Do Resources Matter? Effects of an In-Class Library Project on Student Independent Reading Habits in Primary Schools in Rural China

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ABSTRACT

It is commonly believed that reading challenges should be addressed early to reduce the likelihood that developmental delays will impact students over the long term. However, students in developing countries often have limited access to reading resources. In this study, the authors used a randomized controlled trial of 11,083 fourth- and fifth-grade students in 120 primary schools in rural China to examine the causal effect of an in-class library program on student reading outcomes and academic achievement in schools with poor reading resources over an eight-month period. An in-class library was installed in each of the selected classes in the 40 treatment schools. The authors found that the program significantly improved student affinity toward reading and student reading habits, and in these regards, it narrowed the gap between male and female students, between low- and high-performing students, and between left-behind children and children living with parents. However, the authors found no overall effect of the program on reading and academic achievement and a negative effect on student confidence in reading. There was also no effect on student, teacher, and primary caregiver perceptions toward the effect of independent reading on academic achievement, nor any effect on whether teachers and primary caregivers provided reading instructions to students. The authors propose three possible explanations for these findings: a lack of reading instruction from teachers and caregivers, a lack of reading materials specifically tailored to local needs and interests, and the relatively short duration of the intervention.

L earning to achieve literacy is a fundamental goal in modern society. Reading literacy is defined by the Progress in International Reading Literacy Study (PIRLS) as "the ability to understand and use those written language forms required by society and/or valued by the individual" (Mullis, Martin, & Sainsbury, 2015, p. 11). Reading not only impacts everyday life but also is at the heart of self-education and lifelong learning (Cox & Guthrie, 2001; Slavin, Lake, Chambers, Cheung, & Davis, 2009). Independent reading facilitates communication, expands general knowledge, and impacts academic success (Dent & Goodman, 2015; Phasha, Lisa, & Magano, 2012).

For this reason, it is commonly believed that reading challenges should be addressed early to reduce the likelihood that delays will impact students over the long term. Matthew effects have been observed in reading development, in which good readers get better while weak readers get weaker in relation to their peers with strong reading skills

(Pretorius & Currin, 2010; Stanovich, 1986). Reading assessments in the United States showed that the gap in reading scores between students from low- and middle-income families expanded from 25% of a standard deviation in grade 4 to 65% of a standard deviation in grade 8 (National Center for Education Statistics, 2011). Those who do not succeed in reading or become reluctant readers also face long odds in achieving success in school and life (Slavin et al., 2009).

Unfortunately, students in developing countries often have limited access to reading resources. School libraries in these countries are scarce and frequently in a dismal state. For example, less than 8% of South African public schools have a functional library (Equal Education, 2011). These libraries are often located in urban areas, whereas most of the population lives in rural areas (Dent & Goodman, 2015). Furthermore, even if there is a school library, it often lacks age-appropriate books for children (H. Wang, 2012; Zhang, 2014). Access to books at home is even less common, especially in low-income families. H. Wang et al. (2015) found that less than 10% of primary school students in rural China reported that their parents ever bought any books for them, and around 70% of students have no more than 10 books at home.

Although providing books to students seems to be a primary intervention for improving student reading skills in developing countries, previous research has found mixed results of whether increasing resources is alone enough to improve student performance. Some studies have found that reading skill development is related to the quantity of material that a student reads, especially age-appropriate readings (Cheung, Tse, Lam, & Loh, 2009; Elley, 2000; Houle & Montmarquette, 1984; McQuillan, 1998; McQuillan & Au, 2001; van Bergen, van Zuijen, Bishop, & de Jong, 2017; Whitehead, 2004). However, most of these studies were conducted in developed regions or countries. In recent years, a growing body of evidence has suggested that merely increasing resources, such as course materials, is generally insufficient for improving student outcomes in general education in developing countries (Ganimian & Murnane, 2016; Glewwe, Hanushek, Humpage, & Ravina, 2013; Hanushek, 1997).

Furthermore, few studies have used randomized controlled trials (RCTs), a high-level kind of impact evaluation, to examine whether providing books alone (without any additional instruction) can influence student reading performance in developing countries. Several studies examined whether students can benefit from programs that provide both reading resources and instruction, however, and their results were conflicting. Two studies using RCTs (conducted in the Philippines and Rwanda, respectively) found that an in-class library program combined with the provision of reading instruction was effective in improving student reading skills (Abeberese, Kumler, & Linden, 2014; Friedlander & Goldenberg, 2016). However, another RCT in India showed that the provision of a school library with a trained librarian had no effect on student reading achievement (Borkum, He, & Linden, 2012). Furthermore, a recent study (Gao et al., 2018) in rural China using matching methods found that two different interventions—one that provided books only and another that provided books along with low-quality, reading-related professional development for teachers— did not have significantly different effects on student reading outcomes and academic performance. In sum, given the fact that quality instruction is even scarcer (relative to reading resources) in developing countries, well-designed research studies are needed to examine whether there is an effect of providing books alone on student reading.

In this article, we evaluate the causal effect of an in-class library program on student attitudes toward reading, student reading habits, and achievement in reading and other subjects in schools with poor reading resources. To meet this goal, we carried out a cluster RCT among the fourth- and fifth-grade classes in primary schools in rural China. Specifically, we have four objectives. First, we document the extent and nature of the attitudes of students toward reading, student reading habits, reading resources, and environmental support for reading in rural primary schools in China. Second, we measure the impact of a free in-class library intervention on student outcomes. Third, we examine whether a free in-class library intervention was more or less effective with certain subgroups of students. Specifically, we seek to identify whether there were any differential effects of the intervention on male versus female students, low reading achievement readers versus other readers, students from low-income families versus other students, and left-behind children versus children who live with their parents. Finally, we explore why the intervention worked or not by examining the effect of the intervention on the teacher and primary caregiver perceptions toward student independent reading and supporting behaviors (or lack thereof). If simply providing books without any additional instruction can reverse the vicious cycle brought on by early reading difficulties, books could, in turn, offer a mechanism through which developing countries can support future educational development.

Independent Reading and Reading Resources in Rural China's Primary Schools

Although reading is an important component of Chinese-language courses in primary schools, independent reading

has not been emphasized until very recently. Traditionally, the content of Chinese-language courses in public schools consisted of word recognition, word spelling, reading, and writing (Zhang & Zheng, 2009), with the main goal of teaching students to achieve high scores on standardized tests (Tian, 2015; Zhao, 2015). Thus, students did not engage in much independent reading (Tian, 2015; Zhao, 2015). In the latest two versions of the Standards on the Course of Chinese Language in Compulsory Education (Ministry of Education of China, 2001, 2011), however, the stated objective of reading instruction is to improve the reading ability of students by encouraging them to read often, read comprehensively, and read independently. In particular, to foster an environment conducive for independent reading, the 2011 version of the standards emphasizes that student independent reading activities should not be replaced by teacher-centered classroom reading (Ministry of Education of China, 2011).

Whereas strong reading performance and good reading habits have become much more common in urban areas in recent years, poor reading achievement and infrequent independent reading are still the norm in rural areas. Urban Chinese students, such as Shanghai students, have been frequently reported as outperforming or ranking near the top among similarly aged peers worldwide in reading, math, and sciences (World Bank, 2016). In contrast, a recent study used test items from PIRLS to assess more than 23,000 rural primary school students from 203 schools in the low-income rural areas in western China and found that the students ranked last in reading skills among a sample of students from the other 44 countries and regions (Gao et al., 2017). It may not be surprising that urban students significantly outperformed their rural peers, at least partly because research has shown that urban primary school students read more frequently than rural students. A study in seven large cities showed that 73% of primary school students read more than half an hour per day (L. Li, 2016). Additionally, nearly 75% of urban children start their reading before 2 years of age (L. Li, 2016). However, some evidence from rural China has indicated that rural students read rarely. In a case study, Q. Zhuang and Du (2007) found that approximately two thirds of rural primary school students in two schools in western China read for less than 15 minutes per day. Another small-scale survey in three counties in northeast China showed that approximately 50% of students read for less than half an hour per day and that 38% of students never participated in any reading activities (X. Li, Jiang, & Fu, 2014).

Although there are many reasons to explain the poor reading performance and habits among primary school students in rural China vis-à-vis their peers in urban China, one of the most frequently cited is the comparative lack of independent reading resources. Across China each year, 460 million children books, only 1.3 books on average for each child, are released onto the market (G. Liu, 2014; J. Zhuang, 2010), and 30% of urban children buy more than 80% of the new books each year (Wen, 2007; J. Zhuang, 2010). In urban China, each family has approximately 51 children's books, and 50% of families buy more than 10 books every year (L. Li, 2016). In contrast, some evidence showed that 40–70% of rural students had fewer than 10 books for independent reading at home (Deng, 2006; X. Li et al., 2014; Sheng, 2014; H. Wang et al., 2015). This urban–rural gap in reading resources exists not only in homes but also in public and school libraries (Lu, 2013; Qiao & Li, 2009; H. Wang, 2012). Even more problematic, libraries and bookstores are often absent or unavailable in remote rural areas (X. Li et al., 2014; H. Wang et al., 2015). Even among students who reported that they read, the evidence is clear that the students, in fact, had few choices regarding accessible reading materials (Sheng, 2014; H. Wang et al., 2015; Q. Zhuang & Du, 2007).

Another reason behind the urban–rural gap in reading performance and habits might be that in the highly competitive schooling system in China, schools, teachers, and parents in rural schools have little incentive to encourage independent reading. In China's developing economy, jobs in agriculture are increasingly being replaced by higher wage and higher value-added jobs. However, rural youths from low-income areas are 7 times less likely to access college—the gateway to these jobs—than urban youths because urban students consistently score better than rural students on college entrance examinations (H. Li, Loyalka, Rozelle, Wu, & Xie, 2015). As a result, urban students, equipped with better academic qualifications and core skills such as reading, have a significant advantage over their rural peers in the job market. Primary schools in rural China are thus under high pressure to prepare students for high-stakes examinations that begin in primary school and last through selection into tertiary schooling by adhering closely to the standard curriculum (H. Wang et al., 2015), which leaves little room for independent reading (X. Li et al., 2014; H. Wang et al., 2015; Yue, 2016; Q. Zhuang & Du, 2007). An assessment system to encourage independent reading has not been established yet, especially in low-income, rural schools (Kong, 2014; Tian, 2015). It is not a surprise, therefore, to find that schools, teachers, and parents in rural areas have frequently objected to independent reading because they believe it will negatively affect student performance in the college entrance examinations (Deng, 2006; Lin, 2007; X. Liu & Tian, 2014; Sheng, 2014; H. Wang et al., 2015; Zhang, 2014; Q. Zhuang & Du, 2007).

Although policymakers in China have launched initiatives to promote reading nationwide, it is yet to be seen whether these strategies will be effective in rural areas. In December 2016, the Chinese government issued its first National Development Plan for Reading during the 13th Five-Year Plan ("National Development Plan for Reading," 2016). Improving literacy among young children and reducing inequality in access to reading resources between rural and urban residents have become national priorities. Many provinces, including Jiangxi in our sample, also made plans to promote reading accordingly. The plan in Jiangxi includes providing more reading resources to schools. To some extent, improving the reading ability of rural students, which is critical for both scholastic and professional achievement in the modern economy, could be one way to significantly improve both their academic and life outcomes. However, it is not clear whether providing more reading resources alone is enough to promote student independent reading in rural schools.

