Influence of the Home Literacy Environment on Reading Motivation and Reading Comprehension

Ann M. Kennedy, TIMSS & PIRLS International Study Center, danielac@bc.edu

Kathleen L. Trong, TIMSS & PIRLS International Study Center, trong@bc.edu

Abstract

This research used PIRLS 2006 data to explore home factors that influence students' motivation to read, as well as the relationship between student motivation and reading achievement. The research employed structural equation modeling to empirically test a theoretical model of student motivation to read and home factors that may influence motivation, including parental attitudes and behaviors, early literacy activities, and the presence of children's books. In addition, the theoretical model tested the relationship between motivation and student reading achievement. Lastly, differences in the relationships among these variables were examined for boys compared to girls. This research will contribute to the body of literature on the influence that the home literacy environment can have on reading motivation and reading comprehension, and may help inform analysis and reporting strategies for future cycles of PIRLS.

Keywords: *parent attitudes, motivation, reading achievement, early literacy, structural equation modeling*

Introduction

The purpose of this research was to examine the influence of the home literacy environment on student enjoyment of reading, self-concept, and reading comprehension in PIRLS 2006.

Theoretical Framework

The home environment provides the foundation for early literacy, and plays a prominent role in the development of children's positive attitudes, self-concept, and reading skills. This is accomplished through access to reading resources, exposure to modeled reading behaviors, and participation in early literacy activities that provide them with the skills for formal education (Duncan, et al., 2007; Mullis, Martin, Kennedy, Trong, & Sainsbury, 2009). A supportive home environment begins with positive parental attitudes toward reading and a high value placed on literacy. Baker and Scher (2002) found that children whose parents had positive beliefs about reading for pleasure had higher motivation as readers.

These parental values about reading are manifested in the level and types of literacy engagement parents have with their children. Participating in literacy activities and having access to reading resources help prepare children for school. Past research has found that early literacy experiences can lead to school readiness, and that those experiences involving high levels of child engagement tend to be the most effective (Britto, Brooks-Gunn, & Griffin, 2006). Beginning school prepared with pre-literacy skills can lead to greater subsequent success in reading (Duncan et al, 2007; Coley, 2002). Furthermore, the early home environment, including activities and reading resources, can have longer-lasting effects on reading achievement and attitudes (Mullis, Martin, Kennedy, & Foy, 2007; Purves & Elley, 1994; Whitehurst & Lonigan, 2001).

In addition to reading achievement, positive attitudes toward reading and self-confidence in reading are cited by researchers as being of critical importance to children becoming lifelong, avid readers (Baker, Scher, & Mackler, 1997; Guthrie, Wigfield, Metsala, & Cox, 1999; Mullis, Martin, Gonzalez, & Kennedy, 2003; Mullis, Martin, Kennedy, & Foy, 2007). Children who like to read and think they are good readers read more often than their less positive counterparts and have higher reading achievement (Guthrie, Hoa, Wigfield, Tonks, Humenick, & Littles, 2006; Wigfield & Guthrie, 1997; Wang & Guthrie, 2004).

Based on the literature discussed above, a model was built to characterize the influence of the home literacy environment and school readiness on reading motivation and reading comprehension, making use of a number of variables that have been shown to be related to reading achievement internationally (Mullis, Martin, Kennedy, & Foy, 2007). The model is shown in Figure 1. Because the home environment plays a central role in reading development, the model focused primarily on the home, rather than on school and classroom effects, as a first step to understanding the complexity of the effects of different contexts on reading development. Therefore, it is recognized that the model does not incorporate a full range of variables that explain reading outcomes. Additionally, while research supports the influence of socioeconomic status on reading achievement, a decision was made to focus primarily on those parental beliefs and behaviors shown to promote children's reading attitudes and achievement, as opposed to broader indicators of socioeconomic status.

