Published in final edited form as:

Read Writ. 2015 February ; 28(2): 239–269. doi:10.1007/s11145-014-9523-2.

Comparing Relations of Motivation, Engagement, and Achievement among Struggling and Advanced Adolescent Readers

Susan Lutz Klauda and

Department of Human Development, University of Maryland, College Park

John T. Guthrie

Department of Human Development, University of Maryland, College Park

Abstract

This longitudinal study examined the development of reading motivation, engagement, and achievement in early adolescence by comparing interrelations of these variables in struggling and advanced readers. Participants were 183 pairs of seventh grade students matched in gender, ethnicity, socioeconomic status, and school attended. They completed measures of reading motivations, engagement and comprehension for information text as well as measures of general reading comprehension and reading fluency twice during the school year. Advanced readers showed stronger relations of motivation and engagement with achievement than struggling readers. However, motivation predicted concurrent engagement and growth in engagement similarly for struggling and advanced readers. These results are interpreted as support for the hypothesis that cognitive challenges limit the relations of motivation and engagement to achievement for struggling readers. The discussion also considers the impact of the focus on the information text genre on the relations observed and implications of the findings for achievement motivation theories.

Keywords

reading motivation; reading engagement; reading comprehension; struggling readers; information text

In the literature on motivation theory, engagement is viewed as an integral construct. It was recently the centerpiece of the *Handbook of Research on Student Engagement* (Christensen, Reschly, & Wylie, 2012). While *motivation* refers to goals, values and beliefs in a given area, such as reading, *engagement* refers to behavioral displays of effort, time, and persistence in attaining desired outcomes (Guthrie, Wigfield, & You, 2012). For example, the motivation of self-efficacy (defined as belief in one's ability to succeed in a certain task; Bandura, 1997) increases effort and persistence in task performance. This persistence as an aspect of engagement increases the frequency of success and eventual achievement in a task

domain. In a synthesis of chapters on the relations of motivation, engagement and achievement, Eccles and Wang (2012) state that the preponderance of evidence confirms the linkage and probably causal relations among these constructs. In other words, motivation facilitates engagement, which in turn facilitates achievement.

In this perspective, motivations in a certain area (such as reading) are postulated to lead to increases in engagement in related tasks. Increased engagement is expected to generate gains in achievement across a variety of measures. Several authors in the engagement handbook explicitly affirm this theoretical view with empirical findings and cogent arguments (Reeve, 2012; Skinner & Pitzer, 2012), with Guthrie et al. (2012) specifically focusing on the reading engagement model. In this model, reading motivation is seen as multidimensional, with constructs based on several general motivation theories. For example, the constructs of self-efficacy, value, intrinsic motivation, and peer value are based, respectively, in social-cognitive theory (Bandura, 1997), expectancy-value theory (Eccles & Wigfield, 2002), self-determination theory (Ryan & Deci, 2000), and social motivation theory (Wentzel, 1996). Substantial correlational and causal evidence support the linkages of motivation, engagement, and achievement in the reading engagement model at the elementary and secondary school levels even when cognitive variables are statistically controlled (Baker & Wigfield, 1999; Becker, McElvany, & Kortenbruck, 2010; Guthrie et al., 2012; Retelsdorf, Koller, & Moller, 2011).

This view of the relations of motivation, engagement, and achievement in reading is assumed to operate similarly for students at all achievement levels. However, we expect that the connections of motivation and engagement to achievement may differ for struggling and advanced readers. Thus, the present study is of theoretical importance as it may suggest qualifications to current theories stipulating motivation, engagement, and achievement relations, such as the general theories of motivation cited in the preceding paragraph, based on students' achievement levels. It is of particular concern that current theories may not apply fully to struggling readers. Given the considerable proportion of young adolescents that struggle with reading – for instance, nearly a quarter of eighth graders perform below the basic level on the National Assessment of Educational Progress [National Center for Education Statistics (NCES), 2011], this is an important consideration.

One perspective regarding the potential differential relations of motivation and engagement with achievement may be termed the cognitive challenge hypothesis. Some students who struggle with reading have serious cognitive challenges that make the acquisition of reading laborious and difficult. For these students we expect that motivation may not influence reading as strongly and consistently as it does for students with fewer or no comparable cognitive challenges. In this instance we expect to observe developmental discontinuity in the connections of motivation or engagement with achievement. In other words, the model suggesting that reading motivations lead to reading engagement, which in turn facilitates reading achievement may be stronger for advanced readers, as they may possess greater capacity for change in achievement and engagement than struggling readers, whose capacity for change may be limited by cognitive challenges.

Alternatively, a motivation challenge hypothesis may be considered. It is possible that some struggling readers are low in achievement because they have unusually low motivations. These low motivations may lead to disengagement in the form of lack of effort, attention, and persistence. With such low engagement, these students may not acquire reading competencies quickly and fully. In this case, the motivations of struggling readers would show stronger and more consistent connections to engagement and achievement than for advanced readers. This alternative thus also points to developmental discontinuity for struggling and advanced readers. It is also possible that there are no differences between struggling and advanced readers in these motivational connections. In this instance, we infer that there is developmental continuity in the relations of motivation and engagement to achievement.

The current study considers specifically how the reading engagement model functions in the context of the genre of information text reading. The model may be undermined for adolescents, especially advanced readers, whose strong preferences for literature appear to lessen the value they place on reading information text in comparison to literature (Authors, 2013b; Nippold, Duthie, & Larsen, 2005). The personal salience of literature for advanced readers may be sufficiently powerful that these students read information text with regret, reluctance, resistance, and even resentment. With this disposition, these students may comprehend information text at a relatively surface level; for instance, they may not perceive complex text structures as fully or synthesize new information as deeply into their prior knowledge networks as they do with literary texts.

Key Study Constructs

The study focuses on seven dimensions of reading motivation, including four *affirming motivations*, or motivations typically associated with active participation and high achievement in reading in samples heterogeneous in reading proficiency (Authors, 2013b; Baker & Wigfield, 1999; Gottfried, 1990), and three *undermining motivations*, or motivations ordinarily associated with avoidance and low achievement in such samples (Authors, 2013b).

Each of the affirming motivations represents a major, general theory of achievement motivation that has previously been applied to the domain of reading. *Intrinsic motivation* is viewed as integral to self-determination (Ryan & Deci, 2000), and refers to inherent enjoyment and interest in reading. It is particularly connected with frequency of reading activity, as well as reading achievement (Baker & Wigfield, 1999). *Value* is a key construct in expectancy-value theory (Eccles & Wigfield, 2002) that refers to the belief that reading is important and useful for one's future (Trautwein, Lüdtke, Schnyder, & Niggli, 2006). It is particularly connected with students' academic choices, such as class selection (Wigfield & Cambria, 2010). *Self-efficacy*, integral to sociocognitive theory (Bandura, 1997), denotes one's belief in his or her ability to perform reading tasks, and is strongly related to achievement and reading activity (Baker & Wigfield, 1999). *Peer value*, drawn from research on relations between social interactions and achievement in school (Furrer & Skinner, 2003), reflects the perception that peers value one's reading practices and opinions;

the least studied of the affirming constructs, it has shown positive correlations with reading comprehension, fluency, and grades (Authors, 2013b).

The undermining motivations of devalue, perceived difficulty and peer devalue were chosen because they are reliable indicators of reasons why students avoid reading and correlated negatively with several indicators of reading achievement for middle school students in one study (Authors, 2013b). *Devalue* refers to the belief that reading is not important or useful. Devaluing studying and homework has been linked negatively with overall academic performance (GPA) and time spent studying, and positively with intent to drop out of school (Legault, Green-Demers, & Pelletier, 2006). *Perceived difficulty* refers to the sense that reading tasks are hard. It is the most extensively studied of the undermining constructs in the reading domain and appears to relate more negatively to performance for older than younger children (Chapman & Tunmer, 1995). *Peer devalue* is the perception of disrespect from peers about one's reading practices and opinions and of disregard for the general value of reading. Previous research has shown that students' negative perceptions of their peers' goals for them (such as telling them to leave school as soon as possible) relate negatively to both elementary and high school students' GPA (McInerney, Dowson, & Yeung, 2005).

The engagement construct in the present study is reading *avoidance*, which we view as an aspect of the behavioral dimension of engagement (Fredricks, Blumenfeld, & Paris, 2004) and which has shown strong associations with achievement (Legault et.al., 2006). It emphasizes student actions taken to avoid school reading activities altogether or to minimize time and effort expended on them (Meece & Miller, 2001). Lower-achieving readers indicate greater avoidance than higher-achieving readers (Lee & Zentall, 2012).

