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Third grade and concurrent predictors of engagement and achievement in reading in eighth grade

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ABSTRACT

Theoretical models of learning highlight the role of engagement. The current investigation assessed the role of self-concept, locus of control, internalizing and externalizing behavior problems, and self-perceived interest and competence in reading in reading achievement. Using data from the Early Childhood Longitudinal Study-Kindergarten Class (ECLS-K), longitudinal (third grade) predictors of eighth grade reading achievement and motivation, and concurrent predictors of eighth grade reading achievement were analyzed. Regression modeling revealed that self-perceived interest and competence in reading, behavior problems, self-concept, and locus of control were weak predictors of reading achievement, both longitudinally and concurrently. Socioeconomic status and third grade reading achievement were the strongest predictors of eighth grade reading achievement. These findings highlight the importance of early intervention for reading deficits, especially for children of low socioeconomic status.

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Reading engagement; motivation; behavior problems; self-concept; locus of control


It is important to ascertain predictors of reading mastery in adolescence. Stanovich (1986) suggested that there is a 'Matthew effect' in reading acquisition, whereby children who are successful readers in the early grades continue to achieve reading success, and children who exhibit difficulty early in the reading process fall further and further behind their peers. This finding has been replicated by a number of investigators. For example, Spira, Bracken, and Fischel (2005) assessed the progress of children of low socioeconomic status who were found to be poor readers in first grade, and by second grade the differences between children who would improve and those who would remain poor readers were established. Torgesen (2004) characterized the typical pattern of the negative impact of early reading difficulty as follows. First, kindergarten children exhibit deficits in phonemic awareness and phonics, which results in difficulty with decoding. This leads to negative perceptions of their ability to read independently, and decreased interest in reading and motivation to read. Engaging in less reading adversely impacts the development of fluent reading, as words become sight-words only with repeated practice. The decreased practice also limits the learning of new vocabulary, which is essential for comprehension.

Positive outcomes have been established for children who receive early intervention for reading difficulties (Partanen & Siegel, 2014; Torgesen, 2004). Thus, the

investigation of early elementary school predictors of reading achievement in eighth grade has significant implications for designing reading instruction to facilitate better outcomes for all learners, particularly those who exhibit difficulty learning to read. Motivation and engagement have been posited to contribute to academic achievement. Knowledge of the relation between engagement and reading achievement has both theoretical and practical implications.

The self-System model of motivational development

Skinner, Furrer, Marchand, and Kindermann (2008) described the self-system model of motivational development (SSMMD) to detail the processes contributing to two types of engagement, *behavioral engagement* and *emotional engagement*. *Behavioral engagement* includes good conduct, effort in learning, and involvement in extra-curricular activities. *Emotional engagement* includes interest in and attitudes toward school. Fredricks, Blumenfeld, and Paris (2004) described these same two types of engagement, and included a third, *cognitive engagement*, which focuses on investment in learning that goes beyond behavioral engagement and includes regulating one's own behaviors, using strategies, and going above and beyond requirements. Three self-system processes that facilitate

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engagement are competence, autonomy, and relatedness. *Competence* refers to perceptions of effectiveness. *Autonomy* refers to the ability to express preferences. *Relatedness* refers to feelings of belonging. All three self-system processes significantly predicted increases in both behavioral and emotional engagement, with autonomy emerging as the strongest predictor (Skinner et al., 2008).

Green et al. (2012) analyzed the relations among the components of the SSMMMD. Their investigation included four components: *context*, *self*, *engagement*, and *outcome*. *Context* in their model was 'high school.' *Self* included academic motivation and self-concept. *Engagement* included both emotional and behavioral engagement. *Outcome* referred to scores on a standardized achievement test. They found that academic motivation and self-concept predicted engagement, which predicted test scores.

Competence and reading achievement

Theoretical models of learning, including the Model of Domain Learning (MDL; Alexander, 1997, 2003) and the engagement model of reading (Guthrie & Wigfield, 2000) suggest that learner interest is an important factor in learning. The MDL suggests that three key constructs are necessary for becoming an expert in an academic domain: knowledge, strategic processing, and interest. This model suggests that interest in a given domain (e.g., reading) is associated with knowledge and strategic processing. Although students in elementary and secondary education programs are not yet at the proficiency/expertise stage, individual interest does play a key role in learning in these students.

Similarly, the engagement model of reading comprehension suggests that engaged readers have strong internal motivation and effectively use reading comprehension strategies, whereas readers with lower engagement have decreased motivation and use of strategies (Guthrie & Wigfield, 2000). This model suggests that reading interventions need to increase engagement in reading in order to facilitate improved reading comprehension.