Furthermore, it is also not clear whether more reading resources can help reduce the education gap between certain subgroups of students, such as left-behind children and children from low-income families versus their peers in rural schools. Left-behind children are those rural children whose parents migrated to urban areas for work, and because of policy barriers that restrict the children from receiving access to a free public education in the cities, they live at home with surrogate caregivers, typically the paternal grandparents (H. Li, Loyalka, Rozelle, & Wu, 2017; Mu & Hu, 2016). Because of the rapid increase in migration from rural to urban areas in recent years, left-behind children have become a common phenomenon in modern Chinese society. Due to illiteracy, their grandparents are often unprepared to support the children's learning activities at home (Mu & Hu, 2016). Recent policy efforts, including improving school libraries, will be geared toward meeting the basic needs for reading of such children, in addition to low-income children ("National Development Plan for Reading," 2016). In this study, we looked at whether providing more resources, as these policy efforts plan to do, will actually help improve these children's reading outcomes.

Method

Research Design

We conducted a RCT in three counties in the southern part of the Jiangxi province in China. The economic development in the three counties, which have been nationally designated as low-income counties, is lagging behind the average of China and of other areas in Jiangxi (State Council Leading Group Office of Poverty Alleviation and Development 2012).[1] Per capita gross domestic product in the three counties was less than 20,000 yuan in 2015, which is approximately 40% percent of the national average (Ganzhou Municipal Bureau of Statistics & Survey Office of the National Bureau of Statistics in Ganzhou, 2016; National Bureau of Statistics of China, 2016). More than 80% of the population are rural residents, in comparison with 44% across China and 48% across the Jiangxi province (Ganzhou Municipal Bureau of Statistics & Survey Office of the National Bureau of Statistics in Ganzhou, 2016; National Bureau of Statistics of China, 2016). In sum, to some extent, the three counties are representative of the 680 nationally designated low-income counties, where nearly one fifth of China's population lives. In addition, the population in the three counties is predominantly Han. The share of the ethnic-minority population is less than 1% (Fang, 2017; Ganzhou Municipal Bureau of Statistics & Survey Office of the National Bureau of Statistics in Ganzhou, 2017; Huichang County Chronicles Compilation Committee, 2010; Ruijin People's Government, 2018). These counties border each other, and the local residents speak the same language (Mandarin/Chinese).

The first step of our research design involved selecting a representative sample of schools from the three counties. We used official records from county education bureaus to create a population frame of all rural, public primary schools in the three counties. According to the records, there was a total of 458 schools. In each of the townships, we randomly selected schools using a sampling fraction that was proportional to that of the total number of schools. Finally, we randomly selected 120 schools. Of these, 37 schools (30.8%) were in county A, 25 schools (20.8%) were in county B, and 58 schools (48.3%) were in county C.

After selecting the schools, we next sampled classes and students. We conducted our study among classes and students from the fourth and fifth grades of each of the sample schools. Because of financial constraints, we randomly selected at most two classes in each grade in each school. Specifically, if there were one or two classes in a grade, all classes in this grade were selected. If there were more than two classes in a grade, we randomly selected two classes. We surveyed all students in the sampled classes. Ultimately, we sampled a total of 11,083 students in 288 classes in these 120 schools.

After selecting the sample, we conducted a baseline survey of the fourth- and fifth-grade students in our sample at the end of the school year (in May 2015).

The baseline survey of students entailed a 30-minute standardized reading test, a 30-minute standardized Chinese-language test, a 30-minute standardized mathematics test, and an eight-page student survey questionnaire (described later in the Data Collection subsection). Because of time constraints, we randomly assigned students in each classroom into two groups, and the students in each group only took either the Chinese-language test or the mathematics test. Because of this random assignment, approximately half of the students (5,519 students, 49.8%) took the standardized mathematics test, and the other half (5,564 students, 50.2%) took the standardized Chinese-language test.

Following the baseline survey, we randomly assigned the sample schools into either a treatment group or a control group (see Figure 1). We conducted power calculations to determine the minimum sample size of schools we would need. In doing so, we assumed an intraclass correlation coefficient of .15 and an R-squared of .5. As is standard in much of the social science literature, we set the probability of falsely rejecting a true null hypothesis (alpha) at .05 and the probability of failing to reject a false null hypothesis (beta) at 0.2. We then calculated that we required at least 40 individuals per school and 40 schools per group to detect a standardized effect size of 0.20 (a minimum effect size used by Kim, Samson, Fitzgerald, & Hartry, 2010). Because of

financial constraints, we randomly selected 40 schools for the treatment group, and then we included the rest of the schools in the control group.

We carried out the randomization at a central location (in our office in Beijing) using R software. The random assignment successfully created a sample at the time of the baseline. Among the 23 variables, which measure individual student characteristics, family characteristics, available reading resources, student reading habits, student reading attitudes, student reading skills, student creativity, and performance in other subjects, the balance analysis suggested that there were no statistically significant differences between the treatment and control groups (see Table 1).

The sampled classes within a treatment school all received an in-class library that was provided by a nongovernmental organization (NGO) at the beginning of the next school year (September 2015). In contrast, the sampled classes within a control school were run in a business-as-usual manner (i.e., they did not receive any in-class, or any other, library provisions from the NGO). At the time of the baseline, neither schools nor enumerators were informed of either the overall design of the study or the nature of the treatment group assignment.

In May 2016, eight months after the intervention, we revisited the students in the sampled classes and

FIGURE 1
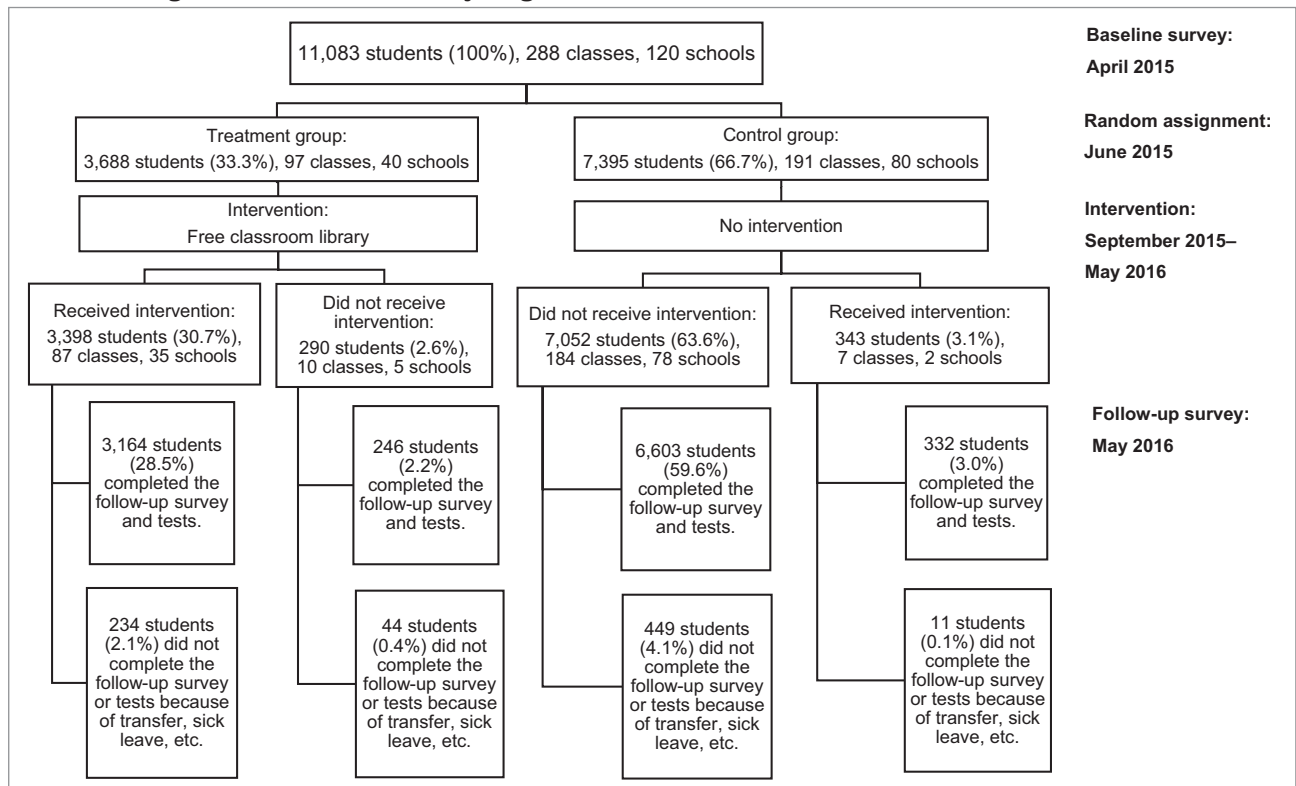**Research Design of the Classroom Library Program in 120 Schools**

TABLE 1
Baseline Characteristics of Students, by Treatment Group

Definition	Control group	Treatment group	Difference	p
Individual student characteristics				
Fifth-grade student (1 = *yes*)	.52 (3,831/7,395)	.51 (1,870/3,688)	−.01	.8676
Age (in years)	11.09 (0.91)	11.07 (0.95)	−.02	.7774
Male (1 = *yes*)	.52 (3,850/7,395)	.52 (1,912/3,688)	−.00	.8294
Boarding student in the spring 2015 semester (1 = *yes*)	.11 (827/7,393)	.06 (228/3,687)	−.05**	.0181
Family characteristics				
At least one parent held a university degree or higher (1 = *yes*)	.17 (1,164/6,926)	.18 (621/3,486)	.01	.3115
At least one parent had a professional occupation (1 = *yes*)	.21 (1,451/6,927)	.20 (692/3,482)	−.01	.2735
Left-behind children (1 = *both parents migrated away for work*)	.46 (3,404/7,395)	.48 (1,764/3,688)	.02	.2568
Students from low-income families (1 = *no refrigerator at home*)	.12 (885/7,393)	.12 (457/3,688)	.00	.6690
Reading resources				
Have library or reading room at school (1 = *yes*)	.75 (5,535/7,395)	.78 (2,871/3,688)	.03	.5722
Have some kinds of books available in the classroom (1 = *yes*)	.22 (1,633/7,395)	.30 (1,114/3,688)	.08	.1788
Have more than 25 children's books at home (1 = *yes*)	.09 (596/6,816)	.09 (308/3,453)	.00	.8022
Student attitudes toward reading				
Scaled score on the Students Like Reading scale	.01 (1.49)	−.02 (1.44)	−.03	.5799
Scaled score on the Students Confident in Reading scale	−.01 (1.44)	.02 (1.44)	.03	.6288
Perceived negative effect of reading on Chinese (1 = *yes*)	.10 (743/7,385)	.10 (377/3,679)	.00	.8601
Perceived negative effect of reading on math (1 = *yes*)	.19 (1,386/7,380)	.19 (687/3,679)	−.00	.9439
Student reading habits				
Never borrow books from school library (1 = *yes*)	.82 (6,029/7,395)	.78 (2,888/3,687)	−.03	.5054
Never borrow books from classroom (1 = *yes*)	.83 (6,117/7,395)	.76 (2,813/3,688)	−.06	.2058
Read for 30 minutes or more each day after class (1 = *yes*)	.42 (3,129/7,389)	.42 (1,539/3,684)	−.01	.8256
Talk about readings with friends (1 = *yes*)	.40 (2,936/7,363)	.43 (1,594/3,669)	.04	.2604
Read together with friends (1 = *yes*)	.37 (2,744/7,387)	.39 (1,434/3,681)	.02	.5111
Borrow books that friends read (1 = *yes*)	.49 (3,607/7,388)	.50 (1,855/3,679)	.02	.5935
Student achievement in reading, Chinese, and math				
Standardized reading score (0–1)	−.01 (0.99)	.01 (1.02)	.02	.7238
Standardized Chinese score (0–1)	.00 (1.01)	−.01 (0.99)	−.01	.7978
Standardized math score (0–1)	.00 (1.00)	−.00 (1.00)	−.01	.8951

Note. Data source: Authors' survey. The sandwich method was used to calculate robust standard errors for the class-level cluster sampling data.
**Significant at 5%.

conducted an evaluation survey. Among 11,083 students who completed our baseline survey, 10,345 students (93%) completed another round of testing and filled out a second set of questionnaires during the evaluation survey (see Figure 1).[2] According to our analysis, there was balance across all 24 variables (except for

boarding status) that we examined between the treatment group and the control group among our nonattrited students who completed both the baseline and endline surveys (see Table B1). This suggests that the attrited students in the treatment group were not significantly different from the attrited students in the control group across observed variables.

