


It all starts at home: ‘Home reading environment and reading outcomes in rural China’

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Background: The educational resources that parents provide at home are crucial to their children’s development. In this study, we focused on home reading environment, a key contributor to success rates regarding the mastery of reading skills. We aimed to investigate students’ home reading environments and examine its effect on the reading development of primary school students in rural China.

Methods: We draw on a dataset composed of 10,740 randomly selected primary school students and their households in rural areas of Jiangxi province in China. Surveys were administered by trained enumerators in May 2015.

Results: The results show that students exhibited quite poor reading environments and reading outcomes. Specifically, we found the majority of the rural students lacked reading and learning resources in the context of their families and their parents did not enjoy reading or support their children’s reading. Moreover, our regression analysis documented students with poorer home reading environments are more likely to

have worse reading performance.

Conclusion: Our study supports the significance of the home reading environment in the reading development of students in the upper elementary grades in rural China. Furthermore, the results suggest that the home reading environments of rural Chinese students must be improved.

Keywords: home reading environment, primary school, reading achievement, rural China

Highlights

What is already known about this topic

- The home reading environment is believed to have a positive influence on students' reading performance, especially during early childhood.
- Previous studies examining the relationship have found mixed results, with effects varying across different study settings.
- Few studies have examined this topic in the context of rural China.

What this paper adds

- This study analysed students' home reading environments and the reading outcomes of primary school students in rural China.

Implications for theory, policy or practice

- Our findings provide developing Asian countries with information that enhances understanding of the impact of home reading environments on students from low socio-economic backgrounds.
- Our findings highlight the importance of home reading environments in the student reading development of primary school students in rural China and are aligned with previous research in other countries. Improving the limited reading environment of rural Chinese students in this stage could promote their reading development.

The educational resources parents provide at home are crucial for their children's development (Becker & Tomes, 1986; Gustafsson et al., 2011). Research has found that these resources, as well as the behaviours and backgrounds of parents, influence student attitudes towards learning, academic performance at school and success in later life (Davis-Kean, 2005; Linver et al., 2002; Tse et al., 2016; Yeung et al., 2002). In fact, studies have consistently shown that parental investment in their children's education can be more influential in determining students' educational outcomes than investments made by schools or students themselves (De Fraja et al., 2010; Dufur, 2013; Heckman, 2008; Houtenville & Conway, 2008). For these reasons, the home learning environment has become an important and widely accepted predictor of long-term student achievement (Clark & Hawkins, 2010; Sanders & Epstein, 2005; Van Steensel, 2006).

In particular, the home reading environment, which includes access to books and parental involvement in reading, is believed to positively influence students' reading performance, especially during early childhood (Boerma et al., 2017; Tse et al., 2016). Possessing adequate reading skills has been recognized as a gateway for students to succeed in other academic areas (Clark & Hawkins, 2010; Jordan et al., 2000; Tse et al., 2016). Moreover, of all school subjects, reading is believed to be the most sensitive to parental influence and investment (Clark & Hawkins, 2010; Monique & Lefevre, 2002). Studies suggest that students from richer home reading environments tend to develop both an enjoyment of reading and more advanced reading skills at an early age, which ultimately stimulate the development of reading and language skills (Araújo & Costa, 2015; Clark & Hawkins, 2010; Farkas & Beron, 2004; Gustafsson et al., 2011; Moore, 2000; Myrberg & Rosén, 2009; Nord et al., 2000). Furthermore, the adverse effects of socio-economic background on the student reading development were in part mediated by a richer home reading environment (Brooks-Gunn et al., 1996; Duncan et al., 1994).

Although past research has attempted to quantify this effect on student reading achievement and other reading outcomes, existing evidence is mostly limited to younger children (i.e., preschool, kindergarten or those in the first few grades of primary school) in developed settings (Chansa-Kabali & Westerholm, 2014). However, few studies have explored the effect of home reading environments on students in the later grades of primary school (specifically, fourth and fifth grade) (Boerma et al., 2017; Sénéchal & LeFevre, 2014). The reading skills developed during this period are critical and different from those acquired earlier. For example, students in these grades need to learn how to create and extract meaning from texts (Boerma et al., 2017; Katzir et al., 2009; Woolley, 2011). The correlates of student reading achievement in these later stages cannot be overlooked and may differ from those among younger children. Moreover, socio-economic context has been shown to influence the relationship between home reading environment and reading achievement; as a result, studies examining this relationship have had mixed results, with effects varying across different study settings (Araújo & Costa, 2015; Mol & Bus, 2011; Park, 2008). However, given that illiteracy and low educational status are concentrated in lower income countries, more empirical research is needed to elucidate this relationship in developing settings, especially among students in the upper grades of primary school.

Rural China presents a valuable case study to investigate the relationship between home reading environment and student reading performance for several reasons. First, China is not only representative of a developing country, but also of developing countries in Asia specifically (Lau & Ho, 2016). Second, because of the severe economic and educational inequalities between urban and rural areas of China, rural students lag behind their urban peers in various educational measures (Wang, Liu, Zhang, Shi, & Rozelle, 2013; Zhang et al., 2013). Specifically, it has been found that rural students consistently perform worse than urban students in core academic subjects such as math and science (Kleiman-Weiner et al., 2013; Lai et al., 2009; Li et al., 2015; Qian & Smyth, 2008). Moreover, rural students have worse educational resources in both their schools and home reading environments (Fu, 2005; Guo et al., 2013; Li et al., 2017; Wang & Li, 2009). As a result, rural students are likely to face greater challenges in their reading development and lifelong academic achievement (Chansa-Kabali & Westerholm, 2014). Given that more than half of all Chinese students live in rural areas, it is imperative to understand how their home reading environments impact their reading performance (Ministry of Education of the People's Republic of China, 2015).

