Investigating the Relationship Between Literacy Achievement on the PIRLS Assessment and Environmental Factors Using Bivariate and Regression Models

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The Progress in International Reading Literacy Study (PIRLS) entails an assessment that measures reading comprehension and literacy skills amongst fourth grade students at the international level. The PIRLS assessment is designed to conceptualize literacy achievement in each country. In addition to the asssessment's 18-passage format (9 are narrative fiction and 9 are expository text), the PIRLS also measures psychological and environmental factors relating to reading achievement. Within its questionnaire the PIRLS assesses student attitudes and their academic self concepts towards the subject.

The purpose of this research is to provide insight into the relationship between home environment factors that contribute to achievement and actual measured achievement on the literacy section of the PIRLS assessment. in alignment with theories of social and behavioral psychology, such as Ecological Systems Theory, Social Learning Theory, Attribution Theory, Self Determination Theory, etc., this research investigates whether the PIRLS assessment item measuring the number of books in a child's home is a useful predictor of scores on the literacy section. Per the aforementioned theories, children's word-reading fluency and accuracy in a school environment is theorized to be largely influenced by their family home environment; several studies in the realm of educational psychology demonstrate robust support[1] for the strongly correlated relationship between reading achievement and the availability of reading materials in the home.

In order to investigate the predictive nature of books in home environments on literacy score, this study also uses two additional independent variables: national identity and attitudes towards reading. Controlling for the demographic factor of national identity is useful in the context of the validity of the PIRLS assessment, as analyzing differences in home environment and achievement score may be reflective of cultural differences attributed to national origin. Likewise, student attitudes are used as the other control because it may be a key predictor of literacy score specifically. According to the PIRLS website, those who score high in literacy demonstrate *that they can "construct meaning from texts in a variety of forms ....[students demonstrate that] they read to learn, to participate in communities of readers in school and*

[1] Bergen et al., *Why Are Home Literacy Environment and Children's Reading Skills Associated? What Parental Skills Reveal*. 2016 .https://doi.org/10.1002/rrq.160.

everyday life, and for enjoyment.[2]*"* Therefore, it can be inferred that high attitudes correlate with higher literacy.

This research investigates the association between the number of books in a child's home and their reading literacy ability. This is accomplished through three central research questions, which are investigated using both bivariate statistics and a linear regression analysis.

1. What is the relationship between the number of books at home and 4th grade literary scores, holding all other variables constant?
2. What is the relationship between the number of books in the home and student attitudes towards reading, holding all other variables constant?
3. What is the relationship between the number of books in the home and country origin, holding all other variables constant?

II. Methods

A. Dataset: Sample & Variables

A subset of the PIRLS assessment data was used for this project; the data frame had 2,789 data entries from 2,789 participants from a range of four countries: the U.S., England, Norway, and Columbia N = 2789: Columbia, N = 170; Norway, N = 539, England N = 840, U.S. N = 996). The dataset has a total of 31 variables that account for achievement, attitudes, self-concept, and environmental factors. This study uses data from two of the four countries, the U.S. and England, based on similarities in sample size (U.S. N = 840, England N = 926) and based on preliminary data analysis of differences in achievement across countries. A one-way analysis of variance **(Table 1)** revealed that there were not significant differences of achievement between the U.S. and England, however every other pairwise comparison revealed significant differences in achievement between countries. This is important because it reduces the likelihood of making Type I or II errors due to confounding factors between countries that otherwise can not be accounted for using the dataset provided. Likewise, because the U.S. and

[2] The Progress in International Reading Literacy Study: https://pirls2021.org/

England use the same language and reflect more similarities in culture than do the U.S. and Norway Or England and Columbia (and vice versa), this helps mitigate potential biases reflected by score differences for literacy construct.

The main outcome variable (i.e. dependent variable) that this study uses is literacy score. The PIRLS assessment measures two constructs of reading ability by assessing comprehension of both literature and information, therefore the total PIRLS score reflects a standardized score from the literacy scale and information scale. There are three independent variables used in this study. The number of books in the home is the main predictor variable. In addition, this study incorporates two control variables, country origin and reading attitudes, which are used as predictors in the multiple regression equation and analysis.