Intervention and Implementation

Each of the free in-class libraries installed in the treatment classrooms had one shelf and was stocked with 70 extracurricular books carefully selected by the NGO using several criteria. First, a comprehensive and detailed reading list was collected from a variety of different reputable sources: (a) the winning entries of children's literature awards both internationally (e.g., Hans Christian Andersen Award, Kate Greenaway Medal) and domestically (e.g., Chen Bochui International Children's Literature Award), (b) recommended readings by professional reading institutions (e.g., General Administration of Press and Publication) and specialists (e.g., Anita Silvey), and (c) reading lists used in highly regarded primary schools in China.[3] Next, the reading list was further classified into subgroups according to their subject and topic. Finally, the final booklist was selected by a specialist group that consisted of more than 20 educators, writers, publishers, and librarians. The books varied in content and difficulty based on the age and reading levels of students. In sum, the program provided books that reading specialists and educators believed would be interesting to students and that covered content beyond what was taught in school, such as literature and natural science books. As soon as the in-class library was established in a classroom, teachers and students took the responsibility of managing the in-class library on their own. In other words, the NGO's intervention was limited to selecting the books and installing the in-class library resources.

Several unexpected occurrences created complications while carrying out the intervention. First, two schools (2.5%) in the control group had received in-class libraries even though they were not supposed to (see Figure 2). According to the NGO, this was purely due to a clerical error. Second, despite the planned library-assembling date (all in-class libraries were supposed to, by treatment design, be completed by the end of the first month of class during the academic year, or by the end of September 2015), our evaluation survey showed that the sampled classes in 12.5% of treatment schools had not actually been equipped with a free in-class library (see Figure 2). The reason for the delays in this subset of schools was that the school principals were initially reluctant to put the libraries provided by the NGO into the classrooms. Ultimately, the libraries were installed, but the timing of the installations was delayed. In the subsequent analysis, we examine the impact of this noncompliance on the outcomes.

Data Collection

We collected two rounds of data. The first round of survey, or baseline survey, was conducted in the middle of the spring semester of the 2014–2015 academic year (April 2015). The intervention started at the beginning of the fall semester of the 2015–2016 academic year (September 2015). After eight months of the intervention (May 2016, near the end of the spring semester of the 2015–2016 academic year), we conducted the second round of data collection through a follow-up survey.

FIGURE 2
Compliance of the Random Assignment at Seven Months After the Intervention, by Treatment Group
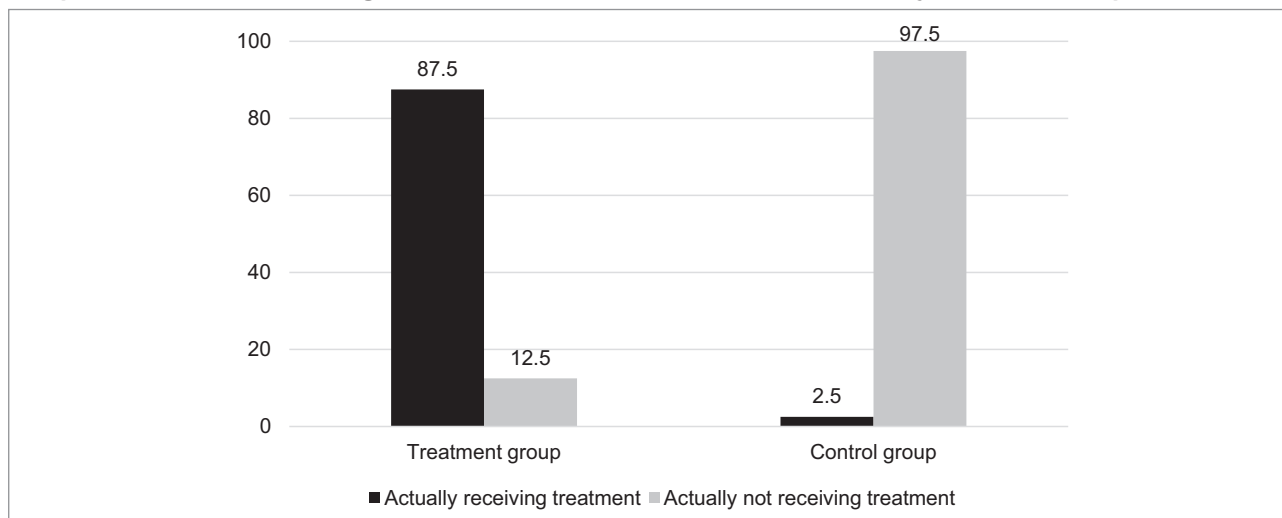
Specifically, in the semester prior to the launch of the program (the second semester of the 2014–2015 school year), we conducted a baseline survey of students, Chinese teachers, and primary caregivers of students in all sampled treatment and control schools. The student survey consisted of two parts. In the first part, we administered a 30-minute standardized test that evaluated reading skills and a 30-minute math or Chinese-language test. In the second part, we administered a four-block questionnaire to each student.

The standardized reading test questions were constructed by professional psychometricians by using test items from the PIRLS test, an international test of reading comprehension that is widely used throughout the world (Caygill & Chamberlain, 2004; Cheung et al., 2009; Mullis, Martin, Foy, & Drucker, 2012; Mullis, Martin, & Gonzalez, 2004; Tunmer, Chapman, Greaney, Prochnow, & Arrow, 2013). We carefully translated the test questions according to the PIRLS translation guidelines (Foy & Drucker, 2013), and then the questions were reviewed by a panel of experts and local teachers familiar with China's educational system. The translated reading tests then went through several rounds of pilot testing in Chinese rural schools. Next, the psychometric properties of the test were validated using data from the extensive pilot testing to ensure good distributional properties (e.g., no ceiling or floor effects). In the analyses, we normalized reading achievement scores using the mean and distribution in the control group. Estimated effects are therefore expressed in standard deviations.

The math and Chinese-language tests were carefully designed with assistance from educators in the local education bureau to ensure coherence with the national curriculum. We pretested the exam multiple times to ensure its relevance and that time limits were appropriate. When we administered the exam in the sample schools, it was timed carefully and closely proctored by enumerators. In our study, half of the sampled students took the reading and Chinese-language tests, and the other half took the reading and math tests. We normalized all test scores according to the distribution of scores in each grade.

In the second part of the student survey, the five-block questionnaire, we first collected individual student characteristics (e.g., each student's grade, age, gender, and boarding status) and family assets.[4] Next, in the second block, we asked students questions about available reading resources at school, classroom, and home. In the third block, we asked a series of questions about student reading habits. Each student was asked whether he or she ever borrowed books from the school library, ever borrowed books from the classroom, read for 30 minutes or more each day after class, talked about readings with friends at least once a month, read

together with friends at least once a month, and borrowed books that friends read at least once a month. In the fourth block, we asked students about their perceptions concerning the effect of independent reading on their performances in Chinese and math. In this block, a series of questions were designed to assess the student's reading confidence and the degree to which the student likes reading and were based on questions asked in the PIRLS assessment (Mullis et al., 2012).[5] We used principal components analysis to calculate a single metric for each of the scales. In the last block, we asked students to report whether their teachers gave them any support for independent reading by asking them to borrow books to read and teaching them how to read in the course.

At baseline, we also administered surveys to Chinese teachers and the primary caregivers of the students. The survey given to Chinese teachers collected information on their demographics and their perceptions toward student independent reading. Specifically, the demographic information was teacher age, gender, education, and teaching experiences. We also asked Chinese teachers in each of the selected classes about their perceptions concerning the effect of independent reading on student academic performance in Chinese and math. The family survey was delivered to the primary caregivers of the students. It collected information on their demographics (e.g., education level), their relationship with the student, family characteristics (the education level, occupation, and migration status of each parents; and the education level of other students in the family), the perception of the primary caregivers toward the effect of independent reading on academic performances (Chinese and math, respectively) of students, and whether they ever read with or to their child.

In May 2016, we conducted the second round of data collection. The survey instruments used in this survey were similar to those used in the baseline survey. In addition, on the follow-up survey day, we carefully recorded student flow, including whether they stayed at school, left their hometown, dropped out, or transferred.

Statistical Approach

In this study, we have four sets of outcome variables. The first set is those that measure student attitudes toward reading. The second set measures the reading habits of students. The third set comprises standardized scores on the reading exam, the Chinese-language exam, and the mathematics exam. The last set of outcome variables measures the perception toward student independent reading and supporting behaviors of Chinese teachers and primary caregivers. The descriptive statistics of these outcome variables are reported in Table B2.

We conducted three types of analysis. Given our randomized experimental design, we first estimated the impact of the intention-to-treat (ITT) effect. The ITT effect captures the effect of being offered the chance to participate in the program. However, because not all schools complied with the random assignment, we also present results from the local average treatment effect (LATE). The LATE scales up the treatment effect to take account of the fact that not everyone complied with the treatment assignment. We further estimate the interaction terms of the intervention and student baseline characteristics to infer how the impact of the intervention on student outcomes depends on student baseline characteristics.