Reading achievement is represented as reading comprehension performance. In line with the construction-integration (Kintsch & Kintsch, 2005) and landscape (van den Broek, Virtue, Everson, Tzeng, & Sung, 2002) comprehension models, *reading comprehension* is construed as an active process leading to both a representation of the literal meaning of the text and a structured knowledge network comprised of links among text and background knowledge. As such, reading fluency and inferencing play critical roles in understanding text. Fluency refers to accuracy, speed, and expressiveness in reading (Kuhn & Stahl, 2003), whereas inferencing refers to formation of connections between text segments or between text and background knowledge (Hannon & Daneman, 2001).

Previous Studies Comparing the Role of Motivation by Achievement Level

A limited number of studies have compared relations between reading motivation and achievement for students at different proficiency levels, with variation in the findings. For instance, Saarnio, Oka, and Paris (1990) measured reading motivation, in accord with constructs examined in the present study, by a scale including value and intrinsic motivation items, as well as items representing expectancy for success, a construct closely related to self-efficacy. This scale positively predicted reading comprehension for fifth graders scoring above the 50th percentile on a standardized comprehension test, but not for fifth graders scoring below the 50th percentile or third graders at either comprehension level, controlling for decoding, recall, cloze performance, and strategy knowledge. Conversely, Logan,

Medford, and Hughes (2011) found that among 9- to 11- year olds, intrinsic motivation ($\beta = .61$) predicted poor (standardized comprehension score below 95) but not good (standardized comprehension score above 105) readers' sentence-level reading comprehension, controlling for verbal IQ and decoding ability. Likewise, Sideridis, Mouzaki, Simos, and Protopapas (2006) found that two intrinsic motivation dimensions, challenge and curiosity, correlated positively with poor (standardized comprehension scores below the 10th percentile) but not average/above readers' (comprehension performance above the mean) word reading efficiency in the second to fourth grades. Additionally, reading self-efficacy predicted a low-achieving group's multiple-choice comprehension, but not their constructed-response comprehension, whereas neither motivation significantly predicted a high-achieving group's performance, controlling for word reading, nonverbal ability, and listening comprehension (Solheim, 2011). Thus, the present study builds on this past research by incorporating a broader variety of motivation constructs. Most notably, the extant research has not examined the potential differential role of peer value or the focal undermining motivational constructs for lower- and higher-achieving readers.

If developmental discontinuity for concurrent associations among motivation, engagement and achievement are observed for struggling and advanced readers, it will be valuable to investigate whether developmental discontinuity also is observed for predictions of growth. Previous research showed that motivation predicts growth of engagement and achievement for elementary-aged students. Studying heterogeneous groups, Authors (2009) reported that students' internal motivation predicted growth of standardized reading test scores when background knowledge and reading strategies were controlled statistically. Additionally, a review of research on primary-grade students by Morgan and Fuchs (2007), which relied especially on well-executed experimental studies, showed that motivations such as self-efficacy predicted increases in reading achievement. In the only study known to demonstrate this in subgroups defined by reading proficiency level, Logan et al. (2011) found that intrinsic motivation predicted growth in poor readers' comprehension ($\beta = .70$), but not good readers'. Regarding engagement, Mol and Bus's (2011) literature review and meta-analysis showed that at several points across grades 1–12, reading engagement, measured as print exposure, predicted future reading comprehension and word recognition while holding previous achievement constant. In conclusion, the capacity of motivation and engagement to predict growth of achievement has been investigated mainly in heterogeneous groups and primarily involved only elementary students. This investigation addresses these issues.

Research Questions

This study investigates whether there are developmental discontinuities in the connections among motivation, engagement and achievement for struggling and advanced readers, within the context of information text reading. It addresses four questions:

1. Are levels and changes in levels of motivation and engagement similar for struggling and advanced readers?
2. Are concurrent associations among motivation, engagement, and achievement variables similar for struggling readers and advanced readers?

3. To what extent do motivation variables predict growth in engagement and achievement for struggling and advanced readers?
4. To what extent do engagement and achievement variables predict changes in motivation for struggling readers and advanced readers?

Method

Participants

This study used a subsample of the 1,205 participants from a larger project conducted during the 2008–2009 school year. One published study, Authors (2013b), includes the present participants as part of a heterogeneous sample. Whereas that study utilized data collected in April 2009, the present study utilizes data collected in both September 2008 and April 2009, which were baseline and pre-test assessments for a six-week curriculum intervention. In line with American Psychological Association guidelines (APA, 2010) the overlap in use of data between these studies is warranted, as the studies differ in theoretical purposes and analytical methods. The 2008–2009 study included all seventh-grade students attending four middle schools in a rural public school district of a mid-Atlantic state, minus 61 students whose parents withheld consent for their data to be utilized.

Struggling readers were identified by selecting all students in the larger project sample with a grade equivalent of 5.0 or below on the Gates-MacGinitie reading comprehension test (MacGinitie, MacGinitie, Maria, & Dreyer, 2000a) at the start of the school year ($n = 307$); advanced readers were identified as those with a grade equivalent of 9.0 or above ($n = 430$). From these groups, pairs of struggling and advanced readers were formed, matched in Free and Reduced Meals status (FARMs), ethnicity, gender, and school attended, so that results would not be attributable to disparities in these demographic characteristics which are frequently related to reading achievement (NCES, 2011). If multiple possible matches could be made using these criteria, students were additionally matched according to reading/language arts teacher; this occurred for 67.2% of the pairs. When there were multiple possible pairs after matching on teacher, pairs were randomly formed. In total, we were able to form 183 pairs of struggling and advanced readers using this process. Supporting the use of the Gates-MacGinitie comprehension scores to distinguish struggling and advanced readers, in the full sample performance on this test correlated .81 with state reading assessment scores from the spring of sixth grade. Due to this strong correlation and the considerable number of cases with missing data for the state assessment ($n = 128$), Gates-MacGinitie performance was the sole criteria used to determine reading level.

The demographic characteristics of the final struggling and advanced reader groups, in comparison to the complete 2008–2009 project sample, appear in Table 1. The groups were similar to the complete project sample in gender, ethnicity, FARMs status, and receipt of English as a Second Language Instruction. However, the groups differed from each other and the complete 2008–2009 sample in the receipt of special education services. Nearly a fifth of the struggling readers, compared to about 3% of the advanced readers and 11% of students in the complete sample, had Individualized Education Plans. Also, the percentage of students drawn from school A was higher for the groups of the present study than for the

complete sample, while the percentages drawn from schools C and D were somewhat lower. This difference reflects the fact that schools C and D were slightly lower-performing in reading overall, meaning there were fewer advanced readers available to pair with struggling readers. However, school A was the highest-performing school, with ample numbers of both advanced and struggling readers available to pair.

Measures

Overview—The current analyses use data obtained through one researcher-developed questionnaire concerning reading motivation and engagement and three measures of reading achievement, including one researcher-developed assessment and two standardized tests. Each measure is described briefly herein. For complete measurement details, see Authors (2012).

Reading motivation and engagement—The Motivation for Reading Information Books -School Questionnaire (MRIB-S) is a self-report measure of middle school students' motivation and engagement in reading any kind of informational non-fiction books (e.g., textbooks, trade books, reference books) for school purposes. The questionnaire directions explain that "Information books are any books you read that tell you real facts and knowledge. School reading is any reading that will help you in school. It does not have to take place in your school building. School reading can be homework reading or studying too." The questionnaire contains 56 items total, or seven for each of the seven focal motivation constructs and the single engagement construct of the current study. The affirming motivation constructs are as follows, with sample items in parentheses: *intrinsic motivation* ("I read information books for school because it's fun."), *value* ("Reading information books is more useful than most of my other activities for school."), *self-efficacy* ("I can find the main idea of a section in an information book for school."), and *peer value* ("Other students value my ideas about the information books I read for school."). The undermining motivations are *devalue* ("Reading information books for school is a waste of time."), *perceived difficulty* ("The information books I read for school are way too hard."), and *peer devalue* ("My classmates do not care about my opinion about the information books I read for school."). The negative behavioral engagement construct is *avoidance* ("I try to get out of reading information books for school.").

To examine the relationships between the pairs of affirming and undermining variables we conducted six factor analyses, one for each time point for each pair (self-efficacy/difficulty, value/devalue, peer value/peer devalue). Because we hypothesized the members of each pair to be relatively independent, we requested two factors in each case. For the constructs of self-efficacy and perceived difficulty in September, two eigenvalues larger than 1.0 appeared which accounted for 51% of variance. The first factor was self-efficacy with seven items loading higher than .58, and the second factor was perceived difficulty with seven items loading higher than .66. For these constructs in April, two eigenvalues larger than 1.0 appeared, accounting for 57% of variance. The first factor was self-efficacy with seven items loading higher than .56, and the second factor was perceived difficulty with seven items loading higher than .55. For value and devalue, items loaded at .46 or higher on the predicted factors at both times, with the exception of one double loading at one time point.

The eigenvalues representing the two factors accounted for 50% or more of variance. For peer value and peer devalue at both times, loadings equaled or exceeded .44 on the predicted factors and explained variance equaled or exceeded 43%. Due to these results, we inferred that the members of each motivation pair were relatively independent, and we retained all items for each scale.