Table 2.
Variables and Descriptive Statistics

Variable Type**	Variable Name	# of levels	Level Descriptors	Level of Measurement	Value range	Corresponding Variables
DV: O	Literacy Score	1		Continuous	235 – 800	
IV: P	# of Books at Home	1		Continuous	0 – 300	Scale variable in dataset: "variable name"
IV: C1	Country / Student Nation ID	2	1 = U.S. 2 = England	Categorical	1 or 2	
IV: C2	Attitudes Towards Reading	3	1 = high 2 = medium 3 = low	Ordinal	1, 2, or 3	See table 5 in Appendix A

***Note: DV: O = dependent variable / outcome variable; IV: P = independent variable / predictor variable; IV: C1 = independent variable / control variable #1; IV: C2 = independent variable / control variable #2*

B. Descriptive statistics

Due to missing data the total sample size used in the analysis for both countries is nearly equal, with the U.S. having 730 participants and England having 740. The overall mean literacy score for both countries is 556.65 (U=556.647). The number of books in the home was measured on a continuous scale. The values range from zero to 300. The number of people who

rated high attitudes towards reading was 628, the number of people with medium attitudes was 634, and the number of students who rated as having low attitudes was 190.

Table 3. Descriptive Statistics of the Outcome Variable for Each of the Control Variables

# of books		Country	England	U.S.		Attitudes	1/High	2/Medium	3/Low
Mean		556.65	559.866	553.38		556.95	586.98	536.15	527.11
SD		88.79	92.08	85.27		88.97	81.93	88.26	84.05
Min		235	252	235		235	329	235	252
Max		808	808	752		808	808	768	700
N		1470	730	740		1452	628	634	190

Note. The mean, min, max, and SD of literacy scores based on country origin of the participant and self-report index level for attitude towards reading. The attitudes variable includes both U.S. and England participants (N = 1470), however 18 observations were deleted due to missingness (attitudes variable: N = 1452).

Table 4. Descriptive Statistics of the Predictor Variable on Each of the Control Variables

# of books	Country (combined)	England	U.S.		Attitudes	1/High	2/Medium	3/Low
Mean	112	118	107		112	126	103	98
SD	90	91	88		89	89	89	89
Range	0 – 301	0 – 301	0 – 301		0 – 301	0 – 301	0 – 301	0 – 301
N	1470	740	730		1452	628	634	170

Note. Since the predictor variable is # of books, values are rounded to the nearest whole number. Mean (+ SD and range) for the number of books in the home by country (combined vs. U.S. vs England) and attitude index level (overall vs. high, medium, and low). *The attitudes variable includes both U.S. and England participants (N = 1470), however 18 observations were deleted due to missingness (attitudes variable: N = 1452).*

A note on the attitudes variable: This variable is illustrative of overall trends that can be seen by each scale item measuring attitudes towards reading. In the appendix, (**Table 5 and Figure 1)** there are six bar charts that illustrate the frequency distributions of self-report scores on each of the six items within the attitudinal scale of the PIRLS questionnaire. Examples of attitude

items in the questionnaire include “I enjoy reading” and “I would be happy if someone got me a book as a present.” These questions differ in response options; a self-report rating of 1 indicates “Agree a lot” while a self-report rating of 4 indicates “disagree a lot.”

C. Bivariate Statistical Test

The bivariate statistical test that was conducted was a one-way analysis of variance (ANOVA) of the predictor (number of book in home) across the levels of one of the control variables (i.e. student attitudes). This test determines whether there are statistically significant differences in the mean number of books in the home across three groups: students who rate having high attitudes towards reading (scale score of 1), medium attitudes towards reading (scale score of 2), and low attitudes towards reading (scale score of 3). The level of probability (or alpha level) used to indicate statistically significant differences is 0.05 ($\alpha=0.05$).

Ho: There is no variance in the mean number of books in the home across all three levels of the attitudes towards reading index ($u1 = u2 = u3$).

H1: the mean number of books in the home varies across levels of the attitudes towards reading index ($u1 \neq u2 \neq u3$).