[INSERT Figure 1 HERE]

It was hypothesized that success in reading begins with support in the home, as measured by parents' attitudes toward reading, parents' own reading behaviors, early home literacy activities, and the presence of children's books in the home. A supportive home environment can help prepare students for school, based on parents' reports of their children's early literacy skills. These home supports for literacy were predicted to relate to aspects of reading

motivation, including reading behaviors, student attitudes, and self-concept. This combination of a rich home literacy environment, reading enjoyment, and confidence in reading were hypothesized to ultimately relate to high reading achievement, as measured by the PIRLS assessment.

Differences between boys and girls have been reported both with regard to reading achievement and reading motivation, with girls having higher reading achievement and motivation to read (Mullis, Martin, Kennedy & Foy, 2007; Wigfield & Guthrie, 1997). For this reason, it was hypothesized that the strengths of the relationships in this research model will differ between boys and girls. Additional analyses were conducted to explore group differences in the hypothesized model.

Study Significance

This research will contribute to the body of literature on the influence that the home literacy environment can have on reading motivation and reading comprehension by examining the making connections between a number of factors known to be important to reading development (Baker & Scher, 2002; Baker, Scher, & Mackler, 1997; Mullis, Martin, Kennedy, & Foy, 2007; Wang & Guthrie, 2004). The use of PIRLS 2006 also allows for the exploration of these relationships internationally with a rich and well-recognized dataset. The results of this study may also help inform analysis and reporting strategies for future cycles of PIRLS.

Methodology

Data and Variables

The data used for this research includes student reading achievement scale scores, student background questionnaire data, and home background questionnaire data from all participating countries in PIRLS 2006. The database includes data from over 210,000 students and their parents. Tables 1–5 list the variables selected for the analyses and their sources. The student sampling weight SENWGT was used to treat each country equally in the analysis. Missing data were deleted listwise. The first of five estimates of students' achievement scores (plausible values) was used in these analyses, instead of all five estimates, for the sake of expedience. These analyses were replicated using the second plausible value to examine the stability of the model results when using different plausible values. Differences in the results were negligible. Therefore, all results in this paper are based on the analyses using the first plausible value. It is recognized that this decision to use one plausible value results in the underestimation of standard errors, as it does not take into account the imputation variance.

[INSERT Tables 1–5 HERE]

Analysis Methods

This study employed structural equation modeling to empirically test the theoretical model described in the previous section (shown in Figure 1) and included a multi-group analysis to explore the differences between boys and girls within the model. As a preliminary step, confirmatory factor analyses were conducted to examine the dimensionality of each of the latent constructs in the model. The analyses were conducted using MPlus (Muthén & Muthén, 2006), data analysis software designed for use with complex samples, such as those in PIRLS.

In the first phase, a confirmatory factor analysis was conducted for each of the five latent variables: parental reading enjoyment, home literacy environment, parents' reports of school readiness, student reading enjoyment, and student reading self-concept. In the second phase, a structural model was built, linking the latent variables according to the theoretical model described in the previous section. In the third phase, a multi-group analysis was conducted to observe the differences in the relationships between latent variables for boys and girls.

Results

Confirmatory Factor Analysis

A confirmatory factor analysis was conducted for each of the latent constructs proposed in the model to determine the relationships between the observed variables comprising the constructs. For each construct the factor loadings are reported along with the reliability of the underlying factor (Cronbach's alpha) and model fit indices. The factor loadings indicate the correlations between each component variable and the latent construct. Higher factor loadings mean that the variable is representative of the latent construct. Factor loadings above 0.3 are considered "salient" (Kline, 1992), with loadings above 0.6 considered high.

There are a number of statistics used to evaluate model fit. While the model chi-square statistic is commonly used to measure model fit, it is very sensitive to large sample size, as is the case in this study. The Comparative Fit Index (CFI) is an alternative fit statistic that takes into consideration the sample size. The values for the CFI range between 0.0 and 1.0, with values at or above 0.9 indicating good fit. Lastly, the Root Mean Square Error of Approximation is an index that focuses on an estimated population fit, with desired values approaching zero and an acceptable value below 0.1. Factor loadings and fit indices for each factor analysis are described below. In evaluating the results, the primary focus was on the strength of the relationships of the variables. Although fit indices were considered, it was

recognized that these latent construct models were not final models and would be used later to specify a more complex structural equation model.