As noted earlier, we measured the behavioral engagement construct of avoidance in accord with prior work demonstrating the importance of behavioral engagement in general and avoidance in particular as correlates of reading motivation and achievement (Legault et al., 2006). Furthermore, avoidance correlated well (-.60 to -.70) with a positive behavioral engagement measure in Authors (2013a), justifying its use here as the engagement measure.

We evaluated the reliability of each scale at each time point separately and combined for the struggling and advanced readers. As shown in Table 2, all reliabilities were at or above the minimal desirable level of .70, and most were well above this value. The reliabilities were comparable for struggling and advanced readers, with the three largest differences, favoring advanced readers, occurring for September avoidance, devalue, and peer value.

Reading achievement—The three assessments employed to tap reading comprehension-related skills varied in complexity and genre specificity. At the lowest level of comprehension, the reading fluency test of the Woodcock-Johnson III Diagnostic Reading Battery (Form B in September, Form C in April, Woodcock, Shrank, Mather, & McGrew, 2007) was employed. This test evaluates speed of reading and literal understanding at the single sentence level. Standardized scores were used in analyses. Internal consistency coefficients for each form are .90 for ages 12 and 13, and one-year test-retest correlations are .70 (McGrew, Schrank, & Woodcock, 2007; Schrank, Mather, & Woodcock, 2004). Henceforth, the construct measured by the test is referred to as *reading fluency*.

The reading comprehension subtest of the Gates-MacGinitie Reading Tests (Form S in September, Form T in December; MacGinitie et al., 2000a) was employed as a standardized measure of text passage comprehension. It was used, as described above, to select participants, as well as a focal variable of the study. Students completed either Level 5, 6, or 7/9, depending on their performance on the state reading assessment the prior spring. There are at least seven reasons for such out-of-level testing (MacGinitie, MacGinitie, Maria, & Dreyer, 2000b); most relevant to the present study, less able readers are likely to experience less frustration and do less guessing, leading to more reliable scores and more accurate determinations of the amount of growth in achievement from one test administration to the next. Extended scale scores were employed in analyses. Internal consistency coefficients for all forms and levels employed in the present study are .90 (Johnson, 2005). Henceforth, the construct measured by the test is referred to as *general reading comprehension* because it assesses comprehension of both informational and narrative text, in contrast to our other comprehension measure.

Comprehension of information text was assessed with a researcher-developed measure consisting of three 60–100 word passages at third- through fifth-grade reading levels and three 250–300 word passages at seventh-grade through college reading levels on animal and

plant survival. Each passage was followed by four or five multiple choice items, with a total of 29 items. Three alternate forms of the measure were created. To create parallel forms, we designated six passage levels from “very easy” to “very hard”. Each form included one passage at each level. We ensured that the passages at the same level across forms were highly similar in number of words, number of sentences, grammatical complexity, vocabulary load, and Flesch-Kincaid index (which considers average number of words per sentence and average number of syllables per word). Also, we created a taxonomy of nine item types and ensured that each form had an identical distribution of these types. For passages at the three lower reading levels, the item types were literal/paraphrase, word meaning in context, phrase meaning in context, and basic conceptual understanding; for passages at the three higher reading levels, the item types were main concept, subconcept, links and relations, partial synopsis, and full synopsis. Operational definitions of these item types are available from the authors. In general, the items for the shorter passages required exact or near paraphrases of text, which involved, at most, linking information in two consecutive sentences. The items for the longer passages required more complex reasoning and text analysis, involving integration of two or more consecutive or non-consecutive text propositions with each other and/or background knowledge.

The primary assessment writer (the first author) had extensive undergraduate coursework in biology and chemistry as a science major, and a former science education director for a major U.S. city school district evaluated the content validity of the measure. All test passages received the most positive rating, on a 3-point scale, for scientific validity, indicating that they were factually accurate, included interrelated concepts appropriate to the topic, and were well-organized. The science education director also classified the items using our item type taxonomy; his classifications matched ours for 90% of the items.

The alternate test forms consisted of one linking passage and five unique passages, with the forms counterbalanced so that students received different forms at each assessment point and approximately equal numbers of students received each form. Raw scores on the three forms were equated for difficulty at each time point through linear equating (Crocker & Algina, 1986). Equated percent correct scores were used in analyses because item deletions resulted in slightly uneven numbers of items per form (Livingston, 2004). Henceforth, the construct measured by this test is referred to as *information text comprehension*.

Cronbach’s alpha values for this measure were somewhat low for the struggling and advanced reader groups, but the wide range of passage difficulty and array of item types may explain this, and with the groups combined, the reliabilities were strong (see Table 2).

Procedure

The assessment battery was administered by students’ reading/language arts teachers in their usual classrooms with oversight and assistance from project personnel. It was administered twice during the 2008–2009 school year – two weeks into the year (early September) and seven weeks before the school year ended (mid-April). Testing occurred on two consecutive days, during two 45-minute periods each day. Absent students made up the tests within a week whenever possible. The teachers read aloud directions and reviewed sample items for each assessment. Then students completed each assessment silently, with strict time limits

for all but the motivation and engagement questionnaire. For the reading fluency test, which is typically administered individually, small-group administration instructions provided in the test manual were followed with extra project personnel on hand to ensure that all students understood the directions and stopped working when time was called, in line with previous work in our lab (Authors, 2008).

On the first day, students completed the information text comprehension test at the start of the first 45-minute period. There was a 40-minute allotment for administration of this test, including 5 minutes for directions and a 35-minute limit for the test itself. The motivation/engagement questionnaire (18-minute allotment) was administered at the start of the next reading/language arts period, which was either consecutive or following an intervening period. On the second day, students completed the general reading comprehension test (45-minute allotment, with 35-minute testing time limit) in the first period and the reading fluency test (10-minute allotment, with 3-minute testing time limit) at the end of the second period. Demographic data was obtained from the central office of the school district.

Results

Preliminary Analyses

First, missing data was examined. If, for a given time point, one member of a matched pair was missing scores for more than half of either the eight motivation/engagement variables or for more than one-third of the achievement variables, both members of the matched pair were excluded. With such cases removed, 168 of 183 matched pairs were available for September analyses, 167 pairs were available for April analyses, and 152 pairs were available for analyses using both September and April data. One factor in the attrition rate was the pairing of struggling and advanced readers, which, as just noted, necessitated removal of both members of the pair if one was missing significant data. Also, the participating schools had a fairly transient population, partly as they were situated near a military base. The remaining cases contained minimal missing data, which was Missing Completely at Random, based on the non-significant result of Little's (1998) chi-square test. Specifically, there were 15 missing September values (.37%) and 34 missing April values (.85%); the denominator used to determine these percentages was the number of participants multiplied by the number of motivation/engagement variables (8) plus the number of achievement variables (3). Given these low percentages, the regression analyses were conducted using mean imputation, which ensured that each member of each matched pair was included in each analysis and thus that overall comparability of the groups was maintained.

Regarding the assumption of normality, one achievement variable, general reading comprehension, was moderately skewed in each group at each time point and kurtotic at each time point for the advanced readers. Given that the skew differed in direction in September for the struggling and advanced readers and that general comprehension was measured with a widely employed test, the variable was not transformed in order to maintain the interpretability of analyses (Tabachnick & Fidell, 2007). For the motivation/engagement variables, self-efficacy was negatively skewed in both groups at both time points, and kurtotic for advanced readers in April. As the skew and kurtosis was slight to moderate

(values of -2.35 to -4.00 across groups and times), and comparability in all scales used to measure motivation was desirable for interpretation of the findings, this variable was not transformed either. Screening for outliers, multicollinearity, and singularity followed procedures of Tabachnick and Fidell (2007). No univariate outliers were identified, but based on Mahalanobis' distance values, four multivariate outliers (two struggling and two advanced readers) were identified in September and two (one struggling and one advanced reader) were identified in April. These individuals and their matches were removed before further analyses, resulting in 164 pairs available for September analyses, 165 pairs available for April analyses, and 147 pairs available for analyses involving both September and April data. The assumptions of multicollinearity and singularity were met.

Levene's tests of homogeneity of variance were conducted to ascertain whether the struggling and advanced readers differed in their variance for any of the 11 focal variables. Applying the Bonferroni-corrected alpha of .005 (.05/11 analyses), all variances except three were equal across groups (see Table 2).

Question 1

The first question, which concerned the levels of motivations for the struggling and advanced reader groups, was addressed by inspecting the means (see Table 2). The rank order of affirming motivations for struggling and advanced readers in September was identical, consisting, from strongest to weakest, of self-efficacy, value, peer value and intrinsic motivation. At time 2 in April, self-efficacy was again the highest motivation, and intrinsic motivation was again the lowest motivation for both groups. Using the criterion of 3 SEM, both groups of readers decreased from September to April in intrinsic motivation and perceived difficulty. Struggling readers increased in devalue while advanced readers decreased in value. These means reveal substantial consistency in the relative strengths of motivations and changes of motivations across time for the two groups.