The one-way ANOVA revealed statistically significant differences using the p-value of .05 (as indicated by ($\alpha=0.05$). Due to this finding, a post-hoc test (TukeyHSD) was conducted. The Tukey HSD test compares all pairs of means from the levels of the factor variable. since the attitude scale has three levels, this post-how test is useful for our analysis because it highlights where the actual differences are between groups, Lastly, in contrast to the p-value found in the one-way ANOVA output, the TukeyHSD provides an adjusted p-value that corrects for multiple comparisons.

D. Simple Linear Regression and Multiple Regression

In order to collectively answer the three aforementioned research questions, two regression models were developed and analyzed using r coding software. The first model is a simple linear regression demonstrating the relationship between one dependent variable, literacy score, and one independent variable, the number of books at home. The second model is a

multiple regression model that incorporates both of the control variables, country origin and student attitudes towards reading, into the equation as additional predictor variables of the dependent variable, literacy score (also referred to as the criterion variable).

The overall significance of each model is identified by its p-value corresponding to the F-statistic. All of the statistical models in this paper (both the bivariate and regression) are contrasted at a 95% confidence level, as indicated by an alpha level / significance level of .05 (α=0.05). The two models are compared using an analysis of variance and are evaluated using three elements of the statistical outputs generated by the r coding software, namely the variable coefficients (beta), r-squared and adjusted r-squared values, and p-values. The overall objective of this model comparison is to determine whether the addition of the two control variables to the regression equation more accurately predicts literacy scores; this is reflected by the regression's null and alternative hypotheses:

Ho: The regression equation does not significantly predict variance in literacy scores
H1: The regression equation significantly predicts variance in literacy scores

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III. RESULTS

A. Bivariate Statistical Test

Overall, the one-way ANOVA **(Table 6)** indicates that there is a significant difference in the mean number of books at home across the three levels of reading attitudes *(F-statistic* = 13.7, *p-value* = 1.28e-06, *p-value* <0.001). The post hoc test further confirms specific differences between the groups, with significant p-values being indicated for medium-high (*p-value* < .001) and low-high (*p-value* < .001), but not low-medium (*p-value* = 0.79). To delineate what these p-values mean for each pair comparison, for the`medium-high interaction a significant p-value indicates that the mean books at home for the medium reading attitude group is significantly lower than the high reading attitude group. For the low-high interaction, the mean books at home for the low reading attitude group is significantly lower than the high

reading attitude group. Lastly, in comparison to the two statistically significant interactions, the low-medium comparison revealed that there is no significant difference in mean number of books at home between the low and medium attitude groups as the p-value is relatively high (0.79) which indicates that this comparison is not statistically significant.

The significant ANOVA and TukeyHSD results indicated that the null hypothesis (*Ho: There is no variance in the mean number of books in the home across all three levels of the attitudes towards reading index (u1 = u2 = u3)* should be rejected and the alternative should be accepted. The implications of this finding is that the number of books in the home seems to have a statistically significant effect on the way participants rate their attitudes towards reading.

Table 6.
Bivariate Results: One-Way Analysis of Variance & TukeyHSD Post-Hoc Test for the Number of Books at Home (predictor) Across Three Levels of the Attitudes Towards Reading Variable.

Anova Result	df	Sum Sq	Mean Sq	F-value	P
Attitudes (towards reading)	2	217872	108936	13.7	1.28e-06 ***
Residuals	1449	11523639	7953		
Post-Hoc Test					
TukeyHSD Result		Diff	Lwr	Upr	p-adjusted
medium-high		-23.418664	-35.19785	-11.63948	0.0000101***
low-high		-28.244117	-45.56740	-10.92084	0.0004***
low-medium		-4.825452	-22.12968	12.47878	0.79

*Note: One-Way ANOVA for Number of Books at Home Across Three Levels of the Attitudes Towards Reading Variable (1 = high, 2 = medium, 3 = low). U.S. and England participants (N = 1452); 18 observations deleted due to missingness. Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1.*