Table 6 presents the results of the confirmatory factor analysis for the latent construct Parental Reading Enjoyment. There were seven observed variables for this construct. These variables include parents' self-reports of reading habits and attitudes. Factor loadings for all component variables were above 0.6. Cronbach's alpha was .81. While the RMSEA (.19) was higher than desirable, the CFI (.87) nearly met the fit criteria.

[INSERT Table 6 HERE]

Table 7 presents the results of the confirmatory factor analysis for the latent construct Home Literacy Environment. This construct was comprised of eight variables measuring early literacy activities in the home and the number of children's books in the home. Factor loadings for all component variables were above .45, with five variables having factor loadings above .60. Cronbach's alpha was .73. The CFI fit statistic was .91, indicating good fit. The RMSEA (.08) also indicated acceptable fit.

[INSERT Table 7 HERE]

Table 8 presents the results of the confirmatory factor analysis for the latent construct Parents' Reports of School Readiness. This construct was comprised of five variables measuring parents' perceptions of their children's literacy skills when they first began formal schooling. Factor loadings were extremely high, with all loadings above .80. Cronbach's alpha was .91. The CFI of .98 indicated excellent fit, while the RMSEA (.19) was above the acceptable limit of .10.

[INSERT Table 8 HERE]

Table 9 presents the results of the confirmatory factor analysis for the latent construct Student Reading Enjoyment, which was comprised of six variables measuring attitudinal and behavioral measures of reading enjoyment. Factor loadings for all variables were above .40; loadings for three variables were above .60. Cronbach's alpha was .71. While the CFI (.92) indicated good fit, the RMSEA (.11) was just above the acceptable criterion.

[INSERT Table 9 HERE]

Table 10 presents the results of the confirmatory factor analysis for the latent construct Student Reading Self-Concept. This construct was comprised of four variables. Factor loadings were above .50 for three of the variables, with one variable having a lower loading of .38. Cronbach's alpha was .60. The CFI value was .90 and RMSEA was .17.

[INSERT Table 10 HERE]

Structural Equation Model

A structural equation model using the latent constructs and student reading achievement was built according to the theoretical framework described above. The model results are presented graphically in Figure 2. Ovals represent the latent variables and the rectangle represents the measured variable reading achievement. Structural relationships are indicated by arrows. Standardized estimates of the relationships between latent variables are presented next to the arrows that indicate the unique relationship. These structural coefficients indicate the strength of the relationship and are interpreted in the same way as a standardized regression coefficient. The percent of variance explained for each of the latent constructs and reading achievement (R^2) are also presented. All estimates were statistically significant at the .05 level. Measures of overall model fit are shown at the bottom of the figure. These measures are parallel to those reported for the confirmatory factor analyses.

[INSERT Figure 2 HERE]

The hypothesized model seems to fit the data reasonably well. The CFI is .88 and the RMSEA is .08. The first hypothesized relationship is that between Parental Reading Enjoyment and Home Literacy Environment. This was the strongest relationship between the latent constructs in this model, with a standardized structural coefficient of .55. The percentage of variance in Home Literacy Environment explained by the model is 30 percent. The relationship between Home Literacy Environment and School Readiness is .38, with 14 percent of the variance in School Readiness explained by the model.

These home factors were hypothesized to relate to aspects of student reading motivation. The relationship between School Readiness and Student Reading Self-Concept was .34, and the relationship between Home Literacy Environment and Student Reading Enjoyment was .30. The model explained only around 10 percent of the variance in either Student Reading Self-Concept or Student Reading Enjoyment. There was a correlation of .44 between the two aspects of reading motivation. The relationship between Student Reading Self-Concept and Student Reading Achievement was .28; the relationship between Student Reading Enjoyment and Student Reading Achievement was .27. The model explained 21 percent of the variance in Student Reading Achievement.