Relations have been found between reading motivation and achievement, especially during the elementary school years (De Naeghel & Van Keer, 2012; Guay, Marsh, & Boivin, 2003; Guthrie et al., 2007; Kirby, Ball, Geier, Parrila, & Wade-Wooley, 2011; Onatsu-Arviolommi & Nurmi, 2000). Kirby et al. (2011) found that reading interest had weak and inconsistent effects on reading ability in first through third grades, accounting for, at most, 4% of unique variance in reading ability after controlling for SES, cognition, phonological awareness, and naming speed. The authors suggested that the effects of reading interest may take time to impact reading ability, and that the consequences of low interest in reading may not be apparent until later grades. Indeed,

reciprocal relations between academic self-concept and academic achievement have been revealed in secondary school students (McInerney, Cheng, Mok, & Lam, 2012). Interest in schooling and self-efficacy have been found to predict academic achievement in 12–15-year-olds (Adeyinka, Adedeji, & Olufemi, 2011), and a stronger relation between self-perception of competence and achievement is evident at age 12 than at age 8) Smith, Smith, Gilmore, & Jameson, 2012) Schiefele, Schaffner, Moller, and Wigfield's (2012) noted that a need remains for studies with a substantial time lag between measures in order to characterize these relations.

Relatedness and reading achievement

Children with lower relatedness may demonstrate internalizing or externalizing behavior problems. Prior research has identified links between behavior problems and motivation. Bulotsky-Shearer, Fernandez, Dominguez, and Rouse (2011) investigated relations among behavior problems and early academic achievement in four-year-old children in Head Start classrooms. They revealed that behavior problems in structured learning significantly predicted decreased motivation and reading achievement, and behavior problems in peer interactions significantly predicted lower attitude toward learning. Sideridis, Mouzaki, Simos, and Protopapas's (2006) investigation of fourth-graders revealed two profiles of students with reading comprehension deficits. Half of the students with reading comprehension deficits exhibited low motivation and high depression, anxiety, and negative affect; this group of students was termed the 'helpless' cluster. The other half of the students with reading deficits displayed high motivation, despite low achievement, and did not display elevated levels of depression. Sideridis et al. (2006) highlighted the importance of investigation into these constructs beyond the fourth grade.

Individuals with reading deficits have been found to exhibit more internalizing (Ackerman, Izard, Kobak, Brown, & Smith, 2007; Morgan, Farkas, Tufis, & Sperling, 2008; Undheim, Wichstrøm, & Sund, 2011; Willcutt & Pennington, 2000) and externalizing behavior problems (Undheim et al., 2011; Willcutt & Pennington, 2000) than children with typical reading achievement. Assessment of the contribution of internalizing and externalizing behavior problems to reading achievement could have implications for classroom instruction and identification of children who may be at risk for difficulty with reading.

Autonomy and reading achievement

Jang, Reeve, and Deci (2010) found that autonomy support and structure predicted behavioral engagement in high school students, and autonomy support predicted student's self-perceived engagement.

Similarly, Stroel, Opdenakker, and Minnaert (2013) reviewed a number of studies and found that student perceptions of autonomy support related positively with motivation and engagement. *Locus of control* refers to an individual's beliefs about whether or not his or her own efforts can impact outcomes. This relates to autonomy, given that individuals with greater autonomy may feel as though they have more control over outcomes. Adeyinka et al. (2011) highlighted the importance of locus of control as a predictor of academic success, suggesting that children who achieve greater success in school are more likely to use locus of control to improve performance.

Socioeconomic status and reading achievement

Children from low socioeconomic status (SES) tend to develop academic skills, including language and reading skills, more slowly than their higher SES peers (Aikens & Barbarin, 2008; Crowe, Connor, & Petscher, 2009; Morgan, Farkas, Hillemeier, & Maczuga, 2009). For these reasons, the American Psychological Association (APA) advocates for controlling for SES in studies involving academic achievement (APA, n.d.).

Current investigation

The current study investigated the relations among engagement and reading achievement within the framework of the SSMD and addressed the following research questions: (1) Does reading achievement, self-perceived interest and competence in reading, and behavior problems in third grade predict reading achievement in eighth grade? (2) Does reading achievement, self-perceived interest and competence in reading, and behavior problems in third grade predict self-perceived interest and competence in reading in eighth grade? (3) Does self-perceived reading interest and competence, internalizing behavior problems, locus of control, and self-concept in eighth grade predict concurrent reading achievement?

Hypotheses

Third grade reading achievement and self-perceptions of interest and competence in reading were predicted to have a positive association with eighth grade reading achievement and self-perceptions of reading interest and competence, whereas third grade internalizing and externalizing behavior problems were predicted to have a negative relation with eighth grade reading achievement, and interest and competence in reading.

Concurrent self-perceived interest and competence in reading, locus of control and self-concept were expected to have a positive association with eighth grade reading achievement. Concurrent internalizing

behavior problems were predicted to have a negative association with eighth grade reading achievement.

The extent to which reading achievement and self-perceived interest and competence are related has significant implications for reading education. Knowledge of factors that predict eighth grade reading achievement is important for guiding instructional practices. A strong link between self-perceptions of interest and competence in reading and reading achievement would suggest a need for educators to employ practices which specifically impact interest and self-perception of competence, such as using child-directed approaches, rather than teacher-directed approaches, as discussed by Lerkkanen et al. (2012). Additionally, if interest and self-perceptions of competence are strongly associated with achievement, ascertaining predictors of these aspects of motivation are relevant for designing instruction that will keep students motivated to read and feel competent in their reading ability. If general self-concept and locus of control are related to reading achievement, schools might allocate resources toward the development of programs designed to facilitate positive feelings about oneself and one's control over life. Educators might also explore ways to provide students with more autonomy. If behavior problems are a strong predictor of reading achievement, this could help teachers identify children who are at risk for having difficulty learning to read, and may suggest that improving behavior could facilitate improved reading outcomes.