Question 2

The second question regarded the similarity of concurrent relations of reading motivation, engagement, and achievement for the two groups. Most important was a multiple regression analysis with group (struggling vs. advanced readers) used as a moderator variable, which enabled us to test the degree of developmental discontinuity between groups. Initially, bivariate correlations were calculated among all variables for the struggling and advanced readers separately and combined at each time point. The correlations for the struggling and advanced groups appear in Tables 3 and 4, respectively; those for the combined group are not tabled for sake of space but are summarized herein to document that the sample was reasonably comparable to heterogeneous groups in the literature.

Across the separate and combined groups and time points, avoidance showed moderate to strong negative correlations with each affirming motivation and strong positive correlations with each undermining motivation, all significant at $p < .001$. The motivation which correlated most strongly with avoidance was devalue; the correlations ranged from .69-.84. Avoidance showed the next strongest correlations with intrinsic motivation and value (absolute values of .54 to .80), and more moderate correlations (absolute values of .27 to .

44) with the competence belief (self-efficacy and perceived difficulty) and social motivation (peer value and peer devalue) constructs. Regarding relations with the achievement variables, avoidance showed significant, negative correlations with April fluency in both the combined and advanced reader groups.

Significant correlations between the motivation and achievement variables were moderate in magnitude in the combined group, with 12 of 21 and 14 of 21 possible correlations significant in September and April, respectively. However, for struggling readers, there was only one significant correlation in September (devalue and general comprehension) and one in April (peer devalue and general comprehension). For advanced readers, there were none in September, whereas there were seven in April. Most notably, fluency correlated significantly with all motivations except value and devalue. Efficacy did not correlate with any achievement variables for struggling readers, but positively correlated with April fluency and information text comprehension for advanced readers.

To examine the relative strength of each motivation as a unique predictor of engagement and achievement, simultaneous multiple regressions were conducted. Following procedures outlined by Frazier, Tix, and Barron (2004), for each time point there were eight regressions (2 time points x 4 DVs). The dependent variables were avoidance, fluency, general comprehension, and information text comprehension. Independent variables were entered in three blocks in each analysis: Block 1 included group coded as a dummy variable (0 = struggling readers, 1 = advanced readers); Block 2 included the seven motivations (intrinsic, value, efficacy, peer value, devalue, perceived difficulty, peer devalue) and avoidance (except when avoidance was the DV), which were standardized with a mean of 0 and standard deviation of 1.

The key issue of question 2 regarding developmental discontinuity was shown by the significance of Block 3. That block included terms representing the interaction of each motivation with group, created by multiplying the codes for group by the standardized motivation scores. Finally, for all analyses which resulted in one or more significant or marginally significant interaction terms, a companion analysis was run, the only change being that the dummy codes for group were reversed (1 = struggling readers, 0 = advanced readers). This was done as the regression coefficients for variables in models with interaction terms represent conditional effects of those variables, or the effects of those variables when all variables in the model are set to 0; that is, the original models represent the effects for struggling readers, while the companion models represent the effects for advanced readers (Frazier et al., 2004). Table 5 displays the results.

To interpret the findings related to Block 3, we used the criterion of $p < .05$ for statistical significance. For the achievement dependent variables, two analyses met this criterion, consisting of general comprehension in September, $F(8, 310) = 2.09, p < .05$, and fluency in April, $F(8, 312) = 2.54, p < .05$. This denotes that the motivation variables predicted reading achievement differently for the struggling and advanced readers in these analyses. This finding confirms the suggestion that developmental discontinuity occurs for these variables.

In both analyses, devalue was the only individual motivation variable involved in an interaction with group. Specifically, for September general comprehension (devalue x group $B = 8.49, p = .05$), devalue was negatively associated with achievement for struggling readers, $\beta = -.07$, (ns), and positively for advanced readers, $\beta = .10, p = .10$. For April fluency (devalue x group $B = 6.42, p = .05$), devalue was negatively associated with achievement for struggling readers, $\beta = -.14, p = .05$, and positively for advanced readers, $\beta = .19, p = .10$. For September general comprehension, intrinsic motivation also appeared as a significant motivational predictor, only for struggling readers, $\beta = -.10, p = .05$. However, it did not significantly interact with group, indicating that it did not truly differ in its effect for advanced readers.

Regarding engagement, avoidance significantly interacted with group in predicting April fluency, $B = -7.90, p = .01$. It was positively associated with achievement for struggling readers, $\beta = .06$, (ns), and negatively associated with achievement for advanced readers, $\beta = -.36, p = .01$. For September general comprehension, avoidance was not associated with achievement for struggling readers, but was negatively associated with achievement for advanced readers, $\beta = -.13, p = .05$; however, as with intrinsic motivation, the interaction with group was not significant. The patterns here are explained in the discussion.

When avoidance was the dependent variable, there was no statistically significant interaction of group by motivation, thus indicating developmental continuity in the motivation-engagement relations. That is, the motivations were associated with engagement quite similarly for struggling and advanced readers. In line with the pattern of bivariate correlations, devalue was the strongest predictor for each of the two subgroups at each time, with standardized regression coefficients ranging from .35 (struggling readers in September) to .55 (struggling readers in April), $p = .001$ for all coefficients. Together, the seven motivations accounted for large amounts of variance in avoidance across groups and times (73–75%). This is relatively strong support for the inference of developmental continuity in the associations of motivations and engagement for the struggling and advanced readers. Although intrinsic motivation showed marginally significant interactions with group at each time point, the differences were ones of magnitude and not strong enough to drive an overall interaction between motivation and group.

Question 3

This question inquired into the degree that motivations predict growth of engagement and achievement similarly for struggling and advanced readers. A set of regression analyses very similar to those used to address Question 2 was conducted. April avoidance, fluency, general comprehension, and information text comprehension were the dependent variables. In Block 1 of each analysis, the September correspondent of each April dependent variable was entered as an autoregressor; for example, September avoidance was the autoregressor when April avoidance was the dependent variable. Block 2 included group dummy-coded (0 = struggling readers, 1 = advanced readers), and Block 3 included the standardized motivations. Block 4 included terms representing the interaction of each motivation with group. Again, for all analyses which produced one or more significant or marginally

significant interaction terms, a companion analysis was run, the only change being that the dummy codes for group were reversed.

The main result was that for all dependent variables Block 4 was not statistically significant. Bearing in mind that use of the autoregressor in Block 1 permits assessment of whether other independent variables are associated with change over time in the dependent variable, this result suggests that motivations were associated with growth of avoidance, fluency, general comprehension and information text comprehension in similar ways for struggling and advanced readers, indicating developmental continuity

Table 6 reports the standardized regression coefficients from the final model for each analysis. Motivation variables in Block 3 predicted engagement growth (i.e., decreases in avoidance) for both struggling readers, $F(7, 284) = 2.50, p = .05$ and advanced readers, $F(7, 284) = 2.50, p = .05$. The most prominent unique predictors for struggling readers were intrinsic motivation, $\beta = -.20, p = .05$, devalue, $\beta = .17, p = .10$, and perceived difficulty, $\beta = .13, p = .10$. For advanced readers, the salient variable was devalue, $\beta = .23, p = .05$. In contrast, the set of motivation variables in Block 3 did not significantly predict growth in any aspect of achievement, although some individual motivation variables were significant predictors, as denoted in Table 6.

Question 4

The final question addressed the extent that achievement and engagement predict growth of motivations similarly for struggling and advanced readers. Again, we used hierarchical regression with an autoregressor entered in Block 1. The dependent variables were each April motivation variable, while the autoregressors were the corresponding September motivation variables. Group was entered in Block 2, and Block 3 contained avoidance and the three achievement variables of fluency, general comprehension, and information text comprehension. Block 4 contained interaction terms, consisting of group crossed with each standardized engagement and achievement variable. Table 7 displays the results. Because Block 4 was not statistically significant for any motivation variable, we infer that engagement and achievement variables were associated with motivation changes quite similarly for the two groups.

For both groups, achievement plus engagement as a block predicted growth significantly ($p = .05$) for peer value and devalue, as well as marginally significantly for value and efficacy ($p = .10$) (see Table 7). More specifically, avoidance was a negative predictor of change in three motivations, intrinsic motivation, $\beta = -.17, p = .05$, value, $\beta = -.19, p = .05$, and peer value, though for the latter, the relationship was significant for struggling readers, $\beta = -.24, p = .01$, but marginally significant for advanced readers, $\beta = -.12, p = .10$. Avoidance was also a positive predictor of change in devalue, $\beta = .28, p = .01$.