Despite that the Chinese government recognizes the importance of reading through its 2014 national reading initiative, little research exists on which interventions best improve the reading skills of rural Chinese primary school students, especially in the context of the home reading environment. The few studies that have examined this subject focused only on students in urban Chinese cities, finding that reading achievement levels were high overall and that the home reading environment plays an important role (Li & Rao, 2000; Ning et al., 2016). Considering the huge gap between urban and rural areas, it is unclear what role the home reading environment plays in rural China, where both resources and parental investment are limited (Chansa-Kabali & Westerholm, 2014; Li et al., 2015; Mullis, Martin, Foy, & Drucker, 2012; Wang et al., 2015). However, to date, no studies have examined this topic in the context of rural China.

The overall objective of this study was to investigate students' home reading environments and the relationship between this factor and the reading performance of primary school students in rural China. To achieve this goal, we first describe the home reading environments of rural primary school students, focusing on home learning resources, parental enjoyment in reading and parental beliefs surrounding reading. Second, we assess students' reading achievement, reading confidence and reading behaviours. Finally, we investigated students' home reading environment in relation to their reading performance including reading achievement, reading confidence and reading behaviours.

Data collection and empirical method

Sampling procedure and data collection

Our study was conducted in rural areas of Jiangxi province, which is located in Southeast China. Accounting for 3.7% of the national rural population, Jiangxi's rural residents have an average income of 11,139 RMB—close to the national average of rural China (11,422 RMB—National Bureau of Statistics of China [NBSC], 2016). In addition, in 2014, the enrolment ratio of school-aged children in primary schools of Jiangxi was close to the national average ratio of 99.8% in the same year (NBSC, 2015). Moreover, more than 3 million primary school students live in rural Jiangxi, 5% of the total number of rural students nationwide (NBSC, 2016). Therefore, the rural Jiangxi province is representative of the populous to a certain extent, predominantly rural provinces in China.

After selecting the Jiangxi province, we used the following procedure to sample our rural primary school students and their households. First, we selected three sample counties in Jiangxi province whose GDP growth rate in 2015 was close to the provincial GDP growth rate of 10.9% in the same year (Statistics Bureau of Jiangxi Province [SBJP], 2015). Next, we randomly selected 118 rural primary schools from a list of all primary schools in these three sample counties. After that, we randomly selected at most two classes in both the fourth and fifth grades of each sample school. In total, 10,740 fourth and fifth-grade rural students and their households from 118 primary schools were included in our study (Table 1). The participation rate was around 96.9%.

Our study data were collected through a survey administered by trained enumerators with students and household members in May 2015. In the survey, we adopted the test items and survey questions from the Progress in International Reading Literacy Study of 2011 (*PIRLS*), which has been used to assess students' reading learning in 45 countries and regions (Caygill, Chamberlain, New Zealand, & Comparative Education Research

TABLE 1. Size of sample in the survey of primary school students in rural China in southern Jiangxi province in 2015

	Schools	Classes		Students	
	<i>N</i>	<i>N</i>	%	<i>N</i>	%
Grade 4	118	138	49.1	5,231	48.7
Grade 5	118	143	50.9	5,509	51.3
Total	118	281	100.0	10,740	100.0

Source: Author's own data.

Notes: We randomly chose at most two classes in each grade of each sample primary school.

Unit, 2004; Cheung et al., 2009; Mullis, Martin, Gonzalez, & Boston College, 2004; Tunmer et al., 2013). Overall, the survey consisted of two main blocks: (a) the student's home reading environment and (b) student reading outcomes.

Examining student home reading environments

In the first block, we collected information about each student's home reading environment from the parent in the household primarily responsible for taking care of the student. Parents answered a questionnaire that focused on three elements of the student's home reading environment: home resources for student learning, parental enjoyment of reading and parental beliefs surrounding reading. The former two elements were drawn from two scales of the PIRLS. To assess whether the student had home resources for learning, we collected information regarding the highest level of education and occupation of either parent, number of books and children's books in the home and other reading support resources at home (e.g., Internet connection or if the student has his or her own room). This was based on questions in the PIRLS scale. The scale for parental enjoyment of reading asked parents to rate how much they agreed with eight statements, which were designed to quantify whether they enjoyed reading (Table A1). Parents were also asked directly whether they held certain attitudes towards reading (e.g., whether reading has a positive effect on student academic performance).

Assessing student reading outcomes

In the second block of the survey, the enumerators assessed student reading achievement, confidence in reading and reading behaviours. In one part of this block, we conducted standardized reading tests to evaluate student reading achievement. With the assistance of local education bureaus and a body of experts, the test items were selected from question pools of the PIRLS reading tests. After pilot testing in Grades 4 and 5 to ensure that the test material and time limits were appropriate, the researchers validated the psychometric properties of the reading tests using data from previous pilot testing to guarantee good distributional properties. Through this process, we ensured the tests were of appropriate difficulty and sufficiently high quality. In addition to evaluating students' overall test scores, we divided the reading scores into two categories based on the PIRLS material: 'score of literacy experience' and 'score of acquiring and using information' (IEA, 2011). To assess students' confidence in reading, we also utilized the PIRLS

confidence in reading scale, which contains seven statements, and the level and score of students' confidence in reading, which was calculated based on how the student responded to each statement (Table A2).

Students were also asked a series of questions about their reading behaviours in the survey. Specifically, in this section, we asked whether the student spends more than 30 min on reading daily, whether the student talks with friends about books monthly and whether the student borrows books from friends monthly. Moreover, our survey questions covered information regarding student gender and age in each sample school.

Statistical approach

We used ordinary least squares (OLS) regression analysis to determine the correlation between student home reading environments and student reading outcomes in rural China. The following model was used:

$$y_{ijc} = \alpha + \beta R_{ijc} + \gamma X_{ijc} + \varphi_{ijc} + \varepsilon_{ijc}$$

Here, the dependent variable y_{ijc} indicates the five reading outcomes of student i in school j and class c . These reading outcomes were as follows: student standardized reading test score, student confidence in reading score, whether the student spends more than 30 min on reading daily, whether the student talks with friends about reading books monthly and whether the student borrows books from friends monthly. R_{ijc} represents a vector of dummy variables that represent the student's home reading environment, including whether the student has home resources for learning, the parent likes reading and the parent believes reading has a positive impact on their child's academic performance. X_{ijc} includes a set of control variables (i.e., student gender and age). We also added class fixed effects φ_{ijc} to account for class-level heterogeneity.