Methods/Procedures/Materials

Data for the proposed investigation were obtained from the Early Childhood Longitudinal Study-Kindergarten Class (ECLS-K), a publicly available extant dataset. All of the variables used in this study were taken directly from this dataset. Developed under the sponsorship of the U.S. Department of Education, Institute of Educational Sciences, and National Center for Education Statistics, the ECLS-K assessed the educational, socioemotional, and physical development of a nationally representative sample of children enrolled in kindergarten during the 1998–1999 school year. Children were recruited from all regions of the United States, and from rural areas, small towns, large towns, mid-sized cities and their urban fringes, and large cities and their urban fringes. Children from public, parochial, and nonreligious private schools were included (Tourangeau et al., 2004, 2009). The children were assessed in the fall and spring of kindergarten (age 5) and first grade (age 6), and in the spring of third (age 8), fifth (age 10), and eighth (age 13) grades. The proposed investigation used data from the third grade (Wave 5) and eighth grade (Wave 7) assessments. More specific information about the

assessments can be found here: <https://nces.ed.gov/ecls/kinderinstruments.asp>.

In eighth grade, 11,929 children participated in the study. In the current investigation, the number of participants ranged from 7911 to 8351, depending on the variables used in the models, due to missing observations in this longitudinal data set. The racial/ethnic backgrounds of the children in the full eighth grade sample were 57% white, 11% black, 19% Hispanic, 7% Asian, 1% pacific islander, 2% native American, 2% more than one race, and less than 1% unknown (Tourangeau et al., 2009). The racial/ethnic composition of the United States is 61.6% white, 17.6% Hispanic, 13.3% black, 5.6% Asian, 1.2% native american or pacific islander (retrieved from <https://www.census.gov/quickfacts/table/PST045216/00>).

The data weights included with the ECLS-K data were used to adjust for selection bias in the sample. The use of traditional descriptive and inferential methods will often underestimate standard errors and can give biased estimates of population parameters. Therefore, the SURVEYMEANS and SURVEYREG procedures in SAS were used to account for clustering, stratification, and the multi-stage sampling scheme of the ECLS-K, giving more appropriate and accurate results.

A continuous socioeconomic status (SES) measure that was included in the dataset was used to control for SES. Components used to create this variable were mother's and father's education and occupation and household income.

Third grade data collection (Age 8 years)

Reading

Reading t-scores, obtained via direct testing, were used as indices of reading achievement. T-scores were used instead of criterion-referenced item response theory (IRT) scores in the current investigation, due to severe left-skewness of the IRT scores, which affected the regression analysis such that assumptions were not met when using IRT scores, even after transformation. T-scores have a mean of 50 and a standard deviation of 10. These were included in the dataset. The internal consistency coefficient was .94 for the third grade reading assessment (Najarian, Pollack, & Sorongon, 2009).

The measure was designed based on the National Assessment of Educational Progress content and process framework, which defined four types of reading comprehension skills (as cited in Najarian et al., 2009). *Initial understanding* refers to readers' ability to understand the text as a whole. *Developing interpretation* necessitates a deeper understanding of the text, and includes linking information from different parts of the text and understanding vocabulary words. *Personal reflection and response* involves linking textual information with prior knowledge and

experiences. *Demonstrating a critical stance* includes the ability to evaluate a text for quality, appropriateness, and style, and to make connections across multiple texts. The third grade reading measure focused on sight words, comprehension of words in context, literal inference, and evaluation, which was defined as knowledge of the author's craft and connections between narratives and real life situations.

The reading passages and multiple-choice questions were administered in a booklet, allowing the children to refer to the passages when answering the questions. The children read the passages to themselves. Trained examiners read the questions to the children, but the children read the response options themselves (Tourangeau et al., 2004). A 15-item routing test was administered. The 25% of the students correctly answering 0–8 questions were routed to the 24-item low second-stage form. The 56% of the students who correctly answered 9–12 questions were routed to the 39-item middle second-stage form. The 42-item high second-stage form was administered to the 19% of the students correctly answering 12–15 questions on the routing test. These cut-points were based on data from the 3-parameter (discrimination, difficulty, and guessability) IRT model from the field testing (Pollack, Atkins-Burnett, Rock, & Weiss, 2005).

Self-Description questionnaire

Students completed an individually-administered Self-Description Questionnaire (SDQ; Marsh, 1992a) in third grade, which included measures of interest and competence in reading and internalizing and externalizing behavior problems. Trained examiners read the SDQ questions aloud and gave the children a few seconds to record their responses in order to avoid reading ability impacting the responses. The examiners did not look at the children's answers as they were recording them, in order to decrease the likelihood that the children's responses were influenced by an attempt to please the examiner. Each child completed the SDQ in approximately five minutes (Tourangeau et al., 2004).

Self-perceived interest/competence in reading. The self-perceived interest and competence in reading subscale of the SDQ consisted of eight statements, which the child rated as 'not at all true,' 'a little bit true,' 'mostly true,' or 'very true.' The internal consistency coefficient was .87 (Tourangeau et al., 2004). This scale measures Skinner et al.'s (2008) concept of *competence*, which facilitates emotional engagement.