Discussion

Key Findings

This study produced three main findings. First, both motivation and engagement predicted achievement more strongly for advanced readers than struggling readers. This finding

substantiates our expectation that the cognitive challenges faced by struggling readers may limit their capacity to increase their achievement as a consequence of the level of their motivation or engagement. Even though struggling readers may be actively engaged as demonstrated by putting forth effort and persistence in reading activities, their engagement does not produce increased levels of achievement as readily as for advanced readers. This supports the notion of developmental discontinuity in the connections of motivation or engagement with achievement.

This finding also complements those of Saarnio et al. (1990), who found stronger relations between a motivation composite, including intrinsic motivation, and reading comprehension for above- than below-average readers. However, it contrasts with intrinsic motivation predicting reading achievement growth for poor but not good readers in Logan et al. (2011). This discrepancy may be related to Logan et al.'s finding that advanced readers' comprehension was predicted by verbal IQ but not decoding, while struggling readers' comprehension was predicted by decoding but not verbal IQ. Because decoding was correlated with intrinsic motivation, and decoding was not included as a predictor in the growth analyses, motivation assumed some of the predictive power of decoding in predicting reading comprehension growth. This potential confounding of decoding and motivation did not appear in the present study because reading fluency (which subsumes decoding) was correlated with reading comprehension equally for struggling and advanced readers.

The differences in the strengths of the relations of engagement and achievement for the advanced and struggling readers support the interpretation of developmental discontinuity. In the analyses showing significance, for the advanced readers' lower avoidance was negatively and weakly to moderately associated with higher achievement, whereas for the struggling readers avoidance was not significantly associated with achievement, with coefficients near zero. This is consistent with the suggestion that cognitive challenges render improvements in reading proficiency particularly resistant to effort, time, and persistence in reading activities.

Why do motivation and engagement appear to be more strongly intertwined with achievement for advanced than struggling readers? One possibility is that advanced readers, due to stronger cognitive functioning, have a greater capacity for change in achievement, whereas struggling readers' capacity for such change may be limited by weaker cognitive abilities. For struggling readers, strong affirming and weak undermining motivations may increase their willingness to engage in reading tasks, as shown in greater time and attention devoted to reading, but that time and attention may not facilitate gains in achievement as effectively as for higher achievers.

A second finding is that motivations related to engagement similarly and strongly (73% of variance with prior achievement controlled) for the struggling and advanced readers. Furthermore, the most prominent motivations for each group were intrinsic motivation and devalue at both time points. Value and peer devalue were also predictive for both groups in September, and perceived difficulty was also predictive for both groups in April. In short,

the motivational associations with engagement processes were quite comparable across groups, indicating developmental continuity for these affective processes.

The third main finding was that the motivational predictions of growth in achievement and engagement did not differ for the struggling and advanced readers, showing developmental continuity on this point. Motivations did not predict achievement growth for either group, whereas they significantly increased reading engagement for both groups. Furthermore, the set of achievement variables combined with engagement predicted changes in motivations similarly for struggling and advanced readers. Specifically, achievement and engagement increased value, self-efficacy, peer value, while decreasing devalue. Such growth predictions extend prior findings (Authors, 2009; Logan, et al., 2011; Retelsdorf et. al., 2011) that motivation predicted achievement growth for the 8–11-year-old age group by showing reciprocity among the variables. This finding also supports for young adolescents the reciprocity of motivation and achievement reported for grade K-3 students (Morgan & Fuchs, 2007).

Another inference drawn from the results is that the focus on motivation for reading information text may have undermined the links in the reading engagement model. For instance, contrary to expectation, greater levels of the undermining motivation of devalue were associated with greater fluency for advanced readers in April; for struggling readers, lower devalue was associated with greater fluency, as expected. This inference, which needs further investigation, might be explained by many advanced readers privileging fiction reading, with the cost of regarding information text as not as worthwhile of their attention and efforts.

Lastly, it is notable that internal consistency reliabilities as well as the variances of the motivation and engagement measures were comparable for struggling and advanced readers. Previous studies of groups differing in reading proficiency have not reported this information, making it difficult to interpret correlations of motivation and achievement across groups.

Study Implications and Limits

This study's strongest implications concern the formulation of current general theories of achievement motivation. The findings suggest a substantial cognitive constraint on the associations among motivation, engagement and achievement stipulated in these theories (Christensen et al., 2012) and the reading engagement model in particular (Guthrie et al., 2012). That is, motivation and engagement may not facilitate achievement as readily for low-achievers as for other students. There was also some indication that the relations specified in the reading engagement model may vary according to reading genre. Future studies should examine whether the current findings of developmental discontinuity in the relations of motivation and engagement with achievement extend to other domains besides reading and to other types of reading.

Two measurement limitations are noteworthy. First, the motivation and engagement data were drawn solely from self-report measures. Future studies might include teacher ratings or researcher observations of student motivation and engagement to validate such self-reports.

Second, information text comprehension was measured with a researcher-developed measure focused on a single domain (science), although a standardized measure of general reading comprehension was also used.

Additionally, the sample was limited to seventh graders performing substantially below and above grade level in reading. Future investigations might also compare these groups with on-grade readers. Further, the inclusion of elementary students would help identify the origins of the observed developmental discontinuities.

Acknowledgments

The research described herein was supported by grant R01HD052590 from the National Institute of Child Health and Human Development awarded to John T. Guthrie.

References

- American Psychological Association. Publication Manual of the American Psychological Association. Washington, DC: APA; 2010.
- Authors. 2008
- Authors. 2009
- Authors. 2012
- Authors. 2013a
- Authors. 2013b
- Baker L, Wigfield A. Dimensions of children's motivation for reading and their relations to reading activity and reading achievement. *Reading Research Quarterly*. 1999; 34:452–477.
- Bandura, A. Self-efficacy: The exercise of control. New York: W. H. Freeman; 1997.
- Becker M, McElvany N, Kortenbruck M. Intrinsic and extrinsic reading motivation as predictors of reading literacy: A longitudinal study. *Journal of Educational Psychology*. 2010; 102:773–785.
- Chapman JW, Tunmer WE. Development of young children's reading self-concepts: An examination of emerging subcomponents and their relationship with reading achievement. *Journal of Educational Psychology*. 1995; 87:154–167.
- Christensen, SL.; Reschly, AL.; Wylie, C., editors. Handbook of research on student engagement. New York: Springer Science;
- Crocker, L.; Algina, J. Introduction to classical and modern test theory. New York: Holt, Rinehart, and Winston; 1986.
- Eccles, JS.; Wang, M. Part I commentary: So what is student engagement anyway?. In: Christenson, SL.; Reschly, AL.; Wylie, C., editors. Handbook of research on student engagement. New York: Springer Science; 2012. p. 133-145.
- Eccles JS, Wigfield A. Motivational beliefs, values, and goals. *Annual Review of Psychology*. 2002; 53:109–132.
- Frazier PA, Tix AP, Barron KE. Testing moderator and mediator effects in counseling psychology research. *Journal of Counseling Psychology*. 2004; 51:115–134.
- Fredricks JA, Blumenfeld PC, Paris AH. School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*. 2004; 74:59–109.
- Furrer C, Skinner E. Sense of relatedness as a factor in children's academic engagement and performance. *Journal of Educational Psychology*. 2003; 95:148–162.
- Gottfried AE. Academic intrinsic motivation in young elementary school children. *Journal of Educational Psychology*. 1990; 82:525–538.
- Guthrie, JT.; Wigfield, A.; You, W. Instructional contexts for engagement and achievement in reading. In: Christensen, SL.; Reschly, AL.; Wylie, C., editors. Handbook of research on student engagement. New York: Springer Science; 2012. p. 601-634.

