSC 2	.76**	9.03	.087
	FLU 1--->RSC 2 .64	.16*	2.15	.260
	RSC 1--->FLU 2	.01	0.17	.009
	FLU 1--->FLU 2 .93	.96**	15.57	.062
	RSC 2--->RSC 3	.97**	12.20	.070
	FLU 2--->RSC 3 .93	−.04	−0.59	.220
	RSC 2--->FLU 3	.05*	1.88	. 008
	FLU 2--->FLU 3 .95	.96**	27.88	.034
Independence				
	RSC 1--->RSC 2 .64	.80**	9.65	.087
	FLU 1--->FLU 2 .93	.97**	15.71	.062
	RSC 2--->RSC 3 .93	.96**	12.90	.065
	FLU 2--->FLU 3 .95	.98**	29.07	.034

Note. RSC = reading self-concept, FLU = reading fluency skill, each abbreviated variable is followed by a number signifying the time point for that variable; R^2 values represent the amount of variance explained in a variable by the combination of all variables with a path leading to it;

* $p < .05$

** $p < .01$; paths in the partial reciprocal effects model are italicized