Internalizing behavior problems. The internalizing behavior subscale consisted of seven items and was developed specifically for the ECLS-K and used the same rating scale as the interest and competence in reading scale. The internalizing behavior problems subscale consisted of eight items assessing sadness and

loneliness, and had a weighted mean of 2.22 and a standard deviation of .74. The internal consistency coefficient was .81 (Tourangeau et al., 2004). This measure was selected to reflect *relatedness*, which facilitates both behavioral and emotional engagement (Skinner et al., 2008). A low score on this measure suggests higher relatedness.

Externalizing behavior problems. The seven-item externalizing behavior problems subscale was developed specifically for the ECLS-K and used the same rating scale as those described above to assess self-perceptions of anger and acting-out behaviors. It consisted of six items, and had a weighted mean of 2.02 and a standard deviation of .71. The internal consistency coefficient for externalizing behavior problems was .77 (Tourangeau et al., 2004). This measure was predicted to inversely relate to behavioral engagement.

Eighth grade data collection (Age 13 years)

Reading

In eighth grade, the reading assessment was administered via paper and pencil in a proctored group setting. Students were given forty minutes to complete the test, which focused on comprehension of words in context, evaluation, evaluating nonfiction, and evaluating complex syntax. Extensive field testing was conducted prior to finalizing the measure. Item discrimination, distractor analysis, alpha coefficients, item characteristic curves, and differential functioning for subgroups were analyzed (Najarian et al., 2009). Children were routed to different difficulty levels based on a routing test consisting of 10 items. The 37% of the students who correctly answered 0–5 questions on the routing test completed the lower second-stage reading measure, which was comprised of 19 total questions about two passages. The 63% of the students who correctly answered 6–10 questions on the routing test completed the higher second-stage reading measure, which was comprised of 21 total questions about four passages. These cut-points were determined by the three-parameter IRT model used in the field-test. As noted above, t-scores were used due to the skewness of the IRT scores. These norm-referenced scores have a mean of 50 and a standard deviation of 10 (Tourangeau et al., 2009). The internal consistency coefficient of IRT scores was .87 for the eighth grade reading assessment (Najarian et al., 2009).

Self-Description questionnaire

In eighth grade, the SDQ (Marsh, 1992b) included scales measuring interest and competence in reading and internalizing behavior problems. The eighth grade SDQ did not include a measure of externalizing behavior problems, which had been assessed in third grade.

Self-perceived interest/competence in reading. As in third grade, the self-perceived interest and competence in reading subscale in eighth grade consisted of four statements, which the child rated as ‘not at all true,’ ‘a little bit true,’ ‘mostly true,’ or ‘very true.’ These questions were adapted from Marsh’s SDQ II (1992b). Eighth grade self-perceived interest and competence in reading had a weighted mean of 2.52 and a standard deviation of .78. The internal consistency coefficient was .76 (Najarian et al., 2009).

Internalizing behavior problems. The internalizing behavior subscale used the same rating scale as the interest and competence in reading scale. The items from the third- and fifth-grade ECLS-K internalizing problems scale were used, based on recommendations from the content review panel for the ECLS-K. It consisted of eight items and had a weighted mean of 2.03 and a standard deviation of .57 (Najarian et al., 2009). The internal consistency coefficient was .75.

National education longitudinal study of 1988 (NELS:88) measure

In eighth grade, the student questionnaire included two scales from the NELS:88: *self-concept* and *locus of control*. These scales were not administered in third grade. The children were given statements to which they indicated whether they ‘strongly agree,’ ‘agree,’ ‘disagree,’ or ‘strongly disagree.’ This scale was standardized to a mean of zero with a standard deviation of one (Tourangeau et al., 2009). Some of the items were reverse scored prior to performing computations, so that higher scores would indicate higher self-concept or locus of control (Tourangeau et al., 2009).

Self-concept. The self-concept subscale consisted of seven items, for example, *I feel I do not have much to be proud of*. The internal consistency coefficient was .81 (Najarian et al., 2009). This measure corresponds to Green et al.’s (2012) construct of *self*, which was found to predict engagement.

Locus of control. The locus of control scale consisted of five items, for example, *In my life, good luck is more important than hard work for success*. The internal consistency coefficient was .75 (Najarian et al., 2009). This scale was selected as an index of *autonomy*, which contributes to emotional engagement (Skinner et al., 2008).

Analyses

The first regression model seeks to predict reading achievement in eighth grade using reading achievement, self-perceived interest and competence in reading, and internalizing and externalizing behavior problems in third grade. To control for SES, a

continuous measure of SES (circa third grade) was entered in the first block. In the second block, all but one of the third grade predictors were added. In the third block, the remaining predictor was added to the model to gauge contribution to explained variability. In the second regression model, a similar technique was used to predict self-perceived interest and competence in reading in eighth grade using the same third grade predictors. In the third regression model, self-perceived reading interest and competence, internalizing behavior problems, locus of control, and self-concept in eighth grade were used to predict concurrent reading achievement. A continuous measure of eighth grade SES was entered in the first block, followed by all but one of the eighth grade predictors, and finally the remaining predictor.

This project was approved by the Human Research Review Committee at the Grand Valley State University (381187-2).