- Hannon B, Daneman M. A new tool for measuring and understanding individual differences in the component processes of reading comprehension. *Journal of Educational Psychology*. 2001; 93:103–128.
- Johnson, KM. [Review of the Gates-MacGinitie Reading Tests, Fourth Edition, Forms S and T]. In: Spies, RA.; Plake, BS., editors. The sixteenth mental measurements yearbook [electronic version]. 2005. Retrieved from EBSCOhost Mental Measurements Yearbook database
- Kintsch, W.; Kintsch, E. Comprehension. In: Paris, SG.; Stahl, SA., editors. Children's reading comprehension and assessment. Mahwah, NJ: Erlbaum; 2005. p. 71-92.
- Kuhn MR, Stahl SA. Fluency: A review of developmental and remedial practices. *Journal of Educational Psychology*. 2003; 95:3–21.
- Lee J, Zentall SS. Reading motivational differences among groups: Reading disability (RD), attention deficit hyperactivity disorder (ADHD), RD + ADHD, and typical comparison. *Learning and Individual Differences*. 2012; 22:778–785.
- Legault L, Green-Demers I, Pelletier L. Why do high school students lack motivation in the classroom? Toward an understanding of academic amotivation and the role of social support. *Journal of Educational Psychology*. 2006; 98:567–582.
- Livingston, SA. Equating test scores (without IRT). Princeton, NJ: Educational Testing Service; 2004.
- Logan S, Medford E, Hughes. The importance of intrinsic motivation for high and low ability readers' reading comprehension performance. *Learning and Individual Differences*. 2011; 21:124–128.
- MacGinitie, WH.; MacGinitie, RK.; Maria, K.; Dreyer, LG. Gates-MacGinitie reading tests. 4th ed.. Itasca, IL: Riverside; 2000a.
- MacGinitie, WH.; MacGinitie, RK.; Maria, K.; Dreyer, LG. Gates-MacGinitie reading tests: Directions for administration. 4th ed.. Itasca, IL: Riverside; 2000b.
- McGrew, KS.; Schrank, FA.; Woodcock, RW. Woodcock-Johnson III normative update technical manual. Rolling Meadows, IL: Riverside; 2007.
- McInerney DM, Dowson M, Yeung AS. Facilitating conditions for school motivation: Construct validity and applicability. *Educational and Psychological Measurement*. 2005; 65:1046–1066.
- Meece JL, Miller SD. Longitudinal analysis of elementary school students' achievement goals in literacy activities. *Contemporary Educational Psychology*. 2001; 26:454–480. [PubMed: 11681828]
- Mol S, Bus A. To read or not to read: A meta-analysis of print exposure from infancy to early adulthood. *Psychological Bulletin*. 2011; 137:267–296. [PubMed: 21219054]
- Morgan PL, Fuchs D. Is there a bidirectional relationship between children's reading skills and reading motivation? *Exceptional Children*. 2007; 73:165–183.
- National Center for Education Statistics. The Nation's Report Card: Reading 2011 (NCES 2012–457). Department of Education, Washington, D.C: National Center for Education Statistics, Institute of Education Sciences, U.S; 2011.
- Nippold MA, Duthie JK, Larsen J. Literacy as a leisure activity: Free-time preferences of older children and young adolescents. *Language, Speech, and Hearing Services in Schools*. 2005; 36:93–102.
- Reeve, J. A self-determination theory perspective on student engagement. In: Christensen, SL.; Reschly, AL.; Wylie, C., editors. Handbook of research on student engagement. New York: Springer Science; 2012. p. 149-173.
- Retelsdorf J, Koller O, Moller J. On the effects of motivation on reading performance growth in secondary school. *Learning and Instruction*. 2011; 21:550–559.
- Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*. 2000; 55:68–78. [PubMed: 11392867]
- Saarnio, DA.; Oka, ER.; Paris, SG. Developmental predictors of children's reading comprehension. In: Carr, TH.; Levy, BA., editors. Reading and its development: Component skills approaches. San Diego, CA: Academic Press; 1990. p. 57-79.
- Schrank, FA.; Mather, N.; Woodcock, RW. Woodcock-Johnson III diagnostic reading battery comprehensive manual. Itasca, IL: Riverside; 2004.

- Sideridis G, Mouzaki A, Simos P, Protopapas A. Classification of students with reading comprehension difficulties: The roles of motivation, affect, and psychopathology. *Learning Disability Quarterly*. 2006; 29:159–180.
- Skinner, EA.; Pitzer, J. Developmental dynamics of student engagement, coping, and everyday resilience. In: Christensen, SL.; Reschly, AL.; Wylie, C., editors. *Handbook of research on student engagement*. New York: Springer Science; 2012. p. 21-45.
- Solheim OJ. The impact of reading self-efficacy and task value on reading comprehension scores in different item formats. *Reading Psychology*. 2011; 32:1–27.
- Tabachnick, BG.; Fidell, LS. *Using multivariate statistics*. 5th ed.. Boston: Allyn and Bacon; 2007.
- Trautwein U, Lüdtke O, Schnyder I, Niggli A. Predicting homework effort: Support for a domain-specific, multilevel homework model. *Journal of Educational Psychology*. 2006; 98:438–456.
- van den Broek, P.; Virtue, S.; Everson, MG.; Tzeng, YT.; Sung, Y. Comprehension and memory of science texts: Inferential processes and the construction of a mental representation. In: Otero, J.; Leon, JA.; Graesser, AC., editors. *The psychology of science text comprehension*. Mahwah, NJ: Erlbaum; 2002. p. 131-154.
- Wentzel, KR. Social goals and social relationships as motivators of school adjustment. In: Juvonen, J.; Wentzel, KR., editors. *Social motivation: Understanding children's school adjustment*. New York: Cambridge University Press; 1996. p. 226-247.
- Woodcock, RW.; Schrank, FA.; Mather, N.; McGrew, KS. *Woodcock-Johnson III Tests of Achievement, Form C/Brief Battery*. Rolling Meadows, IL: Riverside Publishing; 2007.

Table 1

Demographic Characteristics (percentages)

Variable	Struggling readers (<i>n</i> = 183)	Advanced readers (<i>n</i> = 183)	Complete sample (<i>n</i> = 1205)
Gender			
Female	46.4	46.4	49.4
Male	53.6	53.6	50.6
Ethnicity			
African American	16.4	16.4	20.3
American	0.0	0.0	0.6
Indian/Alaska			
Native			
Asian American	1.6	1.6	3.3
European	78.7	78.7	73.0
American			
Latin American/	3.3	3.3	2.7
Hispanic			
FARMS	18.6	18.6	21.8
English as a Second	0.0	0.0	0.2
Language			
instruction			
Individualized	19.7	2.7	10.7
Education Plans			
School attended			
School A	38.3	38.3	25.3
School B	24.6	24.6	25.5
School C	19.1	19.1	26.0
School D	18.0	18.0	23.2

Note. Pairs of struggling and advanced readers were formed for the present study, matched in gender, ethnicity, FARMS status and school attended. They came from the complete sample of the larger study conducted during the 2008–2009 school year.

Table 2

Means, Standard Deviations, and Internal Consistency Reliabilities (Cronbach's Alphas) for Achievement Groups Separately and Combined

	Struggling			Advanced			Combined		
	<i>M</i>	<i>SD</i>	α	<i>M</i>	<i>SD</i>	α	<i>M</i>	<i>SD</i>	α
<i>September</i>									
Affirming motivations									
Intrinsic motivation	2.33	.63	.79	2.02	.60	.86	2.18	.63	.82
Value	2.74	.64	.81	2.75	.63	.85	2.75	.63	.85
Self-efficacy	2.78	.56	.78	3.02	.56	.83	2.90	.57	.81
Peer value	2.59	.53	.72	2.66	.57	.85	2.62	.55	.78
Undermining motivations									
Devalue	2.53	.62	.74	2.55	.73	.88	2.54	.68	.85
Perceived difficulty	2.60	.62	.83	2.10	.63	.86	2.35	.67	.84
Peer devalue	2.39	.53	.70	2.24	.55	.80	2.31	.54	.74
Engagement									
Avoidance	2.68	.58	.70	2.60	.71	.80	2.64	.65	.80
Achievement									
Fluency	92.11	10.56		113.26	12.25		102.80	15.58	
General comp.	473.46	18.90		566.88	20.46		520.17	50.75	
Info. text comp.	44.55	12.40	.52	74.81	10.46	.55	59.68	19.00	.82
<i>April</i>									
Affirming motivations									
Intrinsic motivation	2.14	.64	.82	1.89	.56	.83	2.01	.61	.83
Value	2.62	.67	.85	2.55	.62	.85	2.59	.65	.85
Self-efficacy	2.77	.59	.81	3.20	.57	.86	2.99	.62	.85
Peer value	2.60	.57	.78	2.72	.60	.85	2.66	.59	.80
Undermining motivations									
Devalue	2.69	.71	.85	2.68	.71	.85	2.69	.71	.85
Perceived difficulty	2.43	.66	.84	1.83	.62	.88	2.14	.70	.89
Peer devalue	2.37	.56	.74	2.14	.61	.84	2.25	.59	.80
Engagement									

	Struggling			Advanced			Combined		
	<i>M</i>	<i>SD</i>	α	<i>M</i>	<i>SD</i>	α	<i>M</i>	<i>SD</i>	α
Avoidance	2.76	.67	.80	2.68	.70	.87	2.72	.68	.93
Achievement									
Fluency	95.23	11.79		122.55	15.30		108.80	19.31	
General comp.	486.35	31.30		570.42	26.26		527.86	51.05	
Info. text comp.	46.24	13.06	.58	75.66	10.77	.59	60.90	19.01	.84

Note. Bonferroni-corrected alpha of $p = .005$ used to evaluate differences in variance across groups. Levene's test of homogeneity of variance indicated that all variances were equal across groups except September avoidance, April fluency, and April general comprehension, $p = .005$.