In addition to the direct relationships described above, the indirect effects of Parental Reading Enjoyment, Home Literacy Environment, and School Readiness on Student Reading Achievement were estimated. These estimates represent the effects of each latent construct on

achievement through mediating variables. Table 11 presents the standardized coefficients of the indirect relationships to reading achievement, the highest of which was .12 from Home Literacy Environment to Student Reading Achievement.

[INSERT Table 11 HERE]

Multi-Group Structural Equation Model

A multi-group structural equation model was conducted for girls and boys to investigate group differences that may exist in the relationships between the latent constructs in the overall structural equation model. Figure 3 shows the results of the multi-group analysis. There was little difference between the fit of the overall model and the multi-group model (CFI=.87, RMSEA=.07). In general, the structural relationships between the latent constructs related to aspects of early literacy were similar for boys and girls. However, once students enter school, differences between boys and girls seem to emerge. For example, there was a slight difference in the structural coefficient measuring the relationship between Home Literacy Environment and Student Reading Enjoyment (Girls=.26 and Boys=.18). Furthermore, the relationships between the aspects of reading motivation and student reading achievement were noticeably different for boys and girls. For girls, the relationship between reading enjoyment and achievement was stronger than that for boys (.70 vs. .28), whereas the relationship between reading self-concept and achievement was weaker than that for boys (.25 vs. .56). The percent of variance explained for each of the model components was similar for boys and girls with the exception of Student Reading Enjoyment and Student Reading Achievement. In the latter cases the R^2 value was higher for girls. The percentage of variance of Student Reading Enjoyment explained was 13 percent for girls, compared to 5 percent for boys. The percentage of variance of Student Reading Achievement explained was 24 percent for girls and 19 percent for boys.

[INSERT Figure 3 HERE]

Discussion

The objective of this study was to explore the extent to which the home environment impacts important reading outcomes, such as self-concept, enjoyment, and achievement, at the fourth grade. With this as the primary focus, school and classroom variables were not included, although they play an important role in fostering students' reading habits and behaviors necessary for success as readers. The following section highlights key results of this study and discusses their potential implications.

There were a number of interesting findings in this study. The first of these is the impressive amount of variance in reading achievement (21%) explained by the overall model. Based on the confirmatory factor model fit, the selected observed variables adequately represented the latent constructs, providing a sound foundation for the model. The success of the overall model reinforces the importance of a supportive home literacy environment and positive reading motivation on reading achievement at the fourth grade.

The model confirms that parents' value of reading, exhibited by their reading behaviors, have a strong effect on the literacy environment that they create for their children. In turn, the activities and resources that make up the home literacy environment help to prepare children with the early literacy skills necessary to be successful in school. Students' preparedness for school in terms of early literacy skills continues to impact how they perceive themselves as readers at the fourth grade. The results also show that the home literacy environment impacts children's affect toward reading for years to come. Even though students had been exposed to the school environment for four years, there remains a lasting effect of their early childhood literacy experiences on their attitudes toward reading.

Once students reach the fourth grade, there is evidence of a strong relationship between their attitudes and self-concept, with a correlation of .44. Despite the correlation between attitudes and self-concept, the model shows that each aspect of motivation has a distinct relationship with reading achievement. While the model provides support for the lasting relationship between early experiences and reading motivation, there was relatively little variance in self-concept and reading enjoyment explained by the model. This suggests that early home literacy experiences don't tell the whole story and that what happens during the intervening years of formal schooling may have a strong influence on the development of reading motivation.

Delving beyond the model that was the primary focus of this research, gender differences were investigated. Prior research has shown there to be differences between boys and girls both in their reading achievement and motivation to read. The present research expands on these past findings by examining differences in the relationships among these constructs between boys and girls. Generally, there was little gender difference in the variance in reading achievement explained by the overall model. The model explained a slightly greater proportion of variance in reading achievement for girls, indicating that the latent constructs in the model provide more explanatory information about girls' reading achievement.