Results

Tables 1 and 2 display the descriptive statistics for the variables entered into the regression models. Interpretations of effect size (small, medium, or large), are based on Cohen (1992).

In the first regression model, third grade reading achievement and self-perceptions of interest and competence in reading were predicted to have a positive association with eighth grade reading achievement whereas third grade internalizing and externalizing behavior problems were predicted to have a negative relation with eighth grade reading achievement. Figure 1 shows scatterplots of eighth grade reading achievement vs. the predictor variables. Predicted relationships hold true, albeit weakly for interest/competence in reading, internalizing and externalizing behavior problems. All of the third grade variables were significant

predictors of eighth grade reading achievement except for interest/competence in reading (see Table 3). Taken together, the predictors accounted for 59% of the variance in eighth grade reading achievement which constitutes a large effect ($f^2 = 1.44$). As the solitary predictor in the first block, SES explained 27% of the variance, which is a large effect ($f^2 = 0.37$). Third grade reading T scores had the greatest impact on the prediction of eighth grade reading achievement, adding 25% of the explained variance when it was added to the model (see Table 4), also a medium to large effect ($f^2 = 0.33$). Third grade self-perceptions of interest/competence in reading, internalizing behavior problems, and externalizing behavior problems contributed very small amounts of variance to the model.

In the second regression model, third grade reading achievement and self-perceptions of interest and competence in reading were predicted to have a positive association with eighth grade reading interest/competence, whereas third grade internalizing and externalizing behavior problems were predicted to have a negative relation with eighth grade reading interest/competence. Figure 2 displays these relations, which appear weak. However, all of the third grade variables were significant predictors of eighth grade reading achievement except for internalizing behavior problems (see Table 5). Taken together, the predictors accounted for 14.7% of the variance in eighth grade reading interest/competence, which is a medium effect ($f^2 = .17$). As the solitary predictor, SES explained less than 1% of the variance. In the presence of the other predictors, third grade reading T scores added 4% to the explained variance (a small effect), and third grade interest/competence in reading added 3% of explained variance (a small effect). Internalizing and externalizing behavior problems contributed very small amounts of unique variance (see Table 6).

Table 1. Descriptive statistics for variables included in the two regression models evaluating third grade predictors of eighth grade reading achievement and self-perceived interest/competence. (Dependent variables are in gray).

Variable	N	Min	Max	Mean	Standard. deviation	95% Confidence interval	
Eighth grade reading T score	8711	26.24	78.91	50.02	28.04	49.43	50.61
Eighth grade reading interest/competence	8730	1.00	4.00	2.52	1.30	2.49	2.55
Third grade reading T score	8724	12.83	83.59	50.50	24.88	49.97	51.02
Third grade reading interest/competence	8775	1.00	4.00	3.28	1.29	3.25	3.30
Third grade internalizing	8775	1.00	4.00	2.21	1.48	49.43	50.61
Third grade externalizing	8775	1.00	4.00	2.01	1.62	2.49	2.55
Third grade SES	8527	-2.48	2.54	-0.07	2.03	-0.12	-0.03

Table 2. Descriptive statistics for variables included in the regression model evaluating concurrent predictors of eighth grade reading achievement. (Dependent variable is in gray).

Variable	n	Min	Max	Mean	Standard deviation	95% Confidence interval	
Eighth grade reading T score	8839	26.24	78.91	50.01	28.60	49.41	50.61
Eighth grade interest/competence in reading	8858	1.00	4.00	2.52	1.19	2.50	2.55
Eighth grade internalizing	8862	1.00	4.00	2.03	0.84	2.01	2.05
Eighth grade locus of control	8842	-2.50	1.53	-0.03	1.27	-0.06	-0.01
Eighth grade self-concept	8851	-3.06	1.12	0.00	1.12	-0.03	0.02
Eighth grade SES	8087	-2.62	2.42	-0.10	2.12	-0.15	-0.06