C. Simple Linear Regression Model and Multiple Regression Analysis

Simple Linear Regression Equation:
*literacy score (y) = 531.33 + 0.226 * (# of books in home)*

According to the model's equation, the intercept is the expected value for literacy score when all predictors are equal to zero (intercept = 531.33). When the number of books at home is used as the only predictor of literacy score, for each additional book added into the equation there is an estimated 0.22578 increase in the literacy score. The intercept and coefficient are both highly significant (p-value = <2e-16) suggesting that books at home is a reliable predictor of literacy score. The model fit can be assessed by analyzing the multiple and adjusted R squared values (r-sq: 0.05207, r-sq adj: 0.05142). The multiple R squared value indicates that approximately 5.2% of variability in literacy score can be explained by the number of books in one's home environment.

Table 8. Model 1 Output: Simple Linear Regression

Coefficients	Estimate	Std Error	T-value	Pr(>|t|)
Intercept	531.33110	3.61045	147.16	<2e-16 ***
Books at home	0.22578	0.02514	8.98	<2e-16 ***
F-statistic	DF	Residual SE	Multiple R squared	Adjusted R-Squared
80.64	1468	86.48	0.05207,	0.05142

*Note: Residual standard error: 86.48 on 1468 degrees of freedom. Multiple R-squared: 0.05207, Adjusted R-squared: 0.05142. F-statistic: 80.64 on 1 and 1468 DF, p-value: < 2.2e-16. Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1. Equation: literacy score (y) = 531.33 + 0.226 * (# of books in home)*

Furthermore, the multiple regression model was created by adding both control variables to the equation.

*Multiple Regression Equation: Literacy score (y) = 591.609 + 0.196 * (# of books in home) – 3.711*(1 country origin = US or 0 = England) – 32.433*(attitude index level)*

The multiple regression model equation indicates several things that make it a more accurate model for predicting literacy score. For instance, in terms of coefficients, the predicted literacy score when all other predictor variables equal zero is 591.609; this intercept increased by almost 60 points compared to model 1 (model 1 intercept = 531.33). The coefficient for the main predictor, number of books at home, is similar to Model 1 (book coefficient in model 2 = 0.195, in model 1 = 0.2257). The negative coefficient for U.S. country origin indicates that being from the U.S. is associated with a 3.711 pont decrease in literacy score compared to England (which would be an input of "0" thus canceling out the negative value). Lastly, the attitudes coefficient is equal to -32.433, which indicates that for each lower attitude level towards reading (i.e. higher numeric values, denoted by the scale variable: 1 = high attitudes, 2 = medium, 3 = low) decreases literacy score by 32.433. In the Model 2 equation, only three of the four coefficients have statistical significance at the 0.05 alpha level, namely the intercept, books at home, and attitudes coefficients. Conversely, the country origin coefficient did not have a significant p-value (country origin p-value = 0.479).

The model fit can be assessed by the R squared value which is equal to 0.1157; this indicates that about 11.57% of the variability in literacy scores can be explained by the predictor variables in the model. Overall, by using R-squared to compare the two equations, the multiple regression equation provides a more accurate fit of the literacy score data. This is evident in the adjusted R-squared value for Model 2 (Model 2 adjust r-sq = 0.1138; Model 1 adjusted r-sq = 0.05142).

Table 9. Model 1 and Model 2 Comparison

	Model 1	P-value	Model 2	P-value
# of Books at Home	0.2285	<2e-16 ***	0.1958	4.31e-15***
Intercept	531.33	< 2.2e-16***	591.6091	< 2.2e-16***
Attitudes			-32.4334	< 2.2e-16***
Country Origin			-3.1711	0.472

Residual SE			*83.75*	
F-statistic	*80.64*	< 2.2e-16***	63.13	< 2.2e-16***
R squared (R2)	*0.05207*		*0.1157*	
Adjusted R2	*0.05142*		*0.1138*	

*Note: Multiple Regression Equation: Literacy score (y) = 591.609 + 0.196 * (# of books in home) – 3.711*(1 country origin = US or 0 = England) – 32.433*(attitude index level)*