ITT Effect

We used the ordinary least squares regression to estimate the impact of offering an in-class library on our outcome variables.[6] We conducted adjusted analysis with more statistical power by controlling for baseline individual student characteristics, family characteristics, student performance in corresponding outcomes at baseline, and town fixed effects. The specification of the adjusted model is

$$Y_{ijc} = \alpha + \beta T_{jc} + \gamma X_{ijc0} + \delta Y_{ijc0} + \tau D_c + \varepsilon_{ijc} \qquad (1)$$

where Y_{ijc} represents any of the outcome variables of interest of student i from school j in town c, T_{jc} is a dummy variable that takes a value of 1 if the school was assigned to the treatment group (to offer the opportunity to receive an in-class library intervention) and 0 if the school was assigned to the control group, X_{ijc0} is a vector of variables that measure student and family characteristics of student i in school j at baseline, and Y_{ijc0} is a variable that corresponds to the outcome variable (Y_{ijc0}) at baseline. Specifically, the variables controlled on individual student characteristics are grade, age, male, and boarding status in the spring 2015 semester. A detailed description of these variables is presented in Table 1. The variables controlled on family characteristics are education, professional occupation, migration status of parents, and family economic status. D_c is a vector of town dummies. ε_{ijc} is the random error term. β measures the ITT effect of the in-class library without bias.

We used the sandwich method to calculate robust standard errors for our class-level cluster sampling data. Sandwich standard errors allow for intragroup correlation, relaxing the usual requirement that the observations be independent (Nichols & Schaffer, 2007). That is, the observations are independent across classes but not necessarily within classes.

LATE

Although RCTs are the gold standard for impact evaluation, the ITT estimate above might not be equal to the effect of the treatment due to the existence of noncompliance. In our case, we were concerned about noncompliance because the actual assignment of the treatment differed slightly from the initial assignment. To account for this, in the program evaluation literature, researchers have used an instrumental variables approach to estimate the LATE, in other words, the treatment effect on the compliers (Sussman & Hayward, 2010). The endogenous variable is the actual treatment status, and the instrumental variable is the initial random assignment of the treatment status. The specification of the LATE model is just replacing the T_{jc} in equation 1 with C_{jc}, actually received an in-class library. Specifically, it is

$$Y_{ijc} = \alpha + \beta C_{jc} + \gamma X_{ijc0} + \delta Y_{ijc0} + \tau D_c + \varepsilon_{ijc} \qquad (2)$$

where C_{jc} is a dummy variable that takes a value of 1 if the school actually received an in-class library and 0 if the class did not. However, C_{jc} might be correlated with the unobservables, so we use the variable T_{jc} as the instrument variable of the variable C_{jc}. T_{jc} is uncorrelated with ε_{ijc} (and the baseline control) thanks to the randomization procedure, and it has strong predictive power for C_{jc}. We calculated robust standard errors to adjust for clustering by class.

Interactions Between Treatment and Student Subsets

To see whether the impact of the in-class library differed among different types of students, we further included the interaction term of the intervention and student baseline characteristics in the regression. Specifically, we used the following model to estimate the interaction term:

$$Y_{ijc} = \alpha + \beta T_{jc} + \vartheta T_j D_{ijc} + \theta D_{ijc} + \gamma X_{ijc0} \\ + \delta Y_{ijc0} + \tau D_c + \varepsilon_{ijc} \qquad (3)$$

where D_{ijc} is a dummy variable representing the particular baseline characteristics of a student. In this model, the coefficient ϑ measures the different impact of having an in-class library on students with that baseline characteristic (as opposed to students who do not possess that baseline characteristic). In all of our analyses, we calculated robust standard errors to adjust for clustering by class.

We measured whether the ITT effect of an in-class library program varied substantially among different subsets of students by gender (male vs. female), reading achievement (readers with low reading achievement vs. other readers), family economic status (students from low-income families vs. other students), and parental migration status (left-behind children vs. other children). Specifically, we defined students as weak readers if their reading scores at baseline ranked in the lowest quintile. Students from low-income families were

defined as those whose family did not have a refrigerator. Finally, left-behind children were students whose parents were both living at home for less than half of the previous calendar year.

Results

Student Attitudes Toward Reading, Reading Habits, and Reading Resources in Rural Primary Schools: Evidence From a Field Survey

We first report how students believed independent reading affects their performance in other subjects, finding that a considerable share of students had misconceptions about the role of independent reading. Our baseline survey showed that 50% of students believed that independent reading plays no role in their performance in Chinese, and 10% believed that independent reading negatively affects their performance in Chinese-language class. Similarly, 61% of students believed that independent reading plays no role in their performance in math, and 19% believed that independent reading negatively affects their performance in math. Such misperceptions mark a sharp contrast to the findings of the international literature, which has suggested that independent reading impacts academic success positively and is at the heart of self-education and lifelong learning.

There are two possible reasons to explain this phenomenon. One is that the students were too young to be able to see the relation between independent reading and academic performance. The other reason is that these students were heavily influenced by the beliefs of their teachers and caregivers. The teachers and caregivers in rural China, as we will show in this article, often believed that independent reading has no effect or even a negative effect on academic performance.

We also found that students in our sample schools had what we would consider poor reading habits. Our data showed that 80% of students never borrowed books from school libraries and that 81% never borrowed books from their classroom. Only 42% of students read for 30 minutes or more each day after class. Moreover, more than half of students never communicated with their friends about reading. Specifically, 49% of students reported that they borrowed books that friends had previously read, 41% reported that they talked about reading with friends, and even fewer students (38%) read together with friends.

Similar to the findings of other studies in other primary schools in rural China (see the Independent Reading and Reading Resources in Rural China's Primary Schools section), we also found that reading resources for independent reading were very limited for primary students in our sample schools. Overall, we found that 19% of students did not have any available books to read in school, in the classroom, or at home. Specifically, at the baseline survey, 24% of students attended schools without a school library. Three quarters of students lived in homes where there were no books available for reading. Less than 10% of the families of the sample students had more than 25 children's books in the home.

Furthermore, even if there were reading resources available to students, students often did not use them, sometimes because of accessibility issues. Among 8,405 students who attended a school with a school library, 74% reported that they never borrowed books from it. When we asked why, 67% responded that students were not allowed to take books home from the school library. Even among those students in a classroom with a library, more than one fifth (22%) reported that they never borrowed books from the classroom library. Of these, 50% noted that they were not allowed to take books home. In sum, one possible explanation for the infrequent use of school libraries may be that they were not open to students even if libraries existed.

Meanwhile, the fact that the available books were not age-appropriate for students also may explain why students did not want to read. Even if there were available reading books at school or in the classroom, only 23% of students said that the books in which they were interested were usually available for them at school. Of those readers, 60% reported that they could not fully comprehend what they read. A fairly recent study also indicated that the libraries in rural primary schools were providing students with books that were not always chosen with the needs of students in mind, such as books about how to code or how to repair computers (H. Wang et al., 2015). This is consistent with our observations in the field survey.

We also found that students in rural primary schools were in an environment where there was a lack of support for their independent reading. When we asked Chinese-language teachers how they expected the independent reading would affect students, 9% (of 288 teachers) said it would have no positive effect on student performance in Chinese, and 26% said it would have no positive effect on student performance in math. This might also be why some principals objected to installing the libraries. When we asked the same questions to the primary caregivers of the students, 61% said it would have no positive effect on student performance in Chinese, and 76% said it would have no positive effect on student performance in math. The attitudes of these primary caregivers might be highly correlated with local economic development, as another study in three cities, including the provincial capital of Jiangxi, in China suggested that almost all parents (99%) believed that their children would benefit from reading (Tang, 2003).

Similarly, we found that few teachers and primary caregivers provided reading instruction to the students. Specifically, our baseline survey data showed that 67% of students reported that their teachers never asked them to borrow books to read. Worst of all, less than 2% of students reported that their teachers ever taught them how to read in their courses. Meanwhile, 54% of families reported that the primary caregivers never read together with their children at home. That means that even if students read, most of them had little chance to learn how to read from others.

In sum, according to our survey, there is a great need for age-appropriate reading materials in primary schools in rural China. Available reading resources are scarce. Even if school libraries exist, students often have limited access to the books. Most reading materials are not age-appropriate for primary school students. Meanwhile, few of the teachers and most of the primary caregivers believed that independent reading would not have a positive effect on student academic performance. As a result, they seldom provided encouragement and pedagogical instruction for students' independent reading. To some extent, the provision of age-appropriate reading materials might be a good start to help break myths surrounding independent reading in rural China.

The Impact of In-Class Library Resources: Results of the RCT

Effects on Student Attitudes Toward Reading

We first estimated the effects of the in-class library program on student attitudes toward reading. According to the analysis, we found that the program increased the degree to which students like reading by 0.17 points (score of the Students Like Reading scale in the control group at baseline = 0.01) at a 1% statistical significance level (see Table 2, panel A). The LATE estimate is consistent with the ITT estimate (see Table 2, panel B).

Although there was a positive effect of the program on the "students like reading" variable, the program showed a negative effect on student confidence in reading. We found that the program reduced student confidence in reading by 0.12 points (score of student confidence in reading in the control group at baseline = −0.01) at a 5% statistical significance level (see Table 2, panel A). The LATE estimate showed similar results (see Table 2, panel B). Considering that students had little chance to access many age-appropriate reading materials, it might be possible that this affected their confidence in reading. This may have been particularly true for beginning readers if no one provided instruction to them on how to read.

The results also indicated that in some respects, the program significantly changed student misperceptions about the role of independent reading. Specifically, we found that the program significantly reduced the share of students who perceived a negative effect of independent reading on math by 2 percentage points, a reduction of 11% percent (see Table 2, panel A). However, we did not find any statistically significant effect of the program on student perceptions toward the effect of independent reading on Chinese (see Table 2, panel B).

Effects on Student Reading Habits

The primary goal of the in-class library program was to provide students with the opportunity and means to read. As a result, we started by assessing whether the reading habits of students in schools assigned to the treatment group changed. Table 3 reports the results of the impact of the in-class library program on student reading habits. The estimates of ITT and LATE are respectively reported in panels A and B.

The first two columns of Table 3 report the effect of the in-class library program on students' borrowing behaviors. The ITT estimate showed that the program significantly reduced the likelihood that students never borrowed books from the classroom by 61 percentage points (see Table 3, panel A), a decline of 75%. However, the intervention had no effect on students' borrowing behaviors from the regular school library (see Table 3, panel A). This was not a surprise because the program set up a library in the classroom rather than increasing resources in the school library. The LATE estimates were consistent with the ITT estimates, but the effect size was a bit larger (66 percentage points; see Table 3, panel B).

Accordingly, we found that students in the treatment schools were more likely to spend more time reading after class. Specifically, the results indicated that the in-class library program significantly increased the possibility that students read for 30 minutes or longer each day after class by 10 percentage points (24%; see Table 3, panel A). The LATE estimates were consistent with the ITT estimates (see Table 3, panel B). In light of these results, it appears that the in-class library program not only resulted in students borrowing more often but also caused students to read more.

What is even more interesting is that the in-class library program significantly increased student communication about reading with their peers. We found that the program significantly increased the possibility of students talking about readings with their friends by 13 percentage points (33%), reading together with their friends by 7 percentage points (19%), and borrowing books that their friends read by 9 percentage points (18%; see Table 3, panel A). The LATE estimates showed similar findings, but the effect sizes were a bit bigger than expected (see Table 3, panel B).