Results

Student and household characteristics

Summary statistics for our sample show that the majority of rural students were from low socio-economic status families (Table 2). Specifically, our sample is almost evenly split between male and female students (47.9% and 52.1% of the sample, respectively—Row 1). Most sample students were aged between 10 and 12 years (Row 2). In our sample, only a minority of parents (2.5%) had obtained a university degree, whereas more than half (56.3%) had only finished middle school (Row 3). Considering their low educational attainment, it is not surprising that nearly two-thirds of rural parents (63.2%) were farmers, were low-skilled migrant workers or did not have a job (Row 4).

Student home reading environment

To understand students' home reading environments in rural China, we examined three measured indicators: home resources for learning, parental enjoyment in reading and parental beliefs surrounding reading. Table 2 presents the results. According to our data, the rural Chinese students in our sample had poor home reading environments.

HOME READING ENVIRONMENT IN RURAL CHINA

TABLE 2. Description of student characteristics and home reading environment among rural primary school students in Jiangxi province of China

Variable	Observations (<i>N</i>)	Percent of students (%)
Student characteristics		
1. Student gender		
Female	5,146	47.9
Male	5,594	52.1
2. Student age		
7–9 years old	120	1.1
10–12 years old	9,959	92.7
13–17 years old	661	6.2
Home reading environment		
3. Highest level of education of either parent		
Less than middle school	4,424	41.2
Finished middle or high school	6,050	56.3
Finished university or higher	266	2.5
4. Highest level of occupation of either parent		
Has never worked outside home for pay, general labourer or semi-professional	6,789	63.2
Small business owner	1,721	16.0
Professional or clerical ^a	2,230	20.8
5. Number of books in the home		
0–10 books	7,027	65.4
11–25 books	2,247	20.9
26–100 books	1,048	9.8
101–200 books	207	1.9
More than 200 books	211	2.0
6. Number of children's books in the home		
0–10 books	8,434	78.5
11–25 books	1,432	13.3
26–50 books	562	5.2
51–100 books	175	1.7
More than 100 books	137	1.3
7. Other reading support resources at home		
None	2,779	25.9
Internet connection or own room	5,170	48.1
Both	2,791	26.0
8. Home resources for learning (scale) ^b		
Few resources	2,424	22.6
Some resources	8,298	77.2

(Continues)

Table 2. (Continued)

Variable	Observations (<i>N</i>)	Percent of students (%)
Many resources	18	0.2
9. The parent enjoys reading (scale)		
Does not enjoy it	4,367	40.7
Somewhat enjoy it	5,602	52.2
Very much enjoy it	771	7.1
10. The parent believes independent reading has a positive effect on student academic performance		
No	7,520	70.0
Yes	3,220	30.0

Source: Author's own data.

^aPlease note that because of the household registration system in China, few people living in rural areas can obtain a clerical or professional position unless they are highly educated. Taking into account the small number of these people in our sample, in our analysis, we also consider rural residents with clerical jobs to have professional jobs.

^bThe scale was developed by PIRLS in 2011. It was created based on five statements that are reflected in this table by Variables 3–7.

^cThe scale was developed by PIRLS in 2011. It was created based on eight statements that are shown in Table A2.

Regarding home resources for learning, the results show that very few rural students had sufficient resources for reading and learning at home (Table 2, Rows 3–8). Less than 5% of the sample households had more than 100 reading books (3.9%—Row 5). Furthermore, only 3.0% had more than 50 children's books (Row 6). Moreover, only about one-quarter of the sampled students (26.0%) had both their own rooms (a private study space) and an Internet connection (which allows students to read or buy books online—Row 7). Thus, on the overall scale of home resources for learning, which is an aggregate scale based on responses from five measures of resources such as the level of education of parents and number of books, only 0.2% of the entire sample had 'many resources' for learning at home (Row 8). These findings further confirm the lack of reading materials in rural households in China, as previous studies have revealed (Deng, 2006; Li et al., 2014; Sheng, 2014).

Even if learning resources may be few at home, if parents enjoy reading and support their children's reading, this may contribute and compensate for the home reading environment and subsequently promote children's reading development (Davis-Kean, 2005). Unfortunately, this is not the case. Our data demonstrate that in our sample, rural parents exhibited low levels of enjoyment in terms of reading. In fact, according to the answers provided by the sample parents, 40.7% did not enjoy reading, whereas only 7.1% really enjoyed reading (Table 2, Row 9). These findings are consistent with those of previous studies, which found that the majority of rural Chinese parents did not like reading and that many of these parents spent little time reading (Chen & Yang, 2012; Zhao, 2015).

Furthermore, the analysis found that a large proportion of rural families do not understand the value of reading and do not support their children in engaging in independent reading. Of the sampled families, 70% did not believe that independent reading has a positive effect on student academic performance (Table 2, Row 10). This lack of understanding that reading skills are tied to academic performance contrasts the findings of international research (Gao et al., 2018; Kim, 2006; Kim & Quinn, 2013). Specifically, it has been found that improved reading skills offer a wide range of benefits regarding

students' achievement in various academic subjects (Rutherford-Becker & Vanderwood, 2009; Thurber et al., 2002).