For Model 1, the F-statistic is 80.64 and is statistically significant at an alpha level of .05 (df = 1468; F-statistic = 80.64, p-value = <2e-16). The F-statistic of the multiple regression (i.e. Model 2) is 63.13 with a p-value that is also very small *(F-statistic* = 63.13, p-value = < 2.2e-16). As the p-value is less than our established significance level ($\alpha = 0.05$), there is significant evidence indicating that the addition of the demographic variable, 4th grade participants' country origin, and the attitudinal variable, the index of student attitudes towards reading, significantly improves model fit compared to Model 1. In other words, with 95% confidence we can reject the null hypothesis that the multiple regression model does not significantly predict variance in literary scores, instead accepting the alternative hypothesis that the multiple regression model equation does significantly predict variance in literary scores.

In summary, the multiple regression model suggests that, while controlling for the number of books at home and student attitudes towards reading, being from the U.S. doesn't significantly impact literacy scores, whereas low/negative attitudes towards reading have a significant negative impact on literacy scores.

IV. DISCUSSION

The reason why high attitudes towards reading are strong indicators of literacy score is because literary reading – as compared to reading expository text – requires readers to engage with the setting, characters, themes, etc., which requires the reader to not only understand but also appreciate the literature. Each reader must bring their own experiences, feelings, appreciation of language, and knowledge of literature to the assessment questions in order to score well on the literacy section. In correlation to attitudes, score, and home environment, the

more books a child has in their home is likely an indicator that there are positive attitudes towards reading for fun and leisure. Attitudes are an interesting construct to measure because they are multifaceted – attitudes have a behavioral component, cognitive component, and an affective component – and they ultimately require, at least to some degree, a reflection and retrospective recall of past experiences. With this in mind, a future study that wanted to investigate home environment factors on reading achievement could measure more variables relating to attitudes in order to understand how the socialization of reading in the home translates to how a child behaves / performs in school.

A limitation in this study was the use of country origin as a control / predictor variable in the equation. Initially, the thought process behind using student data from only the U.S. and England was that it would eliminate possible confounds or sampling noise. For example, comparing countries with very different cultures may be a form of sampling bias because of cultural differences influencing why there are more or less books in the home. However, in retrospect I realized that it would have been more insightful to use countries with disparate literacy score distributions; this could have demonstrated whether or not there is an effect of greater numbers of books in the home on literacy score. Future research should utilize a different demographic variable, such as inter-country racial/ethnic groups (i.e. comparing different ethnic groups within the same country) or socioeconomic statuses within a single country.

APPENDIX

Table 1.
Reading Achievement Between Countries: Comparing the variances Literacy Scores One-Way Analysis of Variance & TukeyHSD Post-Hoc Test

Anova Result	df	Sum Sq	Mean Sq	F-value	P
Country origin	3	7848683	2616228	371	<2e-16 ***
Residuals	2875	2027333	7052		
TukeyHSD Result		Diff	Lwr	Upr	p-adjusted
Norway-Columbia		81.227	69.723	92.731	0.000***
England-Columbia		132.243	120.816	143.67	0.000***
U.S.-Columbia		125.76	114.296	137.227	0.000***
England-Norway		51.016	39.717	62.315	0.000***
U.S.-Norway		44.533	33.195	55.871	0.000***
U.S.-England		-6.483	-17.743	4.778	0.4498208

*Note: Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1.*

Table 2.
Variables and Descriptive Statistics

Variable Type	Variable Name	# of levels	Level Descriptors	Level of Measurement	Value range	Corresponding Variables
DV: O	Literacy Score	1		Continuous	235 – 800	
IV: P	# of Books at Home	1		Continuous Scale	0 – 300	
IV: C1	Country / Student Nation ID	2	1 = U.S. 2 = England	Categorical		

IV: C2	Attitudes Towards Reading	3	1 = high 2 = medium 3 = low	Ordinal		See table 5

DV: O = dependent variable / outcome variable
IV: P = independent variable / predictor variable
IV: C1 = independent variable / control variable #1
IV: C2 = independent variable / control variable #2

Table 3. Descriptive Statistics of the Outcome Variable for Each of the Control Variables