In examining the specific relationships in the model, the greatest differences between boys and girls appear in the relationships between motivation and achievement. For girls, there was a strong relationship between reading enjoyment and achievement, showing that positive

reading attitudes are specifically important to their reading achievement. In contrast, the relationship between reading enjoyment and achievement among boys was much weaker, with a structural coefficient less than half the size of that for girls. It is evident that positive attitudes toward reading are more important to girls' success in reading than they are for boys.

For the relationship between reading self-concept and achievement, differences between boys and girls seem to be the reverse of those found for reading enjoyment. Being confident in one's reading abilities plays a more important role in student reading achievement for boys than for girls. Taken together, these results suggest that different aspects of reading motivation vary in their influence on boys' and girls' reading achievement. This could be useful in understanding ways to encourage boys and girls as readers and requires further research in how to make use of this information in the home and classroom contexts.

In conclusion, this research expanded on prior studies that examined models of reading motivation and achievement. The differences found between boys and girls make it clear that future research should examine the relationships between aspects of reading motivation and achievement separately for boys and girls. A more in-depth investigation of gender socialization may provide insight into the influence of gender on reading development. Furthermore, future PIRLS reports may capitalize on the results of this research and consider reporting measures of student reading motivation separately for boys and girls. Lastly, as the PIRLS 2011 background questionnaires will include a number of innovative scales measuring student motivation, future research might incorporate these scales to further explore the relationships between home literacy, student motivation, and reading achievement.

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Figure 1. Structural Equation Model