To contextualize these findings in the previous literature, we compared the home reading environments of our sample students in rural China with those of students in urban China and internationally. Unlike our rural sample students, urban Chinese students reportedly have much better reading environments (Li, 2016; Ren et al., 2015; Zhang, 2017). For example, a study in seven large Chinese cities showed that more than half of urban students (53.2%) have at least 20 children's books at home and that their parents often buy them books (Li, 2016). Another small-scale survey in Shaanxi province found that the majority of urban students from primary schools (69.6%) owned more than 50 books in their families, whereas almost all parents (90.6%) supported their children's reading (Zhang, 2017). Compared with the participants of the PIRLS surveys from 45 countries and regions, our analysis of the international comparison shows that our sample students in Grade 4 or 5 ranked lowest in terms of home reading environment status. Given that students from the other countries and regions in the PIRLS tests were in the fourth grade, we tried to exclude the grade influence and thus split our sample students into students in Grades 4 and 5. Specifically, compared with the other countries/regions, our sample students in Grades 4 and 5 ranked in the last five and six in terms of the average scale score of home resources for learning (Table 3, Rows 40 and 41). When comparing specific components of home resources for learning, for example, at least one parent with a university degree or having more than 25 children's books or more than 100 books at home, rural sample students also ranked last (Table 4, Rows 46 and 47, Columns 1, 3 and 4). Similarly, rural Chinese students ranked last in terms of the percentage of students whose parents enjoyed reading (Table 5, Rows 44 and 45). However, because the indicator of parental attitude towards reading on student academic performance was not adopted from the PIRLS, we could not compare this indicator via the PIRLS assessments.

Student reading achievement, reading confidence and reading behaviours

The home reading environment of sample students was found to be unstimulating and not conducive to their reading development; thus, we believed these students' reading performance would be poor. In this subsection, we evaluate the reading performance of our sample students in rural China. We measured three types of reading performance in the analysis: student reading achievement, confidence in reading and reading behaviours.

The results of the survey confirmed our hypothesis. According to our findings, rural Chinese students are profoundly challenged in their learning-to-read process. First, the rural Chinese students in our sample exhibited low levels of reading skills. Only 37.3% of the sample students (4,001 of 10,740) scored above 50% on the reading exam (Table 6, Row 1). Regarding the two types of reading scores, we found that students performed better in reading to acquire and use information. Specifically, 28.4% of the sample students scored above 50% in the literacy experience test, whereas 86.5% scored above 50% for acquiring and using information (Rows 2 and 3). Through the PIRLS tests, we also compared the reading levels of our sample students with those of students in other countries and regions that participated in the reading tests. We used only the scores of the fourth-grade students in our sample, which was the same grade as the students in other countries and regions. We found that the rural Chinese students ranked last in terms of reading achievement (Figure 1). These findings are similar to another study by Gao et al. (2018), who also

TABLE 3. Home resources for learning: Comparing rural China with other countries/regions^a

Country/region	Percent of students with			
	Many resources	Some resources	Few resources	Average scale score
	(1)	(2)	(3)	(4)
Norway	0.42	0.57	0.00	11.50
Australia	0.41	0.59	0.00	11.50
Sweden	0.39	0.61	0.01	11.40
Denmark	0.38	0.61	0.01	11.30
New Zealand	0.37	0.61	0.02	11.30
Canada	0.35	0.65	0.00	11.30
Finland	0.33	0.67	0.00	11.20
Northern Ireland	0.30	0.68	0.02	10.90
Netherlands	0.27	0.72	0.01	10.90
Ireland	0.27	0.71	0.02	10.80
Israel	0.22	0.75	0.03	10.80
Belgium (French)	0.27	0.70	0.03	10.70
Germany	0.24	0.75	0.02	10.70
Singapore	0.24	0.74	0.02	10.70
France	0.23	0.74	0.02	10.60
Czech Republic	0.18	0.81	0.01	10.50
Austria	0.17	0.82	0.02	10.40
Slovenia	0.17	0.82	0.01	10.40
Russian Federation	0.16	0.82	0.03	10.40
Spain	0.19	0.76	0.05	10.30
Malta	0.15	0.84	0.01	10.30
Chinese Taipei	0.18	0.76	0.06	10.20
Qatar	0.12	0.84	0.04	10.20
Hungary	0.21	0.69	0.11	10.10
Poland	0.15	0.79	0.06	10.00
Slovak Republic	0.13	0.81	0.06	10.00
Portugal	0.16	0.75	0.09	9.90
Georgia	0.12	0.80	0.08	9.90
United Arab Emirates	0.10	0.84	0.06	9.90
Hong Kong SAR	0.12	0.80	0.08	9.80
Lithuania	0.11	0.83	0.06	9.80
Trinidad and Tobago	0.09	0.85	0.06	9.80
Croatia	0.08	0.88	0.05	9.70
Italy	0.08	0.85	0.07	9.70
Bulgaria	0.11	0.71	0.18	9.40
Saudi Arabia	0.04	0.79	0.17	9.00

(Continues)

Table 3. (Continued)

Country/region	Percent of students with			
	Many resources (1)	Some resources (2)	Few resources (3)	Average scale score (4)
Romania	0.07	0.67	0.26	8.70
Oman	0.03	0.75	0.23	8.70
Azerbaijan	0.01	0.77	0.22	8.50
Rural China 1^b	0.00	0.77	0.23	8.39
Rural China 2^c	0.00	0.77	0.23	8.34
Iran, Islamic Rep. of	0.04	0.57	0.39	8.10
Colombia	0.01	0.55	0.44	7.70
Indonesia	0.00	0.55	0.44	7.60
Morocco	0.01	0.46	0.53	7.20

Source: Progress in International Reading Literacy Study (PIRLS) and author's own data.

Notes: England and United States did not administer the home questionnaire. The ranking is carried out according to the *Average scale score* variable (Column 4). If used 'Many resources' variable for ranking, rural China would move from 40th and 41st to ranking 43rd and 44th (Column 1).

^aThe scale of *home resources for learning* is combined by the five variables reported in Table 3.

^bRural China 1 refers to the sample rural students in Grade 4.

^cRural China 2 refers to the sample rural students in Grade 5.

conducted reading surveys in the rural areas of Guizhou province, showing that the rural students there also struggled in reading test exams.