TABLE 2
Impact of an In-Class Library on Student Attitudes Toward Reading at Eight Months After the Intervention

	Students like reading (model 1)	Student confidence in reading (model 2)	Perceived negative effect of reading on Chinese (model 3)	Perceived negative effect of reading on math (model 4)
Panel A: Intention-to-treat effect				
Treatment group	.17*** (.0033)	−.12** (.0326)	−.00 (.9213)	−.02* (.0538)
Student characteristics at baseline	Yes	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes	Yes
Constant	1.12*** (.0000)	−.86*** (.0005)	−.02 (.6095)	.05 (.3857)
Observations	9,575	9,639	9,650	9,627
R^2	.2065	.1717	.0201	.0203
Panel B: Local average treatment effect				
Actually received an in-class library	.19*** (.0032)	−.13** (.0329)	−.00 (.9208)	−.03* (.0504)
Student characteristics at baseline	Yes	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes	Yes
Constant	1.11*** (.0000)	−.85*** (.0005)	−.02 (.6085)	.05 (.3642)
Observations	9,575	9,639	9,650	9,627
R^2	.2065	.1715	.0201	.0207

Note. Student characteristics are whether the student was in fifth grade (1 = *yes*), age (in years), gender (1 = *male*), and whether the student was boarding at school in the spring 2015 semester (1 = *yes*). Family characteristics are whether at least one parent held a university degree or higher (1 = *yes*), whether at least one parent had a professional occupation (1 = *yes*), whether the student was a left-behind child (1 = *both parents migrated away for work*), and whether the student was from a low-income family (1 = *no refrigerator at home*). The lagged outcome variable from models 1–4 is respectively the score on the Students Like Reading scale at baseline, the score on the Students Confident in Reading scale at baseline, whether the student perceived a negative effect of reading on Chinese at baseline, and whether the student perceived a negative effect of reading on math at baseline. The sandwich method was used to calculate robust standard errors for the class-level cluster sampling data. The *p*-values are in parentheses. The regressions of the local average treatment effect instrument are whether the school actually received an in-class library (or take-up) with treatment.
*Significant at 10%. **Significant at 5%. ***Significant at 1%.

Effects on Student Achievement in Reading, Chinese, and Math

The ultimate goal of the in-class library program, of course, was to improve student reading achievement. Although we found statistically significant improvement in student reading habits, both the ITT estimate and the LATE estimate indicated that the intervention did not improve student reading scores after eight months of the intervention. The coefficients are negligible and statistically insignificant in the regression of the standardized reading exam score (see Table 4).

We further examined the impact of the in-class library program on student standardized scores in the Chinese-language test and the math test. However, according to the results, although the coefficients of the program on standardized Chinese score are positive in the models (see Table 4), they are not statistically significant. As with our results for the Chinese-language test, we found that the in-class library program had no impact on the student standardized math score (see Table 4).

Interactions Between Treatment and Student Subsets

According to previous studies, male students, students from low-income families, low-performing students in reading, and left-behind children are more likely to underperform in reading (Mullis et al., 2012; Pretorius & Currin, 2010; Stanovich, 1986). Thus, we further explored whether the in-class library program reduced the achievement gaps between students. Tables 5–7 report the results.

TABLE 3
Impact of an In-Class Library on Student Reading Habits at Eight Months After the Intervention

	Never borrow books from the school library (model 1)	Never borrow books from the classroom (model 2)	Read for 30 minutes or more each day after class (model 3)	Talk about readings with friends (model 4)	Read together with friends (model 5)	Borrow books that friends read (model 6)
Panel A: Intention-to-treat effect						
Treatment group	−.05 (.3487)	−.61*** (.0000)	.10*** (.0002)	.13*** (.0000)	.07*** (.0091)	.09*** (.0006)
Student characteristics at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	.39*** (.0027)	.54*** (.0000)	.69*** (.0000)	.64*** (.0000)	.45*** (.0000)	.62*** (.0000)
Observations	9,683	9,681	9,667	9,609	9,653	9,656
R^2	.3109	.4917	.0912	.1007	.0690	.0826
Panel B: Local average treatment effect						
Actually received an in-class library	−.05 (.3443)	−.66*** (.0000)	.10*** (.0001)	.15*** (.0000)	.08*** (.0073)	.10*** (.0004)
Student characteristics at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	.39*** (.0023)	.64*** (.0000)	.68*** (.0000)	.63*** (.0000)	.44*** (.0000)	.62*** (.0000)
Observations	9,683	9,681	9,667	9,609	9,653	9,656
R^2	.3111	.5263	.0923	.1033	.0705	.0844

Note. Student characteristics are whether the student was in fifth grade (1 = *yes*), age (in years), gender (1 = *male*), and whether the student was boarding at school in the spring 2015 semester (1 = *yes*). Family characteristics are whether at least one parent held a university degree or higher (1 = *yes*), whether at least one parent had a professional occupation (1 = *yes*), whether the student was a left-behind child (1 = *both parents migrated away for work*), and whether the student was from a low-income family (1 = *no refrigerator at home*). The lagged outcome variable from models 1–6 is respectively whether the student never borrowed books from the school library at baseline, whether the student never borrowed books from the classroom at baseline, whether the student read for 30 minutes or more each day after class at baseline, whether the student talked about readings with friends at baseline, whether the student read together with friends at baseline, and whether the student borrowed books that friends read at baseline. The sandwich method was used to calculate robust standard errors for the class-level cluster sampling data. The *p*-values are in parentheses. The regressions of the local average treatment effect instrument are whether the school received an in-class library (or take-up) with treatment.
***Significant at 1%.

Our results showed that when compared with their female peers, male students actually had larger improvements as a result of the in-class library program in terms of the degree to which they liked reading, talked about readings with friends, and borrowed books that friends read. In the baseline survey, in comparison with female students, male students liked reading less by 0.48 points. However, we found that the

TABLE 4
Impact of an In-Class Library on Student Achievement in Reading, Chinese, and Math at Eight Months After the Intervention

	Standardized reading score (model 1)	Standardized Chinese score (model 2)	Standardized math score (model 3)
Panel A: Intention-to-treat effect			
Treatment group	.00 (.9147)	.03 (.4260)	.03 (.5610)
Student characteristics at baseline	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes
Constant	.64*** (.0000)	.43*** (.0080)	.91*** (.0000)
Observations	9,685	4,820	4,851
R^2	.5457	.5579	.4766
Panel B: Local average treatment effect			
Actually received an in-class library	.00 (.9142)	.03 (.4205)	.03 (.5563)
Student characteristics at baseline	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes
Constant	.64*** (.0000)	.43*** (.0073)	.91*** (.0000)
Observations	9,685	4,820	4,851
R^2	.5458	.5580	.4769

Note. Student characteristics are whether the student was in fifth grade (1 = *yes*), age (in years), gender (1 = *male*), and whether the student was boarding at school in the spring 2015 semester (1 = *yes*). Family characteristics are whether at least one parent held a university degree or higher (1 = *yes*), whether at least one parent had a professional occupation (1 = *yes*), whether the student was a left-behind child (1 = *both parents migrated away for work*), and whether the student was from a low-income family (1 = *no refrigerator at home*). The lagged outcome variable from models 1–3 is respectively the student standardized score in reading, Chinese, and math at baseline. The sandwich method was used to calculate robust standard errors for the class-level cluster sampling data. The *p*-values are in parentheses. The regressions of the local average treatment effect instrument are whether the school actually received an in-class library (or take-up) with treatment.
***Significant at 1%.

program narrowed the gap. It significantly increased the degree to which male students liked reading in the treatment group by 0.13 points more than female students (see Table 5, panel A). On average, in the baseline survey, male students also performed worse than female students in reading habits (see Table 6, panel A). However, the program significantly increased the rate at which male students talked about readings with their friends by 6 percentage points (see Table 6, panel A). The program also significantly increased the probability that male students in the treatment group borrowed books that their friends read; this increase among male students was 7 percentage points greater than that of the increase among female students (see Table 6, panel A).

As with our results for male students, the in-class library program had a positive larger impact on low-performing students (when compared with high-performing students) in terms of affinity toward reading and whether they borrowed books from the school library. Specifically, low-performing students in reading in the treatment group were 0.14 points more likely than high-performing students to like reading after eight months of the intervention (see Table 6, panel C). Low-performing students were 5 percentage points more likely than high-performing students to borrow books from the school library (see Table 6, panel C). Furthermore, low-performing students were also 5 percentage points more likely than high-performing students to read together with friends (see Table 6, panel C).

The in-class library program also had a statistically significant and positive larger impact for left-behind children on the variables "never borrow books from classroom" and "borrow books that friends read." They were also 3 percentage points more likely than other

TABLE 5
Differential Effects of an In-Class Library on Certain Subgroups of Students on Student Attitudes Toward Reading at Eight Months After the Intervention: Intention-to-Treat Effect

	Students like reading (model 1)	Student confidence in reading (model 2)	Perceived negative effect of reading on Chinese (model 3)	Perceived negative effect of reading on math (model 4)
Panel A: Male students				
Interaction of Treatment group and Male	.13* (.0539)	−.10 (.1309)	.01 (.5497)	.02 (.1562)
Treatment group	.11* (.0779)	−.07 (.3012)	−.00 (.6577)	−.04** (.0253)
Male	−.48*** (.0000)	.19*** (.0000)	.00 (.6286)	−.02** (.0122)
Student characteristics at baseline	Yes	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes	Yes
Constant	1.14*** (.0000)	−.87*** (.0004)	−.02 (.6278)	.05 (.3480)
Observations	9,575	9,639	9,650	9,627
R^2	.2069	.1719	.0201	.0205
Panel B: Students from low-income families				
Interaction of Treatment group and Students from low-income families	−.01 (.9489)	−.05 (.5597)	−.03 (.1105)	−.03 (.1655)
Treatment group	.17*** (.0037)	−.12** (.0487)	.00 (.7346)	−.02 (.1231)
Students from low-income families	−.14** (.0193)	.12** (.0497)	.02* (.0697)	.02 (.2561)
Student characteristics at baseline	Yes	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes	Yes
Constant	1.12*** (.0000)	−.86*** (.0005)	−.02 (.5744)	.04 (.4106)
Observations	9,575	9,639	9,650	9,627
R^2	.2065	.1717	.0203	.0205
Panel C: Low-performing students in reading				
Interaction of Treatment group and Low-performing students in reading	.14* (.0793)	−.09 (.3135)	−.01 (.5356)	.02 (.4648)
Treatment group	.15** (.0143)	−.11* (.0646)	.00 (.9077)	−.03** (.0321)
Low-performing students in reading	−.62*** (.0000)	.64*** (.0000)	.08*** (.0000)	.07*** (.0000)
Student characteristics at baseline	Yes	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes	Yes
Constant	1.03*** (.0000)	−.77*** (.0013)	−.00 (.9029)	.06 (.2349)
Observations	9,575	9,639	9,650	9,627
R^2	.2262	.1948	.0360	.0272

(continued)

TABLE 5
Differential Effects of an In-Class Library on Certain Subgroups of Students on Student Attitudes Toward Reading at Eight Months After the Intervention: Intention-to-Treat Effect (*continued*)

	Students like reading (model 1)	Student confidence in reading (model 2)	Perceived negative effect of reading on Chinese (model 3)	Perceived negative effect of reading on math (model 4)
Panel D: Left-behind children				
Interaction of Treatment group and Left-behind children	.08 (.1996)	−.14** (.0254)	−.00 (.7651)	−.01 (.4587)
Treatment group	.14** (.0449)	−.06 (.3678)	.00 (.9298)	−.02 (.2037)
Left-behind children	.00 (.9644)	.04 (.2838)	−.01* (.0775)	.00 (.9902)
Student characteristics at baseline	Yes	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes	Yes
Constant	1.14*** (.0000)	−.89*** (.0003)	−.02 (.5970)	.04 (.4195)
Observations	9,575	9,639	9,650	9,627
R^2	.2067	.1721	.0201	.0203