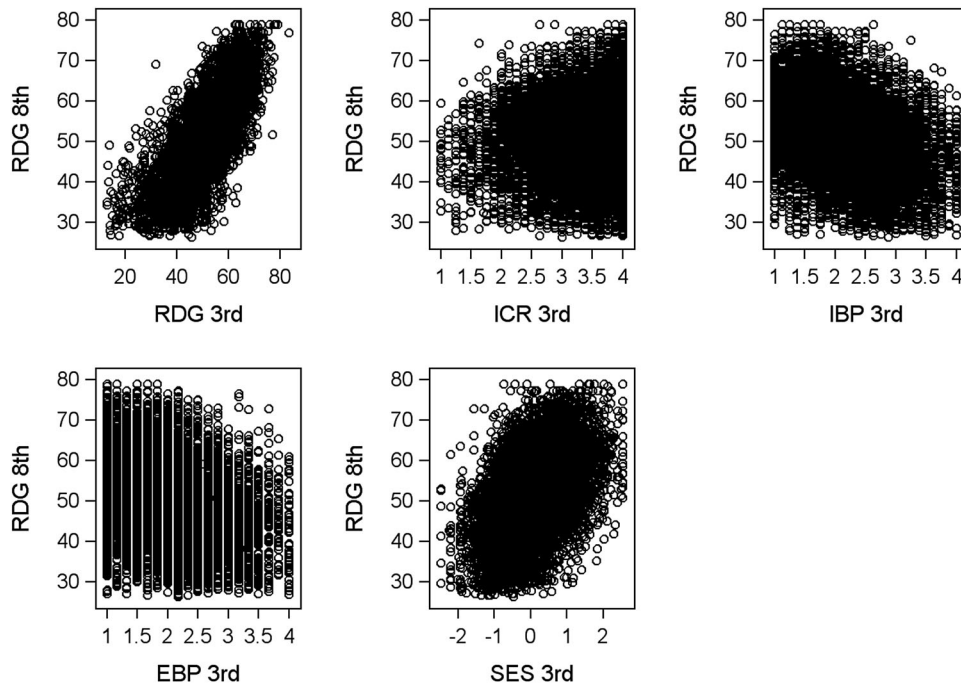


Figure 1. Scatterplots displaying the relation between eighth grade reading achievement and the third grade variables.

Note: RDG = Reading achievement, ICR = self-perceived interest/competence in reading, IBP = internalizing behavior problems, EBP = externalizing behavior problems, SES = socioeconomic status, 8th = eighth grade, 3rd = third grade.

In the third regression model, concurrent self-perceived interest and competence in reading, locus of control and self-concept were expected to have a positive association with eighth grade reading achievement, while concurrent internalizing behavior problems were predicted to have a negative association with eighth grade reading achievement. These predicted relationships can be seen in Figure 3. All of the concurrent variables were significant predictors of eighth grade reading achievement (see Table 7). The predictors together accounted for 38.6% of the variance in eighth grade reading achievement, which is a large effect ($r^2 = 0.63$). In the first block, SES

accounted for 26% of the explained variance on its own, which is a large effect ($r^2 = 0.35$). In the last block, concurrent self-perceived interest and competence in reading added the greatest amount to the model, explaining another 6%, which is a small to medium effect. Locus of control added 2% of explained variance, a small effect. The amounts of variance explained by internalizing behavior problems and self-concept were very small (see Table 8).

Discussion

SES accounted for the largest portion of the variance in reading achievement, both concurrently and longitudinally. This is commensurate with previous investigations the relation between SES and reading outcomes in first through third grade children, and extends these findings to eighth grade adolescents (Aikens & Barbarin, 2008; Crowe et al., 2009). Third grade reading achievement accounted for an additional 25% of the variance in eighth grade reading achievement, beyond that accounted for by SES, highlighting the importance of developing strong reading skills by third grade. However, SES was not a strong contributor to self-perceived interest/competence in reading, which is an encouraging finding that suggests coming from a low-income background does not necessarily limit engagement in reading. Contrary to expectations, perceived interest and competence in reading and internalizing behavior problems in third and eighth grades, externalizing behavior problems in third grade, and locus of control and self-concept in eighth grade accounted

Table 3. Regression coefficients for model #1 (third grade predictors of eighth grade reading achievement).

Predictor	Beta	<i>t</i>	<i>P</i>
Third grade reading T score	0.61	37.94	<.001
Third grade interest/competence in reading	0.26	1.48	.139
Third grade internalizing	-0.58	-2.92	.004
Third grade externalizing	-0.65	-2.71	.007
Third grade SES	2.43	14.18	<.001

Table 4. Contributions to R^2 by third grade predictors of eighth grade reading achievement (model #1).

Predictor	$R^2\Delta$ in block 2 (%)	$R^2\Delta$ in block 3 (%)	F of block 3
Third grade reading T score	6.73	25.45	0.33
Third grade interest/competence in reading	32.15	0.03	<0.001
Third grade internalizing	32.07	0.11	<0.001
Third grade externalizing	32.05	0.13	<.001

Note: The $R^2\Delta$ in block 2 reflects the contribution of the other three variables, beyond the variance accounted for by SES. The $R^2\Delta$ in block 3 reflects the unique contribution of the variable listed.