Based on the low levels of reading skills, it is not surprising that these sample students tend to show low levels of reading motivation and avoid reading, as previous studies suggested (Araújo & Costa, 2015). The survey results show that rural Chinese students displayed low levels of confidence and spent little time reading (Tables 6 and 7). As shown in Table 7, 16% of fourth-grade students and 21% of fifth-grade students reported that they lacked confidence in reading (Rows 46 and 47). Less than 15% of the sample students considered themselves confident in reading (Rows 46 and 47). Given that the assessment of student confidence in reading was from PIRLS, on this indicator, we also compared the rural sample students with those in other countries or regions. Unsurprisingly, the rural sample students still ranked last in terms of the percentage of those who have confidence in their reading ability (Rows 46 and 47).

Furthermore, looking at students' reading behaviours, rural Chinese students were shown to both spend a small amount of time reading and participate in few reading activities (Table 6). In particular, more than half the sampled students (57.9%) spent less than 30 min each day on reading (Row 4), whereas more than half either participated in reading activities with their friends (i.e., talking with friends about books [59.4%] or borrowing books from friends [51.2%]) less than once per month (Rows 5 and 6).

Correlation between home reading environment and student reading outcomes

If a supportive home reading environment is vital for students' reading learning process in rural China, as previously reported in other developed countries (Araújo & Costa, 2015; Boerma et al., 2017), improving the home reading environment could make a significant

TABLE 4. Components of home resources for learning: Comparing rural China with other countries/regions

Country/ region	Percent of students with				
	At least one parent with a university degree or higher	At least one parent in a professional occupation ^a	More than 25 children's books in their home	More than 100 books in their home	Own room and Internet connection in home
	(1)	(2)	(3)	(4)	(5)
England	–	–	–	0.36	0.73
United States	–	–	–	0.28	0.64
Qatar	0.59	0.58	0.36	0.27	0.52
Norway	0.58	0.66	0.86	0.36	0.87
Denmark	0.56	0.57	0.81	0.37	0.90
United Arab Emirates	0.54	0.49	0.33	0.22	0.42
Belgium (French)	0.50	0.38	0.75	0.32	0.59
Israel	0.46	0.50	0.69	0.34	–
Russian Federation	0.46	0.41	0.65	0.25	0.40
Canada	0.45	0.56	0.84	0.35	0.77
Sweden	0.43	0.59	0.86	0.39	0.84
Australia	0.42	0.54	0.89	0.41	0.74
Finland	0.42	0.50	0.88	0.38	0.79
Netherlands	0.41	0.48	0.76	0.27	0.87
New Zealand	0.39	0.54	0.87	0.38	0.68
Georgia	0.36	0.31	0.38	0.35	0.35
Northern Ireland	0.35	0.49	0.83	0.31	0.70
Saudi Arabia	0.35	0.36	0.17	0.20	0.28
Ireland	0.33	0.43	0.78	0.33	0.72
Singapore	0.33	0.56	0.72	0.31	0.49
Spain	0.33	0.34	0.69	0.30	0.65
France	0.30	0.39	0.75	0.33	0.64
Lithuania	0.30	0.29	0.46	0.15	0.48
Poland	0.30	0.30	0.65	0.24	0.52
Bulgaria	0.29	0.25	0.43	0.23	0.55
Germany	0.28	0.30	0.81	0.35	0.71
Hungary	0.26	0.27	0.68	0.33	0.62
Slovak Republic	0.26	0.31	0.58	0.26	0.47
Azerbaijan	0.25	0.18	0.15	0.08	0.10
Portugal	0.25	0.33	0.63	0.21	0.63

(Continues)

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Table 4. (Continued)

Country/ region	Percent of students with				
	At least one parent with a university degree or higher	At least one parent in a professional occupation ^a	More than 25 children's books in their home	More than 100 books in their home	Own room and Internet connection in home
	(1)	(2)	(3)	(4)	(5)
Slovenia	0.24	0.40	0.69	0.27	0.67
Chinese Taipei	0.23	0.35	0.59	0.30	0.53
Czech Republic	0.23	0.35	0.79	0.34	0.58
Oman	0.22	0.33	0.19	0.22	0.19
Austria	0.21	0.27	0.76	0.28	0.70
Italy	0.20	0.25	0.55	0.23	0.38
Croatia	0.18	0.29	0.43	0.16	0.64
Hong Kong SAR	0.18	0.28	0.52	0.25	0.56
Malta	0.18	0.32	0.87	0.24	0.67
Colombia	0.15	0.18	0.09	0.06	0.20
Iran, Islamic Rep. of	0.15	0.13	0.25	0.14	0.23
Trinidad and Tobago	0.14	0.27	0.61	0.26	0.36
Romania	0.13	0.15	0.33	0.15	0.42
Morocco	0.11	0.09	0.14	0.09	0.16
Indonesia	0.10	0.08	0.15	0.05	0.10
Rural China 1^b	0.04	0.21	0.09	0.05	0.25
Rural China 2^c	0.01	0.21	0.08	0.03	0.27

Source: Progress in International Reading Literacy Study (PIRLS) and author's own data.

Notes: England and United States did not administer the home questionnaire.

The ranking is done according to the *At least one parent with a university degree or higher* variable (Column 1). If used *At Least One Parent in a Professional Occupation* or *Own room and Internet connection in home* variables for ranking, then rural China would move from ranking 46th and 47th to 40th and 41st (Columns 2–5).

^aProfessional occupation includes corporate manager or senior official, professional and technician or associate professional in the other 45 countries/regions, whereas in rural China professional occupation also includes clerical workers in addition to the professional workers.

^bRural China 1 refers to the sample rural students in Grade 4.

^cRural China 2 refers to the sample rural students in Grade 5.