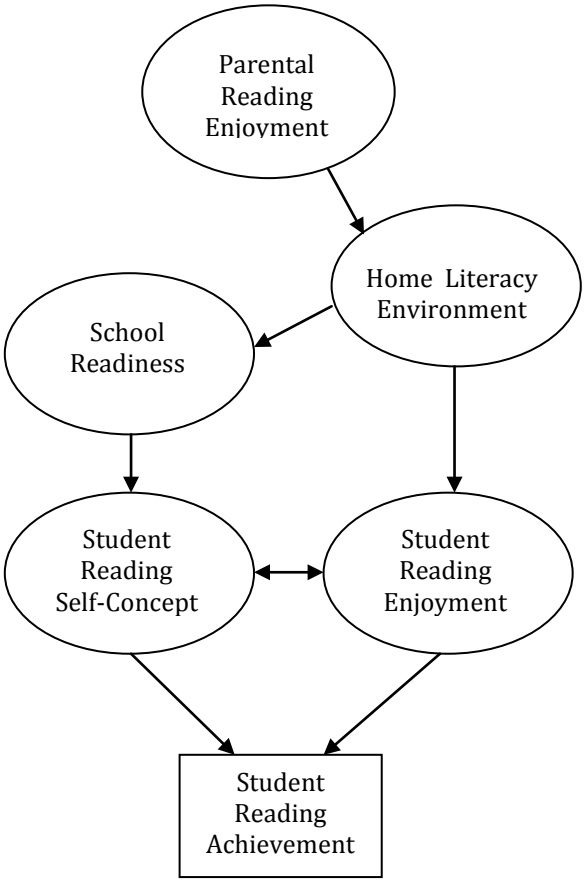

Table 1. Variables Used in Parental Reading Enjoyment Scale

Variable Name	Source	Variable Description	Response Categories
ASBHSTM1	Parents' Reports	I read only if I have to.	Agree a lot; Agree a little; Disagree a little; Disagree a lot
ASBHSTM2	Parents' Reports	I like talking about books with others.	Agree a lot; Agree a little; Disagree a little; Disagree a lot
ASBHSTM3	Parents' Reports	I like to spend my spare time reading.	Agree a lot; Agree a little; Disagree a little; Disagree a lot
ASBHSTM4	Parents' Reports	I read only if I need information.	Agree a lot; Agree a little; Disagree a little; Disagree a lot
ASBHSTM5	Parents' Reports	Reading is an important activity in my home.	Agree a lot; Agree a little; Disagree a little; Disagree a lot
ASBHREAD	Parents' Reports	Time spent in a typical week reading for self	Less than one hour a week; 1-5 hours a week; 6-10 hours a week; More than 10 hours a week
ASBHRRE	Parents' Reports	Frequency of reading for enjoyment	Every day or almost every day; Once or twice a week; Once or twice a month; Never or almost never

Table 2. Variables Used in Home Literacy Environment Scale

Variable Name	Source	Variable Description	Response Categories
ASBHHA01	Parents' Reports	Frequency of reading books before child started school	Often; Sometimes; Never
ASBHHA02	Parents' Reports	Frequency of telling stories before child started school	Often; Sometimes; Never
ASBHHA03	Parents' Reports	Frequency of singing songs before child started school	Often; Sometimes; Never
ASBHHA04	Parents' Reports	Frequency of playing with alphabet toys before child started school	Often; Sometimes; Never
ASBHHA06	Parents' Reports	Frequency of talking about what you had read before child started school	Often; Sometimes; Never
ASBHHA07	Parents' Reports	Frequency of playing word games before child started school	Often; Sometimes; Never
ASBHHA09	Parents' Reports	Frequency of reading signs and labels before child started school	Often; Sometimes; Never
ASBHCHBK	Parents' Reports	Number of children's books in home	0-10; 11-25; 26-50; 51-100; More than 100

Table 3. Variables Used in Parents' Reports of School Readiness Scale

Variable Name	Source	Variable Description	Response Categories
ASBHAIB1	Parents' Reports	How well child could recognize most letters of alphabet when he/she started school	Very well; Moderately well; Not very well; Not at all
ASBHAIB2	Parents' Reports	How well child could read some words when he/she started school	Very well; Moderately well; Not very well; Not at all
ASBHAIB3	Parents' Reports	How well child could read sentences when he/she started school	Very well; Moderately well; Not very well; Not at all
ASBHAIB4	Parents' Reports	How well child could write letters of alphabet when he/she started school	Very well; Moderately well; Not very well; Not at all
ASBHAIB5	Parents' Reports	How well child could write some words when he/she started school	Very well; Moderately well; Not very well; Not at all

Table 4. Variables Used in Student Reading Enjoyment Scale

Variable Name	Source	Variable Description	Response Categories
ASBGRST1	Students' Reports	I read only if I have to.	Agree a lot; Agree a little; Disagree a little; Disagree a lot
ASBGRST2	Students' Reports	I like talking about books with other people.	Agree a lot; Agree a little; Disagree a little; Disagree a lot
ASBGRST3	Students' Reports	I would be happy if someone gave me a present.	Agree a lot; Agree a little; Disagree a little; Disagree a lot
ASBGRST4	Students' Reports	I think reading is boring.	Agree a lot; Agree a little; Disagree a little; Disagree a lot
ASBGRST6	Students' Reports	I enjoy reading.	Agree a lot; Agree a little; Disagree a little; Disagree a lot
ASBGTOC5	Students' Reports	Frequency of reading for fun outside of school	Every day or almost every day; Once or twice a week; Once or twice a month; Never or almost never

Table 5. Variables Used in Student Reading Self-Concept Scale

Variable Name	Source	Variable Description	Response Categories
ASBGRD1	Students' Reports	Reading is very easy for me.	Agree a lot; Agree a little; Disagree a little; Disagree a lot
ASBGRD2	Students' Reports	I do not read as well as others in my class	Agree a lot; Agree a little; Disagree a little; Disagree a lot
ASBGRD3	Students' Reports	When I am reading by myself I understand almost everything I read.	Agree a lot; Agree a little; Disagree a little; Disagree a lot
ASBGRD4	Students' Reports	I read slower than other students in my class.	Agree a lot; Agree a little; Disagree a little; Disagree a lot