Table 3

Bivariate Correlations for Struggling Readers

	1	2	3	4	5	6	7	8	9	10	11
1. Intrinsic		.71***	.43***	.48***	-.67***	-.09	-.15 [†]	-.67***	-.12	-.12	-.10
2. Value	.67***		.59***	.56***	-.69***	-.18**	-.18*	-.64***	-.02	.03	.04
3. Efficacy	.52***	.56***		.54***	-.48***	-.53***	-.26***	-.44***	-.04	.07	.10
4. Peer value	.47***	.62***	.50***		-.43***	-.29***	-.53***	-.44***	-.06	.13	-.05
5. Devalue	-.36***	-.51***	-.24**	-.24**		.27***	.34***	.82***	-.05	-.04	-.08
6. Difficulty	.00	-.01	-.18*	-.02	.35***		.39***	.35***	-.09	-.11	-.10
7. Peer Value	.07	.00	.09	-.14 [†]	.38***	.36***		.36***	-.08	-.17*	-.01
8. Avoid.	-.55***	-.54***	-.36***	-.27***	.69***	.38***	.34***		.00	.05	-.03
9. Fluency	-.09	.01	.02	.13 [†]	-.06	-.08	-.11	-.10		.35***	.18*
10. General comp.	-.06	.10	.12	.10	-.18*	-.13 [†]	-.13 [†]	-.10	.43***		.45***
11. ITC	-.03	.02	.08	.08	.01	-.01	-.06	-.08	.25***	.36***	

Note. September values appear below the diagonal; April values appear above the diagonal. ITC = Information Text Comprehension.

[†] $p < .10$;

* $p < .05$;

** $p < .01$;

*** $p < .001$.

Table 4

Bivariate Correlations for Advanced Readers

	1	2	3	4	5	6	7	8	9	10	11
1. Intrinsic		.64***	.22**	.24**	-.73***	-.15 [†]	-.09	-.75***	.18*	.07	.07
2. Value	.67***		.26***	.37***	-.73***	-.24***	-.23**	-.70***	.12	.10	.12
3. Efficacy	.26***	.35***		.37***	-.29***	-.77***	-.33***	-.29***	.20*	.10	.21**
4. Peer Value	.37***	.36***	.35***		-.37***	-.35***	-.79***	-.37***	.23**	.10	.08
5. Devalue	-.74***	-.75***	-.25***	-.38***		.31***	.33***	.84***	-.14 [†]	-.07	-.08
6. Difficulty	-.16*	-.24**	-.76***	-.33***	.25***		.39***	.36***	-.21**	-.03	-.19*
7. Peer Value	-.22**	-.22**	-.26***	-.75***	.30***	.30***		.35***	-.21**	-.11	-.08
8. Avoid.	-.80***	-.72***	-.32***	-.38***	.84***	.29***	.35***		-.26***	-.10	-.11
9. Fluency	-.07	-.07	.01	-.09	.02	-.08	-.06	-.02		.26***	.31***
10. General comp.	-.02	-.10	.08	-.01	.07	-.14 [†]	-.08	-.05	.38***		.49***
11. ITC	.01	-.11	.08	.05	.06	-.10	-.08	-.04	.19*	.50***	

Note. September values appear below the diagonal; April values appear above the diagonal. ITC = Information Text Comprehension.

[†] $p < .10$;

* $p < .05$;

** $p < .01$;

*** $p < .001$.

Table 5
Multiple Regression Analyses Predicting Concurrent Reading Engagement and Achievement

September									
	Avoidance		Fluency		General comp.		Inf. text comp.		
	SR = 0, AR = 1	SR = 0, AR = 1	SR = 0, AR = 1	SR = 0, AR = 1	SR = 0, AR = 1	SR = 0, AR = 1	SR = 0, AR = 1	SR = 0, AR = 1	
<i>IVs</i>									
Block 1: Ach level	-.09**	.09**	.61***	-.61***	.88***	-.88***	.76***	---	
<i>R</i> ²	.004	.004	.46	.46	.85	.85	.64	---	
<i>F</i>	1.28	1.28	272.19***	272.19***	1844.15***	1844.15***	570.95***	---	
<i>dfs</i>	1, 326	1, 326	1, 326	1, 326	1, 326	1, 326	1, 326	---	
Block 2:									
Intrinsic	-.31*** ^a	-.46***	-.21*	-.08	-.10*	.01	-.12 [†]	---	
Value	-.18**	-.13*	-.06	-.06	.03	-.07	-.03	---	
Devalue	.35***	.44***	.01	-.01	-.07 ^d	.10 [†]	.09	---	
Efficacy	-.04	.00	-.01	-.04	.06	-.01	.08	---	
Difficulty	.17***	.09	.00	-.10	-.01	-.07	.05	---	
Peer value.	.15*	.14*	.21* ^b	-.21*	.02	-.05	.06	---	
Peer devalue	.17***	.20***	.03 ^c	-.18*	-.02	-.05	-.03	---	
Avoidance	---	---	-.20 [†]	-.11	.01	-.13*	-.17 [†]	---	
<i>R</i> ²	.73	.73	.02	.02	.01	.01	.01	---	
<i>F</i>	127.37***	127.37***	1.26	1.26	1.55	1.55	1.62	---	
<i>dfs</i>	7, 319	7, 319	8, 318	8, 318	8, 318	8, 318	8, 318	---	
Block 3:									
Intrnxns									
<i>R</i> ²	.01	.01	.02	.02	.01	.01	.004	---	
<i>F</i>	1.28	1.27	1.79 [†]	1.79 [†]	2.09*	2.10*	.46	---	
<i>dfs</i>	7, 312	7, 312	8, 310	8, 310	8, 310	8, 310	8, 310	---	
Total <i>R</i> ²	.75	.75	.50	.50	.86	.86	.66	---	

September											
	Avoidance			Fluency			General comp.			Inf. text comp.	
	SR = 0, AR = 1	AR = 0, SR = 1		SR = 0, AR = 1	AR = 0, SR = 1		SR = 0, AR = 1	AR = 0, SR = 1		SR = 0, AR = 1	AR = 0, SR = 1
April											
<i>IVs</i>											
Block 1: Ach level	-.05 [†]	.05 [†]		.65 ^{***}	-.65 ^{***}		.78 ^{***}	-.78 ^{***}		.72 ^{***}	-.72 ^{***}
<i>R</i> ²	.004	.004		.48	.48		.66	.66		.60	.60
<i>F</i>	1.24	1.24		307.66	307.66		646.30	646.30		494.04 ^{***}	494.04 ^{***}
<i>dfs</i>	1, 328	1, 328		1, 328	1, 328		1, 328	1, 328		1, 328	1, 328
Block 2:											
Intrinsic	-.23 ^{***e}	-.40 ^{***}		-.13	.04		-.17 [*]	-.03		-.21 ^{**i}	.00
Value	-.08	-.16 ^{**}		.08	-.13		.08	.01		.07	.07
Devalue	.55 ^{***}	.42 ^{***}		-.14 [†]	.19 [†]		-.14	.03		-.12	.07
Efficacy	.11 [†]	.15 [*]		-.08	.09		-.01	.10		.08	.10
Difficulty	.21 ^{***}	.25 ^{***}		-.08	-.02		-.04	.10		-.02	-.03
Peer value	.01	.08		-.07	.11		.08	.01		-.08	-.03
Peer devalue	.07	.17 [*]		-.07	.01		-.08	-.02		.011	-.01
Avoidance	---	.054		.068 [†]	-.36 ^{***}		.16 ^{†h}	-.09		-.02	-.04
<i>R</i> ²	.75	.75		.03	.03		.01	.01		.02	.02
<i>F</i>	140.85 ^{***}	140.85 ^{***}		2.01 [*]	2.01 [*]		1.34	1.34		1.83 [†]	1.83 [†]
<i>dfs</i>	7, 321	7, 321		8, 320	8, 320		8, 320	8, 320		8, 320	8, 320
Block 3:											
Intrnxns											
<i>R</i> ²	.004	.005		.03	.03		.01	.01		.01	.01

	September							
	Avoidance		Fluency		General comp.		Inf. text comp.	
	SR = 0, AR = 1	AR = 0, SR = 1	SR = 0, AR = 1	AR = 0, SR = 1	SR = 0, AR = 1	AR = 0, SR = 1	SR = 0, AR = 1	AR = 0, SR = 1
<i>F</i>	.83	.84	2.54*	2.52*	1.60	1.60	.66	.65
<i>d</i> / <i>s</i>	7, 314	7, 314	8, 312	8, 312	8, 312	8, 312	8, 312	8, 312
Total <i>R</i> ²	.76	.76	.54	.54	.69	.69	.63	.63

Note. Values reported for each independent variable are standardized beta coefficients from the final, third model. When the dependent variable was avoidance, Block 3 included seven interaction terms: group crossed with each of the seven motivation variables entered in Block 2. When the dependent variable was fluency, general comprehension, or information text comprehension, Block 3 included eight interaction terms: group crossed with each of the seven motivation variables and one engagement variable (avoidance) entered in Block 2. Coefficients for the interaction terms (Block 3) are not reported in full, but superscripts indicate motivation/engagement variables that were involved in significant or marginally significant interactions with group. Unstandardized (*B*) coefficients for the interactions are presented here, as β coefficients for interaction terms are not properly standardized (Frazier et al., 2004).