TABLE 5. The parent enjoys reading: Comparing rural China with other countries/regions

Country/region	Percent of students who			
	Like reading (1)	Somewhat like reading (2)	Do not like reading (3)	Average scale score (4)
Sweden	0.52	0.42	0.07	10.90
New Zealand	0.51	0.41	0.08	10.80
Northern Ireland	0.50	0.41	0.09	10.80
Denmark	0.50	0.40	0.10	10.70
Ireland	0.48	0.43	0.09	10.70
Australia	0.48	0.42	0.09	10.70
Malta	0.46	0.45	0.08	10.70
Trinidad and Tobago	0.43	0.51	0.06	10.60
Finland	0.43	0.48	0.09	10.60
Norway	0.44	0.46	0.10	10.50
Israel	0.41	0.50	0.08	10.50
Netherlands	0.45	0.45	0.11	10.40
Canada	0.41	0.50	0.09	10.40
Austria	0.40	0.47	0.13	10.30
Poland	0.34	0.55	0.11	10.20
Germany	0.37	0.48	0.15	10.10
Croatia	0.36	0.51	0.13	10.10
Georgia	0.27	0.67	0.05	10.10
Bulgaria	0.36	0.49	0.15	10.00
Spain	0.34	0.53	0.13	10.00
Czech Republic	0.33	0.53	0.14	10.00
Hungary	0.32	0.55	0.13	10.00
Slovak Republic	0.31	0.56	0.13	9.90
Belgium (French)	0.29	0.56	0.15	9.80
Slovenia	0.26	0.65	0.09	9.80
Italy	0.24	0.66	0.10	9.80
Iran, Islamic Rep. of	0.23	0.68	0.09	9.80
Colombia	0.22	0.68	0.11	9.70
Azerbaijan	0.21	0.70	0.09	9.70
Qatar	0.21	0.70	0.10	9.70
Singapore	0.21	0.68	0.11	9.70
Lithuania	0.25	0.57	0.17	9.60
Russian Federation	0.23	0.61	0.16	9.60
Indonesia	0.21	0.68	0.12	9.60
	0.19	0.71	0.10	9.60

(Continues)

Table 5. (Continued)

Country/region	Percent of students who			
	Like reading (1)	Somewhat like reading (2)	Do not like reading (3)	Average scale score (4)
United Arab Emirates				
Portugal	0.19	0.70	0.11	9.60
Saudi Arabia	0.19	0.67	0.14	9.60
France	0.22	0.62	0.17	9.50
Oman	0.17	0.73	0.10	9.50
Romania	0.21	0.61	0.18	9.40
Chinese Taipei	0.17	0.69	0.14	9.40
Morocco	0.18	0.62	0.20	9.30
Hong Kong SAR	0.14	0.72	0.14	9.30
Rural China 1^a	0.08	0.52	0.40	8.33
Rural China 2^b	0.07	0.52	0.41	8.26

Source: Progress in International Reading Literacy Study (PIRLS) and author's own data.

Notes: England and United States did not administer the home questionnaire.

^aRural China 1 refers to the sample rural students in Grade 4.

^bRural China 2 refers to the sample rural students in Grade 5.

contribution to students' reading development. Thus, we next analysed the relationship between a student's home reading environment and reading performance in rural China.

We first estimated the correlation between student resources at home for learning and students' reading performance. Specifically, after controlling for class-level fixed effects and observable student characteristics, we found that student resources at home for learning were positively correlated with student reading achievement, confidence in reading and reading behaviours (Table 8, Row 1). For example, the average level of reading achievement of students with sufficient reading and learning resources was significantly higher than that of students from households with poor resources ($\beta = 0.06$, $P < 0.01$, Row 1, Column 1). Having resources at home for learning was found to be significantly correlated with student confidence in reading ($\beta = 0.52$, $P < 0.01$, Row 1, Column 2). In addition, compared with their peers, sampled students from families with sufficient reading and learning resources are more likely to spend more time reading and engage in more reading activities, with β values between 0.05 and 0.07 ($P < 0.01$, Row 1, Columns 3–5). Our findings are consistent with those of previous studies, which suggest that the availability of home resources for learning provides more opportunities to cultivate positive reading attitudes in students to engage in reading activities and to an extent promote student reading attainment (Chiu & McBride-Chang, 2006; Tse et al., 2016).

Similarly, there were also positive correlations between parental enjoyment of reading and all observable indicators of student reading performance (Table 8, Row 2). Specifically, our analysis indicated that students whose parents enjoy reading performed better on our measurement of reading achievement than those whose parents do not like to read ($\beta = 0.07$, $P < 0.01$, Row 2, Column 1). The results also show significant correlations between parental

TABLE 6. Description of student reading achievement, reading time and reading activities among rural Chinese students

Variable	Observations (N)	Percent of students (%)
1. Student overall reading score is above half of the total possible score		
Yes	4,001	37.3
No	6,739	62.7
2. Student reading score of literacy experience is above half of the total possible score ^a		
Yes	3,049	28.4
No	7,691	71.6
3. Student reading score of acquiring and using information is above half of the total possible score ^a		
Yes	9,286	86.5
No	1,454	13.5
4. Spend more than 30 min on reading daily (1 = yes)		
Yes	4,525	42.1
No	6,215	57.9
5. Talk with friends about books monthly (1 = yes)		
Yes	4,363	40.6
No	6,377	59.4
6. Borrow books from friends monthly (1 = yes)		
Yes	5,240	48.8
No	5,500	51.2

Source: Author’s own data.

^aAccording to PIRLS, the overall reading test scores can be categorized into two types: score of literacy experience and score of acquiring and using information.