Table 6. Confirmatory Factor Analysis Results for Parental Reading Enjoyment

Latent Construct: Parental Reading Enjoyment		
Cronbach's Alpha: .81		
Chi-Square: 52834.29 (p = .00005)		
Degrees of Freedom: 8		
CFI: .87		
RMSEA: .19		
Observed Variable	Factor Loading	Standard Error
I read only if I have to.	0.81	0.002
I like talking about books with others.	0.64	0.002
I like to spend my spare time reading.	0.76	0.002
I read only if I need information.	0.79	0.002
Reading is an important activity in my home.	0.65	0.002
Time spent in a typical week reading for self	0.61	0.002
Frequency of reading for enjoyment	0.70	0.002

Table 7. Confirmatory Factor Analysis Results for Home Literacy Environment

Latent Construct: Home Literacy Environment		
Cronbach's Alpha: .73		
Chi-Square: 18851.84 (p = .00005)		
Degrees of Freedom: 18		
CFI: .91		
RMSEA: .08		
Observed Variable	Factor Loading	Standard Error
Frequency of reading books before child started school	0.75	0.002
Frequency of telling stories before child started school	0.66	0.002
Frequency of singing songs before child started school	0.53	0.003
Frequency of playing with alphabet toys before child started school	0.61	0.002
Frequency of talking about what you had read before child started school	0.62	0.002
Frequency of playing word games before child started school	0.67	0.002
Frequency of reading signs and labels before child started school	0.59	0.003
Number of children's books in the home	0.46	0.003

Table 8. Confirmatory Factor Analysis Results for Parents' Reports of School Readiness

Latent Construct: Parents' Reports of School Readiness		
Cronbach's Alpha: .91		
Chi-Square: 27417.83 (p=.00005)		
Degrees of Freedom: 4		
CFI: .98		
RMSEA: .19		
Observed Variable	Factor Loading	Standard Error
How well child could recognize most letters of the alphabet when he/she started school	0.83	0.001
How well child could read some words when he/she started school	0.94	0.001
How well child could read sentences when he/she started school	0.90	0.001
How well child could write letters of the alphabet when he/she started school	0.87	0.001
How well child could write some words when he/she started school	0.88	0.001

Table 9. Confirmatory Factor Analysis Results for Student Reading Enjoyment

Latent Construct: Student Reading Enjoyment		
Cronbach's Alpha: .71		
Chi-Square: 20292.32 (p = .00005)		
Degrees of Freedom: 8		
CFI: .92		
RMSEA: .11		
Observed Variable	Factor Loading	Standard Error
I read only if I have to.	0.44	0.003
I like talking about books with others.	0.48	0.002
I would be happy if someone gave me a book as a present.	0.66	0.002
I think reading is boring.	0.71	0.002
I enjoy reading.	0.90	0.002
Frequency of reading for fun outside of school	0.54	0.002

Table 10. Confirmatory Factor Analysis Results for Student Reading Self-Concept

Latent Construct: Student Reading Self-Concept		
Cronbach's Alpha: .60		
Chi-Square: 11625.60 (p = .00005)		
Degrees of Freedom: 2		
CFI: .90		
RMSEA: .17		
Observed Variable	Factor Loading	Standard Error
Reading is very easy for me.	0.56	0.003
I do not read as well as others in my class.	0.74	0.003
When I am reading by myself I understand almost everything I read.	0.38	0.003
I read slower than other students in my class.	0.74	0.003

Figure 2. Structural Equation Model Results (Standardized Structural Coefficients)