# of books		Country	England	U.S.		Attitudes	1/High	2/Medium	3/Low
Mean		556.65	559.866	553.38		556.95	586.98	536.15	527.11
SD		88.79	92.08	85.27		88.97	81.93	88.26	84.05
Min		235	252	235		235	329	235	252
Max		808	808	752		808	808	768	700
N		1470	730	740		1452	628	634	190

Note. The mean, min, max, and SD of literacy scores based on country origin of the participant and self-report index level for attitude towards reading. The attitudes variable includes both U.S. and England participants (N = 1470), however 18 observations were deleted due to missingness (attitudes variable: N = 1452).

Table 4.
Descriptive Statistics of the Predictor Variable on Each of the Control Variables

# of books		Country (combined)	England	U.S.		Attitudes	1/High	2/Medium	3/Low
Mean		112	118	107		112	126	103	98
SD		90	91	88		89	89	89	89
Range		0 – 301	0 – 301	0 – 301		0 – 301	0 – 301	0 – 301	0 – 301

N		1470	740	730		1452	628	634	170

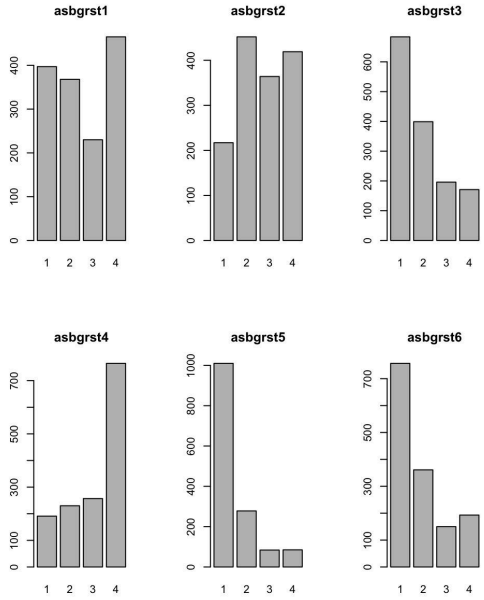
Note. Since the predictor variable is # of books, values are rounded to the nearest whole number. Mean (+ SD and range) for the number of books in the home by country (combined vs. U.S. vs England) and attitude index level (overall vs. high, medium, and low). *The attitudes variable includes both U.S. and England participants (N = 1470), however 18 observations were deleted due to missingness (attitudes variable: N = 1452).*

Table 5. Trends in Participant Responses to Scale Items Measuring Reading Attitudes

	Frequency of "1" responses**	**Frequency of "2" responses**	**Frequency of "3" responses**	**Frequency of "4" responses**	**N**
Question 1	397	368	230	465	1460
Question 2	217	452	364	419	1452
Question 3	684	399	196	171	1450
Question 4	191	230	257	765	1443
Question 5	1010	278	84	85	1461
Question 6	757	361	150	193	1457

Note: 6 total items assessed student attitudes towards reading. The variable names in dataset reflecting each question (1,2,3,4,5,6): "asbgrst1," "asbgrst2," "asbgrst3," "asbgrst4," "asbgrst5," "asbgrst6." Frequencies represent combined U.S. and England participant responses. The attitudes variable includes both U.S. and England participants (N = 1470), however the frequencies of participant responses for each question are representative of their proportion to the total number of responses (as denoted by the "N" column).
*Note** = 1 = agree a lot, 2 = agree a little, 3 = disagree a little, 4 = disagree a lot.*

Figure 1. Bar plots of Attitude Item Response frequencies



Note: 1 = agree a lot, 2 = agree a little, 3 = disagree a little, 4 = disagree a lot. The variable names in dataset reflecting each question (1,2,3,4,5,6): "asbgrst1," "asbgrst2," "asbgrst3," "asbgrst4," "asbgrst5," "asbgrst6." Frequencies represent combined U.S. and England participant responses.