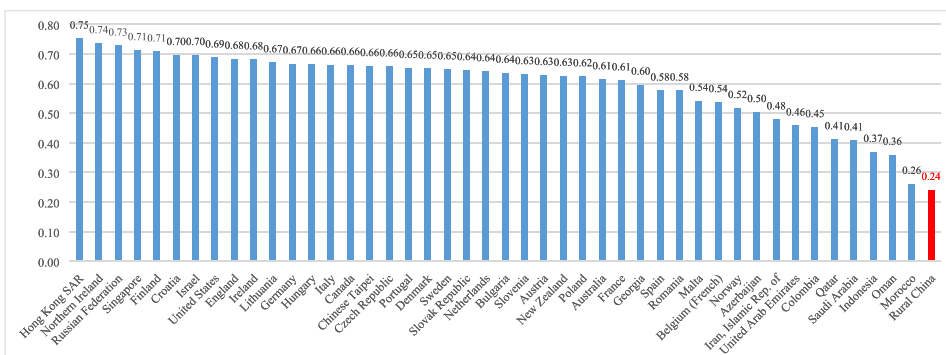


FIGURE 1. Student reading achievement: comparing rural China with other countries/regions. The reading scores for the rural China sample were calculated using reading scores of Grade 4 sample students. The results were calculated using the 11 uniform reading test items from the PIRLS study.

Source: Progress in International Reading Literacy Study (PIRLS) and author’s own data.

HOME READING ENVIRONMENT IN RURAL CHINA

TABLE 7. Student confidence in reading: Comparing rural China with other countries/regions

Country/region	Percent of students who are			
	Confident (1)	Somewhat confident (2)	Not confident (3)	Average scale score (4)
Israel	0.49	0.43	0.08	10.60
Austria	0.48	0.44	0.08	10.60
Finland	0.48	0.47	0.05	10.50
Sweden	0.47	0.48	0.05	10.50
Germany	0.46	0.45	0.09	10.50
Croatia	0.48	0.43	0.09	10.40
Slovenia	0.43	0.48	0.10	10.40
Bulgaria	0.47	0.40	0.12	10.30
Ireland	0.44	0.49	0.08	10.30
Poland	0.44	0.45	0.12	10.30
Romania	0.44	0.44	0.12	10.30
Norway	0.40	0.53	0.06	10.30
Azerbaijan	0.39	0.54	0.08	10.30
Canada	0.41	0.51	0.09	10.20
Hungary	0.41	0.45	0.14	10.20
United States	0.40	0.49	0.11	10.20
Iran, Islamic Rep. of	0.39	0.54	0.07	10.20
Saudi Arabia	0.39	0.53	0.08	10.20
Malta	0.39	0.48	0.13	10.10
Denmark	0.38	0.54	0.08	10.10
Australia	0.37	0.53	0.10	10.10
Indonesia	0.34	0.62	0.05	10.10
Trinidad and Tobago	0.38	0.49	0.13	10.00
England	0.37	0.53	0.10	10.00
Slovak Republic	0.37	0.49	0.13	10.00
Netherlands	0.37	0.48	0.15	10.00
Northern Ireland	0.35	0.55	0.10	10.00
Czech Republic	0.36	0.51	0.13	9.90
Spain	0.35	0.54	0.10	9.90
United Arab Emirates	0.33	0.57	0.10	9.90
Portugal	0.32	0.60	0.08	9.90
Lithuania	0.33	0.54	0.13	9.80
Qatar	0.30	0.59	0.11	9.70
Oman	0.29	0.58	0.13	9.70
Belgium (French)	0.29	0.58	0.12	9.70
Italy	0.28	0.63	0.10	9.70

(Continues)

Table 7. (Continued)

Country/region	Percent of students who are			
	Confident (1)	Somewhat confident (2)	Not confident (3)	Average scale score (4)
Russian Federation	0.28	0.59	0.14	9.60
Georgia	0.28	0.56	0.16	9.60
New Zealand	0.27	0.61	0.13	9.60
France	0.26	0.60	0.14	9.60
Singapore	0.26	0.61	0.13	9.50
Colombia	0.24	0.65	0.11	9.50
Chinese Taipei	0.21	0.57	0.22	9.20
Hong Kong SAR	0.20	0.62	0.18	9.20
Morocco	0.17	0.64	0.19	9.10
Rural China 2^a	0.14	0.70	0.16	9.10
Rural China 1^b	0.1	0.68	0.21	8.90

Source: Progress in International Reading Literacy Study (PIRLS) and author's own data.

^aRural China 2 refers to the sample rural students in Grade 5.

^bRural China 1 refers to the sample rural students in Grade 4.

enjoyment of reading and student confidence in reading ($\beta = 0.63$, $P < 0.01$, Row 2, Column 2). In addition, the coefficients of parental enjoyment of reading on students' reading behaviours are positive and statistically significant in the models, with β values between 0.02 and 0.04 (Row 2, Columns 3–5). As some evidence has indicated, although most of the rural sample parents are constrained by low levels of education and occupation, they still have an impact on their children's reading performance through their own reading experiences and attitudes (Chansa-Kabali & Westerholm, 2014). Aligned with past findings, the degree to which parents enjoy reading may influence parental reading habits and reading activities and thus create a favourable reading climate at home to stimulate student reading development (Graaf et al., 2000; Gustafsson et al., 2011; Hemmerechts et al., 2017).

The results of the regression also indicated that parental beliefs surrounding reading had a positive effect on the reading development of the sampled students (Table 8, Row 3). Specifically, the average reading test scores of students whose parents believe reading has a positive effect on student development were significantly higher than those of their counterparts ($\beta = 0.22$, $P < 0.01$, Row 3, Column 1). Table 8 shows that the *parents believe reading has a positive effect on student academic performance* variable had significant positive correlations with student confidence in reading ($\beta = 0.56$, $P < 0.01$), spending time on reading ($\beta = 0.07$, $P < 0.01$) and their reading behaviours with friends ($\beta = 0.03$, $P < 0.01$, Row 3, Columns 2–5). These results can be explained by the fact that parents with positive reading attitudes are more likely to realize the importance of the relationship between students' reading and their wider academic performance (Clark & Hawkins, 2010; Tse et al., 2016). In this context, parents with positive reading attitudes are more likely to provide a fruitful home reading environment in which they promote reading interaction and activities, which leads to better reading performance.