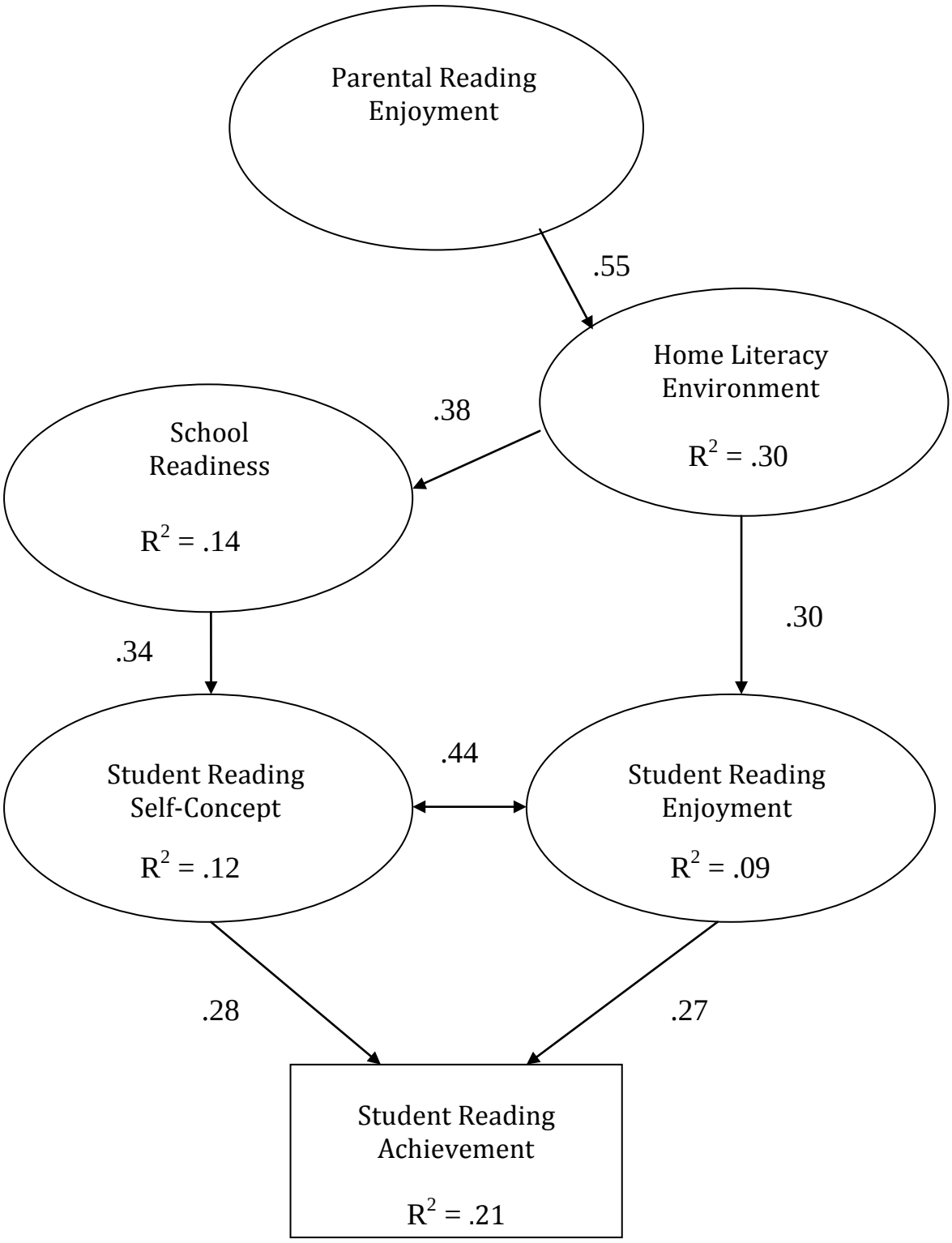

Table 11. Indirect Effects for Structural Equation Model

Indirect Relationships	Total Indirect Effects
Parental Reading Enjoyment to Reading Achievement	0.06
Home Literacy Environment to Reading Achievement	0.12
Parents' Reports of School Readiness to Reading Achievement	0.09

Figure 3. Multi-Group Structural Equation Model Results (Unstandardized Structural Coefficients)