Note. Student characteristics are whether the student was in fifth grade (1 = *yes*), age (in years), gender (1 = *male*), and whether the student was boarding at school in the spring 2015 semester (1 = *yes*). Family characteristics are whether at least one parent held a university degree or higher (1 = *yes*), whether at least one parent had a professional occupation (1 = *yes*), whether the student was a left-behind child (1 = *both parents migrated away for work*), and whether the student was from a low-income family (1 = *no refrigerator at home*). The lagged outcome variable from models 1–4 is respectively the score on the Students Like Reading scale at baseline, the score on the Students Confident in Reading scale at baseline, whether the student perceived a negative effect of reading on Chinese at baseline, and whether the student perceived a negative effect of reading on math at baseline. The sandwich method was used to calculate robust standard errors for the class-level cluster sampling data. The *p*-values are in parentheses. *Significant at 10%. **Significant at 5%. ***Significant at 1%.

students to borrow books from the classroom (see Table 6, panel D) and 4 percentage points more likely than other students to borrow books that their friends read (see Table 6, panel D). However, we also found that left-behind children in the treatment schools were 0.14 points less likely to be confident in reading than other students (see Table 5, panel D). One possible explanation is that left-behind children might have received less support in reading from their family than other students because (as mentioned in the literature review) most of their caregivers were unprepared to support their learning activities at home (Mu & Hu, 2016).

However, although the program seemed to help narrow the gap between some specific subgroups of students and their classmates based on gender, academic achievement, and parental migration status, the extra reading materials did not seem to provide any additional assistance to students from low-income families in catching up with their wealthier peers (see Table 5–7, panel B). We also did not find that the program helped any specific subgroups of students improve across a number of other variables, including student perception about the role of independent reading on the performance in Chinese (see Table 5), as well as achievement in reading, Chinese, and math (see Table 7).

Role of Teachers and Primary Caregivers in the Causal Chain

We found that as a result of the intervention, students borrowed more and read more, but their reading performance did not improve, and their confidence in reading even declined. Why might this be? To answer this question, we further explored the effects of the in-class library on the related attitudes and behaviors of teachers and primary caregivers. We explored these specifically because the existing literature has argued that teachers and primary caregivers have the greatest effect on student reading behavior (Mullis et al., 2012).

First, we examined the effect of the in-class library program on the effect of independent reading on student performance in Chinese and math as perceived by the teachers and primary caregivers. Table 8 reports the results. The table shows that the intervention did not improve the perception of teachers and primary caregivers toward the role of independent reading in either Chinese or math. This finding might at least partially

TABLE 6
Differential Effects of an In-Class Library on Certain Subgroups of Students on Student Reading Habits at Eight Months After the Intervention: Intention-to-Treat Effect

	Never borrow books from the school library (model 1)	Never borrow books from the classroom (model 2)	Read for 30 minutes or more each day after class (model 3)	Talk about readings with friends (model 4)	Read together with friends (model 5)	Borrow books that friends read (model 6)
Panel A: Male students						
Interaction of Treatment group and Male	−.02 (.2704)	−.02 (.2372)	.04 (.1035)	.06** (.0122)	.02 (.5097)	.07*** (.0037)
Treatment group	−.04 (.4446)	−.60*** (.0000)	.08*** (.0057)	.11*** (.0002)	.06** (.0289)	.06** (.0461)
Male	.04*** (.0002)	.04*** (.0001)	−.09*** (.0000)	−.12*** (.0000)	−.10*** (.0000)	−.13*** (.0000)
Student characteristics at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	.38*** (.0029)	.53*** (.0000)	.69*** (.0000)	.65*** (.0000)	.45*** (.0000)	.63*** (.0000)
Observations	9,683	9,681	9,667	9,609	9,653	9,656
R^2	.3110	.4918	.0914	.1014	.0690	.0837
Panel B: Students from low-income families						
Interaction of Treatment group and Students from low-income families	−.01 (.7116)	−.02 (.4138)	.04 (.2615)	.03 (.3455)	.00 (.9678)	.02 (.6460)
Treatment group	−.05 (.3644)	−.60*** (.0000)	.09*** (.0004)	.13*** (.0000)	.07** (.0105)	.09*** (.0011)
Students from low-income families	.05*** (.0001)	.03** (.0370)	−.03 (.1552)	−.07*** (.0001)	−.04** (.0383)	−.04** (.0240)
Student characteristics at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	.38*** (.0028)	.54*** (.0000)	.69*** (.0000)	.64*** (.0000)	.45*** (.0000)	.62*** (.0000)
Observations	9,683	9,681	9,667	9,609	9,653	9,656
R^2	.3109	.4918	.0913	.1008	.0690	.0826

(continued)

explain why the program had no effect or limited effect on such perceptions of students.

However, we found that the project significantly increased the possibility of teachers to encourage students to borrow books. The ITT estimate suggested that in comparison with students in the control group, students in the treatment group were more likely to be asked by their teachers to borrow books by 32 percentage points (50%; see Table 9). The LATE estimate showed consistent results.

There was also no evidence to indicate that the in-class library increased the efforts made by teachers to help students learn how to read. Specifically, we examined the impact of the project on whether teachers provided any

TABLE 6
Differential Effects of an In-Class Library on Certain Subgroups of Students on Student Reading Habits at Eight Months After the Intervention: Intention-to-Treat Effect (*continued*)

	Never borrow books from the school library (model 1)	Never borrow books from the classroom (model 2)	Read for 30 minutes or more each day after class (model 3)	Talk about readings with friends (model 4)	Read together with friends (model 5)	Borrow books that friends read (model 6)
Panel C: Low-performing students in reading						
Interaction of Treatment group and Low-performing students in reading	−.05* (.0743)	.02 (.3529)	−.01 (.7684)	.01 (.7305)	.05* (.0940)	.03 (.1804)
Treatment group	−.04 (.4635)	−.61*** (.0000)	.10*** (.0001)	.13*** (.0000)	.06** (.0279)	.08*** (.0025)
Low-performing students in reading	.03* (.0526)	.04*** (.0031)	−.10*** (.0000)	−.09*** (.0000)	−.07*** (.0001)	−.08*** (.0000)
Student characteristics at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	.39*** (.0028)	.55*** (.0000)	.67*** (.0000)	.62*** (.0000)	.44*** (.0000)	.61*** (.0000)
Observations	9,683	9,681	9,667	9,609	9,653	9,656
R^2	.3115	.4932	.0977	.1058	.0709	.0862
Panel D: Left-behind children						
Interaction of Treatment group and Left-behind children	.01 (.5810)	−.03** (.0393)	.02 (.3277)	.02 (.2940)	.01 (.7172)	.04* (.0532)
Treatment group	−.06 (.3292)	−.59*** (.0000)	.09*** (.0015)	.12*** (.0000)	.07** (.0249)	.07*** (.0091)
Left-behind children	.01 (.4701)	.02** (.0465)	.02 (.1435)	−.01 (.2416)	−.02 (.2088)	−.01 (.4921)
Student characteristics at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	.39*** (.0025)	.53*** (.0000)	.69*** (.0000)	.65*** (.0000)	.45*** (.0000)	.63*** (.0000)
Observations	9,683	9,681	9,667	9,609	9,653	9,656
R^2	.3109	.4920	.0913	.1008	.0690	.0830

Note. Student characteristics are whether the student was in fifth grade (1 = *yes*), age (in years), gender (1 = *male*), and whether the student was boarding at school in the spring 2015 semester (1 = *yes*). Family characteristics are whether at least one parent held a university degree or higher (1 = *yes*), whether at least one parent had a professional occupation (1 = *yes*), whether the student was a left-behind child (1 = *both parents migrated away for work*), and whether the student was from a low-income family (1 = *no refrigerator at home*). The lagged outcome variable from models 1–6 is respectively whether the student never borrowed books from the school library at baseline, whether the student never borrowed books from the classroom at baseline, whether the student read for 30 minutes or more each day after class at baseline, whether the student talked about readings with friends at baseline, whether the student read together with friends at baseline, and whether the student borrowed books that friends read at baseline. The sandwich method was used to calculate robust standard errors for the class-level cluster sampling data. The *p*-values are in parentheses.
*Significant at 10%. **Significant at 5%. ***Significant at 1%.

TABLE 7
Differential Effects of an In-Class Library on Certain Subgroups of Students on Student Achievement in Reading, Chinese, and Math at Eight Months After the Intervention: Intention-to-Treat Effect

	Standardized reading score (model 1)	Standardized Chinese score (model 2)	Standardized math score (model 3)
Panel A: Male students			
Interaction of Treatment group and Male	−.03 (.4496)	−.02 (.6971)	.05 (.2742)
Treatment group	.03 (.4790)	.04 (.3818)	−.00 (.9741)
Male	−.10*** (.0000)	−.10*** (.0001)	.04 (.1028)
Student characteristics at baseline	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes
Constant	1.45*** (.0000)	.43*** (.0082)	.92*** (.0000)
Observations	9,685	4,820	4,851
R^2	.3406	.5579	.4768
Panel B: Students from low-income families			
Interaction of Treatment group and Students from low-income families	−.07 (.1648)	−.06 (.3671)	.06 (.3463)
Treatment group	.02 (.4815)	.04 (.3368)	.02 (.6809)
Students from low-income families	−.12*** (.0001)	−.02 (.5040)	−.07* (.0876)
Student characteristics at baseline	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes
Constant	1.45*** (.0000)	0.43*** (.0091)	0.92*** (.0000)
Observations	9,685	4,820	4,851
R^2	.3407	.5580	.4767
Panel C: Low-performing students in reading			
Interaction of Treatment group and Low-performing students in reading	.01 (.7865)	.03 (.6514)	.03 (.6269)
Treatment group	.01 (.7270)	.03 (.3991)	.02 (.7180)
Low-performing students in reading	−1.31*** (.0000)	−.53*** (.0000)	−.34*** (.0000)
Student characteristics at baseline	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes
Constant	1.45*** (.0000)	0.46*** (.0027)	0.93*** (.0000)
Observations	9,685	4,820	4,851
R^2	.3406	.5891	.4894

(continued)

TABLE 7
Differential Effects of an In-Class Library on Certain Subgroups of Students on Student Achievement in Reading, Chinese, and Math at Eight Months After the Intervention: Intention-to-Treat Effect (*continued*)

	Standardized reading score (model 1)	Standardized Chinese score (model 2)	Standardized math score (model 3)
Panel D: Left-behind children			
Interaction of Treatment group and Left-behind children	.05 (.2085)	.03 (.4917)	.00 (.9327)
Treatment group	−.01 (.8680)	.02 (.7337)	.02 (.6200)
Left-behind children	.04* (.0953)	.03 (.2111)	.03 (.2075)
Student characteristics at baseline	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes
Constant	1.46*** (.0000)	0.44*** (.0071)	0.91*** (.0000)
Observations	9,685	4,820	4,851
R^2	.3407	.5579	.4766

Note. Student characteristics are whether the student was in fifth grade (1 = *yes*), age (in years), gender (1 = *male*), and whether the student was boarding at school in the spring 2015 semester (1 = *yes*). Family characteristics are whether at least one parent held a university degree or higher (1 = *yes*), whether at least one parent had a professional occupation (1 = *yes*), whether the student was a left-behind child (1 = *both parents migrated away for work*), and whether the student was from a low-income family (1 = *no refrigerator at home*). The lagged outcome variable from models 1–3 is respectively the student standardized score in reading, Chinese, and math at baseline. The sandwich method was used to calculate robust standard errors for the class-level cluster sampling data. The *p*-values are in parentheses.
*Significant at 10%. ***Significant at 1%.

reading instruction to students in the class (see Table 9). The results showed that neither the ITT estimate nor the LATE estimate was statistically significant. There are two possible reasons for this. One is that teachers were not aware of the importance of providing reading instruction to students. This is especially true if teachers did not think independent reading has a positive effect on students' performance in Chinese and math. Another reason is that teachers were unprepared to instruct students in reading. Among 120 schools, at the baseline, 84% of schools reported that none of the teachers had ever received any professional development for teaching reading.