TABLE 8. Ordinary least squares regression results explaining the association between student reading outcomes and home reading environment among rural students in primary schools in Jiangxi province in China

Independent variables	Student standardized reading test score	Student confidence in reading (scale score) ^a	Student spends more than 30 min on reading daily (1 = yes)	Student talks with friends about reading books monthly (1 = yes)	Student borrows books from friends monthly (1 = yes)
	(1)	(2)	(3)	(4)	(5)
1. Has resources at home for learning (1 = some/many resources)	0.06*** (0.02)	0.52*** (0.07)	0.05*** (0.01)	0.07*** (0.01)	0.06*** (0.01)
2. The parent enjoys reading (1 = yes)	0.07*** (0.02)	0.63*** (0.07)	0.02** (0.01)	0.04*** (0.01)	0.03*** (0.01)
3. The parent believes reading has a positive impact on student academic performance (1 = yes)	0.22*** (0.02)	0.56*** (0.07)	0.07*** (0.01)	0.03*** (0.01)	0.03*** (0.01)
4. Student gender (1 = male)	-0.08*** (0.02)	-0.78*** (0.06)	-0.07*** (0.01)	-0.09*** (0.01)	-0.09*** (0.01)
5. Student age (years)	-0.11*** (0.01)	-0.22*** (0.04)	-0.01* (0.01)	0.01** (0.01)	0.01** (0.01)
Constant	1.12*** (0.15)	15.34*** (0.46)	0.49*** (0.07)	0.23*** (0.06)	0.30*** (0.07)
Observations	10,740	10,740	10,740	10,740	10,740
R ²	0.132	0.139	0.157	0.244	0.226

Source: Author's own data.

Notes: Robust standard errors clustered at the class level are presented in parentheses. Model includes class fixed effects.

^aWe used the original scale score of student confidence in reading.

* $P < 0.1$.

** $P < 0.05$.

*** $P < 0.01$.

Overall, the findings of this study found positive relationships between a student's home reading environment and their reading development among sample students in rural China. It was found that children from richer home reading environments are more likely to develop better reading skills, reading attitudes and reading behaviours. The implications of these findings are important. Aligned with the findings of previous research, our results confirm the important role of home reading environments in student reading development in developing Asian countries (Chansa-Kabali & Westerholm, 2014; Li & Rao, 2000; Park, 2008). Furthermore, these results support the findings of previous studies that found positive correlations between a student's home reading environment and their reading development in the higher grades of primary school (Boerma et al., 2017; Hemmerichs et al., 2017; Katzir et al., 2009; Myrberg & Rosén, 2009; Park, 2008).

Conclusion

Our study focused on a key contributor to success rates regarding the mastery of reading skills—home reading environment—and examined its effect on the reading development of primary school students in rural China. Although a student's home reading environment is vitally important in their reading development during early childhood, our results suggest that primary school students in rural China currently have poor reading environments. Specifically, we found that the majority of the rural students in our study lacked reading and learning resources in the context of their families and that many rural parents did not enjoy reading or support their children's reading. Regarding student reading outcomes in rural China, the sampled students were also found to exhibit lower levels of reading performance. More important, our findings provide developing Asian countries with information that enables better understanding the impact of home reading environments on students from low socio-economic backgrounds. The regression analysis indicated that primary school students from families with better home reading environments in rural China are more likely to engage in reading and obtain better reading achievements.

In conclusion, the study findings confirm that primary school students exhibit both quite poor home reading environments and reading outcomes in rural China and that these poor home reading environments impair students' reading development. According to the findings of Gao et al. (2018), rural Chinese students are also likely to have limited reading resources and poor reading instructions at school. This means that rural Chinese students experiencing both an unstimulating reading environment at home and under-resourced reading environments at school face significant challenges in terms of their reading development at an early stage, as our study has revealed. In fact, previous studies have pointed out that compared with urban students, rural Chinese students were more likely to have limited resources at school, less capable teachers and a lower quality of investment from their parents (Zhang et al., 2013; Wang, Liu, Zhang, Luo, et al., 2013; World Bank, 2001; Huang & Du, 2007). To address this problem, the Chinese government has recently increased investment in teaching equipment and human resources for rural schools, which will benefit student reading development in the near future (Government.cn, 2013; People.cn, 2015). To support the home reading environment in rural China, existing evidence suggests that interventions that provide reading books for students' families and engage parents in reading may be effective solutions (Kucirkova et al., 2010; Sonnenschein & Munsterman, 2002). Therefore, we recommend that the Chinese government develop reading programmes that raise awareness of the importance of the home reading environment among parents and families and urge parents to read with their children in rural areas.

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Conflict of interest

None.

Data availability statement

Public availability of data would compromise privacy of participants. Data will be made available from the Center for Experimental Economics in Education (CEEE) upon request. Interested readers should contact Professor Yaojiang Shi at shiyaojiang7@gmail.com for more information.

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APPENDIX

TABLE A1. PIRLS scale statements reflecting whether the parent enjoys reading

Items

1. I read only if I have to
 2. I like talking about what I read with other people
 3. I like to spend my spare time reading
 4. I read only if I need information
 5. Reading is an important activity in my home
 6. I would like to have more time for reading
 7. I enjoy reading
 8. When you are at home, how often do you read for your enjoyment?
-

Notes: These eight statements are used to measure whether the parent enjoys reading. They were developed by the Progress in International Reading Literacy Study in 2011.

TABLE A2. PIRLS scale statements reflecting student confidence in reading

Items

1. I usually do well in reading
 2. Reading is easy for me
 3. Reading is harder for me than for many of my classmates
 4. If a book is interesting, I don't care how hard it is to read
 5. I have trouble reading stories with difficult words
 6. My teacher tells me I am a good reader
 7. Reading is harder for me than any other subject
-

Notes: These seven statements are used to measure student confidence in reading. They were developed by the Progress in International Reading Literacy Study in 2011.

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