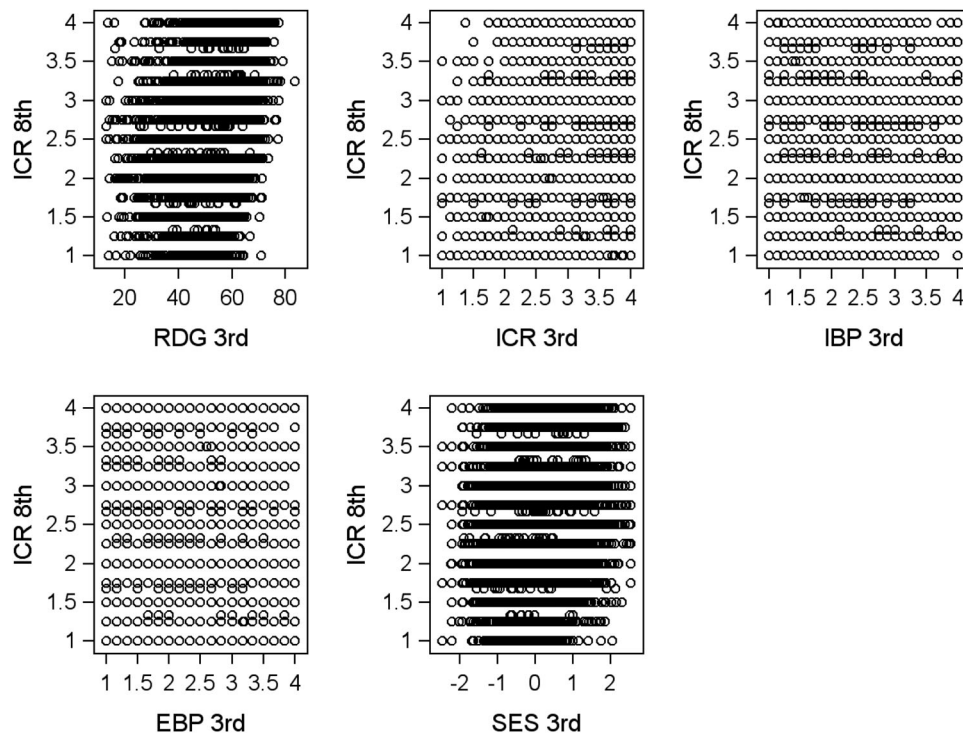


Figure 2. Scatterplots displaying the relation between eighth grade self-perceived interest/competence in reading and the third grade variables.

Note: RDG = Reading achievement, IC R = self-perceived interest/competence in reading, IBP = internalizing behavior problems, EBP = externalizing behavior problems, SES = socioeconomic status, 8th = eighth grade, 3rd = third grade.

for only small or very small amounts of unique variance in eighth grade reading achievement and eighth grade self-perceived interest/competence in reading.

Behavioral engagement

Prior investigations have found a relation between internalizing behavior problems and reading achievement (Ackerman et al., 2007; Morgan et al., 2008). It may be the case that the heterogeneity of individuals

with internalizing behavior problems contributed to the weak relation between internalizing and reading in the current investigation. For example, some individuals who are poor readers may exhibit increased feelings of anxiety or depression, which may, in part, result from academic challenges. These individuals also may exhibit low interest and self-perceptions of competence in reading, possibly as a result of anxious or depressed feelings. However, others who have a predisposition toward anxiousness, withdrawn behaviors, or sadness may find solace in reading and have high interest/self-perceived competence in reading and high reading achievement. Thus, these two profiles of children with internalizing behavior problems may neutralize the relation between internalizing and reading. Indeed, Sideridis et al. (2006) found evidence for two different profiles of fourth graders with deficits in reading comprehension, with some of these children exhibiting increased internalizing behavior problems and others not. Note that this investigation did not assess the presence of the clinical conditions of anxiety or depression, but merely explored relations among ranges of self-reported anxiousness, withdrawal, and sadness with reading ability.

Third grade externalizing behavior problems contributed only a small amount of unique variance to eighth grade reading achievement and self-perceived interest/competence in reading. Externalizing was not assessed in eighth grade. While some investigations have found that externalizing behavior problems are

Table 5. Regression coefficients for model #2 (third grade predictors of eighth grade self-perceived interest/competence in reading).

Predictor	Beta	t	p
Third grade reading T score	0.02	10.29	<.001
Third grade interest/competence in reading	0.20	9.10	<.001
Third grade internalizing	0.03	1.14	.256
Third grade externalizing	-0.08	-3.66	<.001
Third Grade SES	0.07	4.03	<.001

Table 6. Contributions to R² by third grade predictors of eighth grade interest/competence in reading (model #2).

Predictor	R ² Δ in block 2 (%)	R ² Δ in block 3 (%)	F of block 3
Third grade reading T score	10.79	3.89	0.04
Third grade interest/competence in reading	11.71	2.97	0.03
Third grade internalizing	14.64	0.04	<0.001
Third grade externalizing	14.31	0.37	0.004

Note: The R²Δ in block 2 reflects the contribution of the other three variables, beyond the variance accounted for by SES. The R²Δ in block 3 reflects the unique contribution of the variable listed.