Question Key

asbgrst1	**asbgrst2**	**asbgrst3**	**asbgrst4,**	**asbgrst5,**	**asbgrst6.**
I read only if I have to	*I like talking about books with other people*	*I would be happy if someone bought me a book as a present*	*I think reading is boring*	*I need to read well for my future*	*I enjoy reading*

Table 6. Bivariate Results:
One-Way Analysis of Variance & TukeyHSD Post-Hoc Test for the Number of Books at Home (predictor) Across Three Levels of the Attitudes Towards Reading Variable.

Anova Result	df	Sum Sq	Mean Sq	F-value	P
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Post-Hoc Test					
TukeyHSD Result		Diff	Lwr	Upr	p-adjusted
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low-high		-28.244117	-45.56740	-10.92084	0.0004***
low-medium		-4.825452	-22.12968	12.47878	0.79

*Note: One-Way ANOVA for Number of Books at Home Across Three Levels of the Attitudes Towards Reading Variable (1 = high, 2 = medium, 3 = low). U.S. and England participants (N = 1452); 18 observations deleted due to missingness. Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1.*

Table 7. Correlation Analysis: Number of Books at Home and Literacy Score

Pearson's Correlation	corr	p-value	sample size
R output	0.228	8.11e-19***	1470

*Note: Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1*

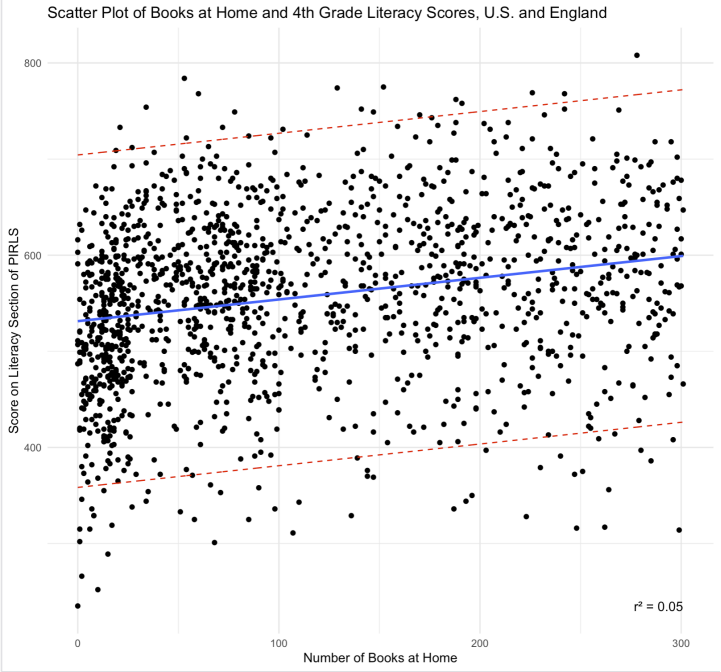
Table 8. Model 1 Output: Simple Linear Regression

Coefficients	Estimate	Std Error	T-value	Pr(>|t|)
Intercept	531.33110	3.61045	147.16	<2e-16 ***
Books at home	0.22578	0.02514	8.98	<2e-16 ***

F-statistic	DF	Residual SE	Multiple R squared	Adjusted R-Squared
80.64	1468	86.48	0.05207,	0.05142

*Note: Residual standard error: 86.48 on 1468 degrees of freedom. Multiple R-squared: 0.05207, Adjusted R-squared: 0.05142. F-statistic: 80.64 on 1 and 1468 DF, p-value: < 2.2e-16. Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1.*

Figure 3. Simple Linear Regression; r^2 value = 0.05



Multiple R-squared: 0.05207, Adjusted R-squared: 0.05142.

Table 9. Model 1 and Model 2 Comparison

	Model 1	P-value	Model 2	P-value
# of Books at Home	0.2285	<2e-16 ***	0.1958	4.31e-15***
Intercept	531.33	< 2.2e-16***	591.6091	< 2.2e-16***

Attitudes			-32.4334	< 2.2e-16***
Country Origin			-3.1711	0.472
Residual SE			*83.75*	
F-statistic	*80.64*	< 2.2e-16***	63.13	< 2.2e-16***
R squared (R2)	*0.05207*		*0.1157*	
Adjusted R2	*0.05142*		*0.1138*	