We also did not find that primary caregivers provided more instruction to students after the implementation of the in-class library project. Although we found that students in the treatment group borrowed more and read more than their counterparts in the control group, the possibility of the primary caregivers reading together with them was not statistically different between the two groups (see Table 9). This may not be a surprise given the primary caregivers' negative perceptions about the role of independent reading and their low levels of education. Our data showed that only 36% of primary caregivers had an education level of junior high school or higher.

In summary, we found that although teachers asked students to borrow more, teachers and primary caregivers

neither changed their perceptions about the role of independent reading in Chinese and math nor provided more instruction to students in reading. Given the importance of reading instruction for beginning readers, the lack of reading instruction seems to explain why students became less confident in reading during the intervention and did not make substantive improvements in reading achievement, although they borrowed more books and read more frequently. Without such kinds of support, it is possible that their reading would also not improve in the long run.

Discussion and Conclusion

It is commonly believed that reading challenges should be addressed early to reduce the likelihood that delays will impact students over the long term. However, students in developing countries often have limited access to reading resources. Rural areas in today's China are no exception. In addition to the prevalence of misperceptions toward independent reading, we found that a majority of fourth- and fifth-grade students in our sample read less than 30 minutes each day after class and never communicated with their friends about reading. Many students, teachers, and primary caregivers in our sample also had misconceptions about

TABLE 8
Impact of In-Class Library on the Perceived Effect of Independent Reading on Students' Academic Performance by Chinese-Language Teachers and Primary Caregivers

	Perceived positive effect of independent reading by students' Chinese-language teachers		Perceived positive effect of independent reading by students' primary caregivers	
	Chinese (model 1)	Math (model 2)	Chinese (model 3)	Math (model 4)
Panel A: Intention-to-treat effect				
Treatment group	.01 (.7907)	.04 (.3759)	.04 (.1135)	.03 (.1197)
Teacher characteristics at baseline	Yes	Yes	No	No
Caregiver characteristics at baseline	No	No	Yes	Yes
Student characteristics at baseline	No	No	Yes	Yes
Family characteristics at baseline	No	No	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes	Yes
Constant	1.03*** (.0000)	.90*** (.0000)	.50*** (.0001)	.38*** (.0050)
Observations	284	284	7,327	7,278
R^2	.2329	.2603	.0760	.0349
Panel B: Local average treatment effect				
Actually received an in-class library	.01 (.7664)	.05 (.3187)	.04 (.1092)	.03 (.1160)
Teacher characteristics at baseline	Yes	Yes	No	No
Caregiver characteristics at baseline	No	No	Yes	Yes
Student characteristics at baseline	No	No	Yes	Yes
Family characteristics at baseline	No	No	Yes	Yes
Lagged outcome variable at baseline	No	No	Yes	Yes
Town dummies	Yes	Yes	Yes	Yes
Constant	1.03*** (.0000)	.90*** (.0000)	.50*** (.0000)	.38*** (.0044)
Observations	284	284	7,327	7,278
R^2	.2327	.2615	.0762	.0348

Note. Teacher characteristics are gender (1 = *male*), education (1 = *college or above*), and teaching experience (in years). Caregiver characteristics are whether the primary caregivers are the parents (1 = *yes*), education (1 = *junior high school or above*), and whether there is a college student in the family (1 = *yes*). Student characteristics are whether the student was in fifth grade (1 = *yes*), age (in years), gender (1 = *male*), and whether the student was boarding at school in the spring 2015 semester (1 = *yes*). Family characteristics are whether at least one parent held a university degree or higher (1 = *yes*), whether at least one parent had a professional occupation (1 = *yes*), whether the student was a left-behind child (1 = *both parents migrated away for work*), and whether the student was from a low-income family (1 = *no refrigerator at home*). The lagged outcome variable from models 1–4 is respectively teachers' perceived positive effect of independent reading on Chinese (1 = *yes*), teachers' perceived positive effect of independent reading on math (1 = *yes*), primary caregivers' perceived positive effect of independent reading on Chinese (1 = *yes*), and primary caregivers' perceived positive effect of independent reading on math (1 = *yes*). The sandwich method was used to calculate robust standard errors for the school-level cluster sampling data for models 1 and 2 and to calculate robust standard errors for the class-level cluster sampling data for models 3 and 4. The *p*-values are in parentheses. The regressions of the local average treatment effect instrument are whether the school actually received an in-class library (or take-up) with treatment.
***Significant at 1%.

independent reading. One major reason is that the available reading resources were scarce. Even if there were any, students often had limited access to books in school libraries, and most reading materials were not age-appropriate for primary school students. In sum, our results indicated that there is a great need for age-appropriate reading materials in primary schools in rural China.

We used a RCT to demonstrate that an in-class library program that only provides students with age-appropriate books (without any combined interventions) can have a statistically significant effect on student attitudes toward

TABLE 9
Impact of In-Class Library on the Behaviors of Teachers and Primary Caregivers to Support Students' Reading

	Teacher never reminded students to borrow books to read (model 1)	Teacher provided reading instructions to students (model 2)	Primary caregiver read together with or read to students at home (model 3)
Panel A: Intention-to-treat effect			
Treatment group	−0.32*** (.0000)	0.02 (.1048)	−0.01 (.7058)
Student characteristics at baseline	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes
Constant	0.66*** (.0000)	0.00 (.9642)	0.34*** (.0000)
Observations	9,615	9,682	7,820
R^2	.2003	.2343	.0736
Panel B: Local average treatment effect			
Actually received an in-class library	−0.35*** (.0000)	0.02 (.1019)	−0.01 (.7040)
Student characteristics at baseline	Yes	Yes	Yes
Family characteristics at baseline	Yes	Yes	Yes
Lagged outcome variable at baseline	Yes	Yes	Yes
Town dummies	Yes	Yes	Yes
Constant	0.69*** (.0000)	−0.00 (.9852)	0.34*** (.0000)
Observations	9,615	9,682	7,820
R^2	.2071	.2355	.0736

Note. Student characteristics are whether the student was in fifth grade (1 = *yes*), age (in years), gender (1 = *male*), and whether the student was boarding at school in the spring 2015 semester (1 = *yes*). Family characteristics are whether at least one parent held a university degree or higher (1 = *yes*), whether at least one parent had a professional occupation (1 = *yes*), whether the student was a left-behind child (1 = *both parents migrated away for work*), and whether the student was from a low-income family (1 = *no refrigerator at home*). The lagged outcome variable from models 1–3 is respectively whether the primary caregiver read together with or read to the student at home at baseline, whether the teacher never reminded students to borrow books to read at baseline, and whether the teacher provided reading instruction to students in the reading course at baseline. The sandwich method was used to calculate robust standard errors for the class-level cluster sampling data. The *p*-values are in parentheses. The regressions of the local average treatment effect instrument are whether the school actually received an in-class library (or take-up) with treatment. ***Significant at 1%.

reading. The program improved student affinity toward reading and corrected the long-held and thus difficult-to-change misperceptions among students about independent reading's relation with academic performance in China's highly competitive education system.

More importantly, the program significantly changed student reading habits at eight months after the start of the intervention. It not only encouraged students to borrow books more, read more, and enjoy reading more but also increased the communication of students with their friends about readings. Evidence also indicated that the in-class library program could be a potential way to reduce the gaps between male and female students, between low- and high-performing students, and between left-behind children and other students regarding the frequency that they communicate with friends about reading.

However, of equal importance is that the intervention, at least after eight months, had no statistically significant effect on student achievement in reading and had a negative effect on student confidence in reading in general. There are three possible reasons for this. First, providing age-appropriate books alone might not be enough. As we discussed in the introduction, a classroom library program combined with the provision of reading instruction might be more effective in developing countries (Abeberese et al., 2014; Friedlander & Goldenberg, 2016; Topping, Samuels, & Paul, 2007). However, the in-class library project did not assign any specific tasks to teachers or primary caregivers regarding the use of the in-class libraries. As a result, although it increased the possibility that teachers asked students to borrow books, the program did not increase the possibility of students receiving

reading instruction either from teachers or from their primary caregivers.

Second, due to the limited nature of our intervention, it is possible that we were unable to truly facilitate a cultural shift in beliefs toward independent reading among teachers and primary caregivers of students. Although we improved student attitudes across a number of different metrics, the possibility still exists that these improvements were not substantial enough to lead to an improvement in student reading achievement and confidence. As we explained in the introduction, the books included in the in-class libraries were selected for their age-appropriateness, but we did not select books that would be particularly relevant to the local context and needs of students.

Third, the program may need a longer time to take effect to improve student reading achievement and academic performance in other subjects, which was the ultimate goal of the program. According to the results of PIRLS, attitudes toward reading and reading habits remain essential to the acquisition of reading literacy skills (Mullis et al., 2012). Better reading skills allow for increased understanding of the language contained in language-learning and mathematics classroom materials, course content, and exams (Mullis, Martin, & Foy, 2013; Reynard, 2018). The fact that we found a statistically significant effect of the program on changing student reading habits in the short term (eight months) highlights the possibility that a statistically significant effect on student achievement in reading, Chinese, and math may exist in the long term. Similarly, a longer exposure to the materials and guidance from teachers and caregivers might help students establish their confidence in reading.

Our results also showed that the program had no effect on student performance in math or Chinese-language tests in the short term. This finding is consistent with those in rural China (Gao et al., 2018), the Philippines (Abeberese et al., 2014), and India (Borkum et al., 2012), although the latter two programs provided reading instruction to students, as well as reading resources. To some extent, the nonnegative effect of the program on the performance of students in school subjects provides evidence to break the myth in China's highly competitive educational system that independent reading lowers student scores in school subjects (Lin, 2007; L. Wang, 2012).