[†]*p* .10;
**p* .05;
***p* .01;
****p* .001.
^a*B* = −.10[†];
^b*B* = −6.50***;
^c*B* = −3.19[†];
^d*B* = 8.49*;
^e*B* = −.11[†];
^f*B* = 6.42*;
^g*B* = −7.90***;
^h*B* = −12.33;
ⁱ*B* = 3.83

Table 6
Multiple Regression Analyses Predicting Growth in Reading Engagement and Achievement

	Avoidance		Fluency		General comp.		Inf. text comp.	
	SR = 0, AR = 1	AR = 0, SR = 1	SR = 0, AR = 1	AR = 0, SR = 1	SR = 0, AR = 1	AR = 0, SR = 1	SR = 0, AR = 1	AR = 0, SR = 1
<i>IVs</i>								
Block 1: Auto-regressor	.39***	.39***	.64***	.64***	.68***	.68***	.38***	---
<i>R</i> ²	.42	.42	.65	.65	.73	.73	.57	
<i>F</i>	207.72***	207.72***	545.23***	545.23***	788.88***	788.88***	388.75***	
<i>df</i> s	1, 292	1, 292	1, 292	1, 292	1, 292	1, 292	1, 292	
Block 2: Ach level	-.05	.050	.26***	-.26***	.17*	-.17*	.44***	---
<i>R</i> ²	.00	.00	.04	.04	.003	.003	.08	
<i>F</i>	.00	.00	36.44***	36.44***	3.25 [†]	3.25 [†]	65.16***	
<i>df</i> s	1, 291	1, 291	1, 291	1, 291	1, 291	1, 291	1, 291	
Block 3:								
Intrinsic	-.20*	-.11	-.04 ^b	.15*	-.11 ^{†d}	.10	-.01	---
Value	-.13	.07	.00 ^c	-.24***	-.11	-.05	-.09	---
Devalue	.17 [†]	.23*	-.05	-.07	-.12 ^{*e}	.04	.04	---
Efficacy	.11 ^a	-.13	.02	.11	.03	.00	-.01	---
Difficulty	.13 [†]	-.07	-.01	.04	-.05	.03	-.01	---
Peer value	-.02	.07	.00	.09	.14*	.01	.07	---
Peer devalue	-.08	.02	.02	-.04	.04	.00	-.06	---
<i>R</i> ²	.03	.03	.01	.01	.01	.01	.01	
<i>F</i>	2.50*	2.50*	1.90 [†]	1.90 [†]	.72	.72	.95	
<i>df</i> s	7, 284	7, 284	7, 284	7, 284	7, 284	7, 284	7, 284	
Block 4: Intrnxns								
<i>R</i> ²	.01	.01	.01	.01	.01	.01	.01	
<i>F</i>	1.02	1.04	1.41	1.42	1.61	1.62	.70	---
<i>df</i> s	7, 277	7, 277	7, 277	7, 277	7, 277	7, 277	7, 277	---

	Avoidance		Fluency		General comp.		Inf. text comp.	
	SR = 0, AR = 1	AR = 0, SR = 1	SR = 0, AR = 1	AR = 0, SR = 1	SR = 0, AR = 1	AR = 0, SR = 1	SR = 0, AR = 1	AR = 0, SR = 1
Total R^2	.46	.46	.71	.71	.75	.75	.66	---

Note. September variables are the independent variables; April variables are the dependent variables. Values reported for each independent variable are standardized beta coefficients in final model. Block 4 included seven interaction terms: group crossed with each of the seven motivation variables entered in Block 3. Coefficients for the interaction terms (Block 4) are not reported in full, but superscripts indicate motivation/engagement variables that were involved in significant or marginally significant interactions with achievement level. Unstandardized (B) coefficients for the interactions are presented here, as β coefficients for interaction terms are not properly standardized (Frazier et al., 2004).

[†] p .10;
* p .05;
** p .01;
*** p .001.
^a $B = -.16^{\dagger}$;
^b $B = 3.53^{\dagger}$;
^c $B = -4.50$;
^d $B = 10.64^*$;
^e $B = 8.14^{\dagger}$

Table 7

Multiple Regression Analyses Predicting Growth in Reading Motivations

	Intrinsic		Value		Efficacy		Peer value	
	SR = 0, AR = 1	AR = 0, SR = 1	SR = 0, AR = 1	AR = 0, SR = 1	SR = 0, AR = 1	AR = 0, SR = 1	SR = 0, AR = 1	AR = 0, SR = 1
<i>IVs</i>								
Block 1: Auto-regressor	.50***	---	.47**	---	.43***	---	.46***	.46***
<i>R</i> ²	.37	---	.31	---	.27	---	.25	.25
<i>F</i>	168.06***	---	131.40***	---	106.01***	---	99.18***	99.18***
<i>df/s</i>	1, 292	---	1, 292	---	1, 292	---	1, 292	1, 292
Block 2: Ach level	.02	---	.00	---	-.06	---	.24 [†]	-.25 [†]
<i>R</i> ²	.003	---	.01	---	.05	---	.01	.01
<i>F</i>	1.36	---	2.54	---	22.82***	---	1.96	1.96
<i>df/s</i>	1, 291	---	1, 291	---	1, 291	---	1, 291	1, 291
Block 3:								
Avoidance	-.17*	---	-.19*	---	-.10	---	-.24**	-.12 [†]
WJ Fluency	-.12	---	-.09	---	-.05	---	-.19 ^b	.12
General comp.	-.09	---	-.03	---	.36 [†]	---	-.07	-.36 [†]
Information text comp.	.03	---	.12	---	.07	---	-.05	.15
<i>R</i> ²	.01	---	.02	---	.02	---	.03	.03
<i>F</i>	1.20	---	2.31 [†]	---	2.23 [†]	---	2.66*	2.66*
<i>df/s</i>	4, 287	---	4, 287	---	4, 287	---	4, 287	4, 287
Block 4: Intrnxns								
<i>R</i> ²	.003	---	.01	---	.01	---	.02	.02
<i>F</i>	.40	---	.52	---	.52	---	1.63	1.51
<i>df/s</i>	4, 283	---	4, 283	---	4, 283	---	4, 283	4, 283
Total <i>R</i> ²	.38	---	.34	---	.35	---	.30	---

Devalue Perceived difficulty Peer devalue

SR = 0, AR = 0, SR = 0, AR = 0, SR = 0, AR = 0,

	Intrinsic		Value		Efficacy		Peer value	
	SR = 0, AR = 1	AR = 0, SR = 1	SR = 0, AR = 1	AR = 0, SR = 1	SR = 0, AR = 1	AR = 0, SR = 1	SR = 0, AR = 1	AR = 0, SR = 1
	AR = 1	SR = 1	SR = 1	AR = 1	SR = 1	AR = 1	SR = 1	AR = 1
IVs								
Block 1: Auto-regressor			.39***	---	.51***	.51***	.44***	---
R ²			.31	---	.41	.41	.23	---
F			133.36***	---	202.41***	202.41***	84.85***	---
dfs			1, 292		1, 292	1, 292	1, 292	
Block 2: Ach level			.03	---	-.08	.08	-.23 [†]	---
R ²			.00	---	.05	.05	.02	---
F			.00	---	24.31***	24.31***	5.89*	---
dfs			1, 292		1, 291	1, 291	1, 291	
Block 3:								
Avoidance			.28**	---	.13 [†]	.08	.07	---
WJ Fluency			.04	---	.07	-.10	.02	---
General comp.			.04	---	-.32 ^{†a}	.12	.06	---
Information text comp.			-.15	---	.05	-.19	.04	---
R ²			.04	---	.01	.01	.01	---
F			4.08**	---	1.71	1.71	1.11	---
dfs			4, 287		4, 287	4, 287	4, 287	
Block 4: Intrnxns								
R ²			.003	---	.01	.01	.01	---
F			.30	---	1.12	1.26	1.02	---
dfs			4, 283		4, 283	4, 283	4, 283	
Total R ²			.35	---	.48	.48	.26	---

Note. September variables are the independent variables; April variables are the dependent variables. Values reported for each independent variable are standardized beta coefficients in final model. Block 4 included four interaction terms: group crossed with avoidance and each of the three motivation variables entered in Block 3. Coefficients for the interaction terms (Block 4) are not reported in full, but superscripts indicate achievement variables involved in significant or marginally significant interactions with achievement level. Unstandardized (*B*) coefficients for the interactions are presented here, as β coefficients for interaction terms are not properly standardized (Frazier et al., 2004).

$\hat{p}$.10;
*
 p .05;
**
 p .01;

 p .001.
 $a_B = .31^{\hat{p}}$;
 $b_B = .20^*$