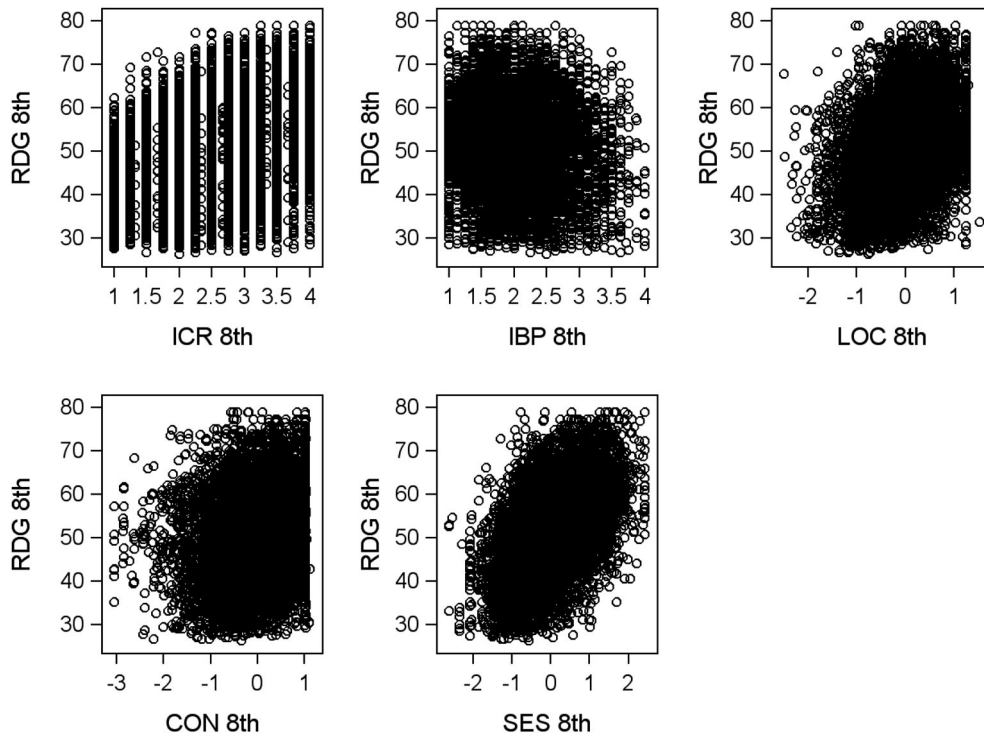


Figure 3. Scatterplots displaying the relation between eighth grade reading achievement and the other eighth grade variables. Note: RDG = Reading achievement, IC R = self-perceived interest/competence in reading, IBP = internalizing behavior problems, LOC = locus of control, CON = self-concept, SES = socioeconomic status, 8th = eighth grade.

associated with deficits in reading (e.g., Undheim et al., 2011; Willcutt & Pennington, 2000), the current findings are consistent with those of Zimmermann, Schütte, Taskinen, and Köller (2013), which suggest that, although externalizing behavior problems may be related to grades given by teachers, they have little effect on scores on standardized achievement tests when controlling for prior achievement, grades, and self-esteem.

Table 7. Regression coefficients for model #3 (Concurrent predictors of eighth grade reading achievement).

Predictor	Beta	<i>t</i>	<i>p</i>
Eighth grade reading interest/competence	3.67	15.98	<.001
Eighth grade internalizing	-0.89	-2.97	.003
Eighth grade locus of control	3.47	10.42	<.001
Eighth grade self-concept	-0.83	-3.08	.002
Eighth grade SES	4.96	21.21	<.001

Table 8. Contributions to R^2 by concurrent predictors or eighth grade reading achievement (model #3).

Predictor	R^2 change in block 2 (%)	R^2 change in block 3 (%)	F^2 of block 3
Eighth grade reading interest/competence	6.25	6.42	0.070
Eighth grade internalizing	12.49	0.18	0.002
Eighth grade locus of control	9.79	2.88	0.030
Eighth grade self-concept	12.47	0.20	0.020

Note: The $R^2\Delta$ in block 2 reflects the contribution of the other three variables, beyond the variance accounted for by SES. The $R^2\Delta$ in block 3 reflects the unique contribution of the variable listed.

Emotional engagement

It was expected that eighth graders with higher self-concept would earn higher reading achievement scores. However, self-concept had a weak relation with reading achievement. It may be the case that, in eighth grade, academic achievement does not strongly impact self-concept. As Fletcher, Grimley, Greenwood, and Parkhill (2012) suggested, reading may not be considered 'cool' in adolescence. Other factors, which were not investigated in the current study, such as success and participation in athletics, outgoing personality, or fashion, may be more important for self-concept in adolescence. Academic self-concept differs from the general self-concept that was measured here, and is more closely related to academic achievement (Marsh, 2007). If academic self-concept had been assessed, the results may have differed.

Locus of control did not have a strong relation with reading achievement. This was surprising, given that prior research has shown strong relations between locus of control/autonomy and academic achievement (Adeyinka et al., 2011; Jang et al., 2010; Stroel et al., 2013). Perhaps, like the fourth graders in Guthrie and Wigfield's (2007) investigation, some eighth graders may highly value choices, whereas others prefer to have choices made for them.

Interest and self-perception of competence was only weakly related to reading achievement. This was surprising, given that theoretical models of learning (e.g., Alexander, 1997, 2003; Guthrie & Wigfield, 2000)

highlight the role of motivation in learning, and that previous studies have shown a relation between interest and achievement in reading (e.g., De Naeghel & Van Keer, 2012; Guay et al., 2003). However, the results of the current investigation are consistent with those of Kirby et al. (2011), Guthrie et al. (2007), and Smith et al. (2012). Kirby et al. (2011) found that the relation between interest and reading was weak after controlling for SES, cognitive ability, naming speed, and phonological awareness in children in grades one through three. The current investigation extends these results to eighth grade students. Guthrie et al. (2007) and Smith et al. (2012) found that self-efficacy did not have a strong relation with reading achievement, suggesting that students do not have a strong awareness of their own capabilities in reading.

The findings of this study suggest that increasing interest in reading or confidence in one's own reading ability may not necessarily significantly facilitate improvements in actual reading achievement. Similarly, focusing on decreasing problem behaviors, while certainly a good idea for other reasons, may not significantly improve reading achievement in eighth grade. Given the contributions of SES and third grade reading achievement to eighth grade reading achievement, providing resources for reading to children of low SES and children who exhibit early difficulty learning to read is important for facilitating optimal reading outcomes.

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