The results of short-term evaluation of the in-class library program highlighted the importance of providing age-appropriate reading resources to primary school students in rural China. Specifically, given the societal prevalence of the misconception that independent reading harms students' academic performance in rural China, this study provides new insights for researchers around the globe who function within a different set of cultural expectations and beliefs. To be clear, we are not saying that the study is new in the sense that the results push or challenge the broader field. Indeed, our findings are ones that scholars in the field would predict and not find new (although they often have not been demonstrated in the context of developing countries). What are new, however, are the insights into societal beliefs about independent reading in China and efforts to challenge those long-held and thus difficult-to-change societal misconceptions.

The Chinese government, which is trying to successfully implement its first National Development Plan for Reading during the 13th Five-Year Plan ("National Development Plan for Reading," 2016), needs to address the following issues to engage students in independent reading in the long run. First, a follow-up impact evaluation of the in-class library program is needed to examine whether it improves student confidence in reading and reading achievement in the long term. Second, future studies should design interventions to challenge those long-held, and thus difficult-to-change, misconceptions of teachers, principals, and students toward independent reading. In addition to age-appropriate books, the inclusion of books that might be more culturally appropriate and responsive to local desires and needs (e.g., books including strategies for university admission) might be helpful for facilitating a cultural shift in the beliefs of communities about independent reading. Finally, additional professional development support, such as programs to teach teachers (at least) or both teachers and primary caregivers (ideally) to provide reading instruction to students, may also be necessary to improve student reading achievement in the long term.

NOTES

[1] The indicators that were used to identify low-income counties include per capita gross domestic product, per capita general budgetary revenue, and rural per capita net income (State Council Leading Group Office of Poverty Alleviation and Development, 2012).

[2] Our data showed that a total of 738 students (7%) did not complete our follow-up survey. The reasons for student attrition were transferring to other schools (78.6%), being present on the survey day but not completing the survey (8.7%), being absent on the survey day (8.9%), dropping out of school (2.0%), and other reasons (1.8%). It should be noted that compared with many published studies in the literature on RCTs in developing countries, an attrition rate of 7% of students is not problematic. For example, in Overgaard et al.'s (2016) study, they lost one school in the

follow-up survey. In Davey, Aiken, Hayes, and Hargreaves's (2015) study, the attrition rate of a follow-up survey after a one-year intervention was more than 20%.

[3] In selecting books, the NGO referred to the reading lists used in some highly regarded primary schools in China such as Elementary School Affiliated to Renmin University of China and Tsinghua University Primary School (Shoulder Action, 2009). Although there is no available official ranking, one ranking list indicated that these two schools ranked sixth and 197th among more than 170,000 primary schools in China ("Top 500 Primary Schools in Mainland China," 2013; National Bureau of Statistics of China, 2017). The selection criteria were the quality of teachers, environment and facilities, enrollment rate of higher level schools, student expenses, and alumni giving ("Top 500 Primary Schools in Mainland China," 2013).

[4] In our sample, the primary caregivers of nearly 57% of students were not their parents. Because many caregivers in our sample, especially grandparents, were unable to provide estimates of family income, we chose the variable of whether the family has a refrigerator at home to distinguish students from low-income families. We did this for two reasons. First, according to Gertler, Shelef, Wolfram, and Fuchs's (2016) study, households with very low levels of income do not allocate additional income to acquire energy-using assets, but past a certain threshold, households become much more likely to use income gains to acquire appliances, such as a refrigerator or an electronic water heater. Second, the ownership of a refrigerator was also used by the National Bureau of Statistics of China (2016) to measure the living status of households.

[5] The Cronbach's alpha reliability coefficients for the Students Like Reading scale were .67 for the baseline survey and .74 for the endline survey (see Appendix A). The Cronbach's alpha reliability coefficients for the Students Confident in Reading scale were .60 for the baseline survey and .66 for the endline survey (see Appendix B).

[6] In order to examine the robustness of our results, we also estimated the findings using a generalized linear model when the dependent variable is a dummy variable (limited dependent variable). The results are reported in Table B3. The results using this alternative econometric model are nearly the same as those reported in this article.

REFERENCES

Abeberese, A.B., Kumler, T.J., & Linden, L.L. (2014). Improving reading skills by encouraging children to read in school: A randomized evaluation of the Sa Aklat Sisikat reading program in the Philippines. *The Journal of Human Resources*, *49*(3), 611–633. https://doi.org/10.3368/jhr.49.3.611

Borkum, E., He, F., & Linden, L.L. (2012). *School libraries and language skills in Indian primary schools: A randomized evaluation of the Akshara library program*. Cambridge, MA: Abdul Latif Jameel Poverty Action Lab.

Caygill, R., & Chamberlain, M. (2004). *Progress in International Reading Literacy Study (PIRLS): New Zealand's year 5 student achievement 2001*. Wellington, New Zealand: Comparative Education Research Unit, Research Division, Ministry of Education.

Cheung, W.M., Tse, S.K., Lam, J.W.I., & Loh, E.K.Y. (2009). Progress in International Reading Literacy Study 2006 (PIRLS): Pedagogical correlates of fourth-grade students in Hong Kong. *Journal of Research in Reading*, *32*(3), 293–308. https://doi.org/10.1111/j.1467-9817.2009.01395.x

Cox, K.E., & Guthrie, J.T. (2001). Motivational and cognitive contributions to students' amount of reading. *Contemporary Educational Psychology*, *26*(1), 116–131. https://doi.org/10.1006/ceps.1999.1044

Davey, C., Aiken, A.M., Hayes, R.J., & Hargreaves, J.R. (2015). Reanalysis of health and educational impacts of a school-based deworming programme in western Kenya: A statistical replication of a cluster quasi-randomized stepped-wedge trial. *International Journal of Epidemiology*, *44*(5), 1581–1592. https://doi.org/10.1093/ije/dyv128

Deng, Y. (2006). Current status of extracurricular reading of rural students and its strategies in Jianyang [in Chinese]. *Journal of Library Science in China*, *32*(2), 107–108.

Dent, V.F., & Goodman, G. (2015). The rural library's role in Ugandan secondary students' reading habits. *IFLA Journal*, *41*(1), 53–62. https://doi.org/10.1177/0340035215571114

Elley, W.B. (2000). The potential of Book Floods for raising literacy levels. *International Review of Education*, *46*(3/4), 233–255. https://doi.org/10.1023/A:1004086618679

Equal Education. (2011). *We can't afford not to: Costing the provision of functional school libraries in South African public schools* (2nd ed.). Khayelitsha, South Africa: Author.

Fang, B. (2017, November 22). *Yudu County works hard to not leave one minority behind* [in Chinese]. Retrieved from http://gzsmzj.gov.cn/n615/n625/n670/c56413/content.html

Foy, P., & Drucker, K.T. (Eds.). (2013). *PIRLS 2011 user guide for the International Database*. Boston, MA: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College; Amsterdam, Netherlands: International Association for the Evaluation of Educational Achievement.

Friedlander, E., & Goldenberg, C. (Eds.). (2016). *Literacy boost in Rwanda: Impact evaluation of a 2-year randomized control trial*. Stanford, CA: Stanford University.

Ganimian, A.J., & Murnane, R.J. (2016). Improving education in developing countries: Lessons from rigorous impact evaluations. *Review of Educational Research*, *86*(3), 719–755. https://doi.org/10.3102/0034654315627499

Ganzhou Municipal Bureau of Statistics & Survey Office of the National Bureau of Statistics in Ganzhou. (2016). *Ganzhou municipal statistical yearbook 2016* [in Chinese]. Beijing: China Statistics.

Ganzhou Municipal Bureau of Statistics & Survey Office of the National Bureau of Statistics in Ganzhou. (2017). *Ganzhou municipal statistical yearbook 2017* [in Chinese]. Beijing: China Statistics.

Gao, Q., Wang, H., Mo, D., Shi, Y., Kenny, K., & Rozelle, S. (2018). Can reading programs improve reading skills and academic performance in rural China? *China Economic Review*. Advance online publication. https://doi.org/10.1016/j.chieco.2018.07.001

Gao, Q., Yi, H., Wang, H., Shi, Y., Abbey, C., & Rozelle, S. (2017). *Reading achievement in China's rural primary schools: A study of three provinces* (REAP Working Paper 325). Stanford, CA: Rural Education Action Program.

Gertler, P.J., Shelef, O., Wolfram, C.D., & Fuchs, A. (2016). The demand for energy-using assets among the world's rising middle classes. *American Economic Review*, *106*(6), 1366–1401. https://doi.org/10.1257/aer.20131455

Glewwe, P.W., Hanushek, E.A., Humpage, S.D., & Ravina, R. (2013). School resources and educational outcomes in developing countries: A review of the literature from 1990 to 2010. In P. Glewwe (Ed.), *Education policy in developing countries* (pp. 13–64). Chicago, IL: University of Chicago Press.

Hanushek, E.A. (1997). Assessing the effects of school resources on student performance: An update. *Educational Evaluation and Policy Analysis*, *19*(2), 141–164. https://doi.org/10.3102/01623737019002141

Houle, R., & Montmarquette, C. (1984). An empirical analysis of loans by school libraries. *Alberta Journal of Educational Research*, *30*(2), 104–114.

Huichang County Chronicles Compilation Committee. (2010). *Huichang County chronicles 1986–2009* [in Chinese]. Xi'an, China: Sanqing.

Kim, J.S., Samson, J.F., Fitzgerald, R., & Hartry, A. (2010). A randomized experiment of a mixed-methods literacy intervention for

struggling readers in grades 4–6: Effects on word reading efficiency, reading comprehension and vocabulary, and oral reading fluency. *Reading and Writing*, 23(9), 1109–1129. https://doi.org/10.1007/s11145-009-9198-2

Kong, X. (2014). Thoughts on improving Chinese teaching [in Chinese]. *Construction of Chinese Language Course*, 26(9), 24.

Li, H., Loyalka, P., Rozelle, S., & Wu, B. (2017). Human capital and China's future growth. *Journal of Economic Perspectives*, 31(1), 25–48. https://doi.org/10.1257/jep.31.1.25

Li, H., Loyalka, P., Rozelle, S., Wu, B., & Xie, J. (2015). Unequal access to college in China: How far have poor, rural students been left behind? *The China Quarterly*, 221, 185–207. https://doi.org/10.1017/S0305741015000314

Li, L. (2016). Report launch: Survey report of the status quo of reading among urban children in China [in Chinese]. *Publishing Vision*. Retrieved from http://www.cbbr.com.cn/article/105202.html

Li, X., Jiang, W., & Fu, J. (2014). Investigation into the role of the library in the reading of rural children and reading promotion [in Chinese]. *Heilongjiang Historiography*, 2014(7), 281–283.

Lin, M. (2007). Status quo of extracurricular reading and its strategies among rural primary schools [in Chinese]. *Journal of Ningbo University*, 29(2), 146–147.

Liu, G. (2014). Investigation into the role of the library in children reading and reading promotion [in Chinese]. *Heilongjiang Historiography*, 2014(5), 220–223.

Liu, X., & Tian, F. (2014). Investigation and study on the current situation of primary students' extracurricular reading in rural areas: A case study on the northeast Guangdong Province [in Chinese]. *Journal of Hunan First Normal University*, 14(2), 27–33.

Lu, X. (2013). Review of the studies on children's reading promotion in China. *Library Work and Study*, 2013(9), 112–116.

McQuillan, J. (1998). *The literacy crisis: False claims, real solutions*. Portsmouth, NH: Heinemann.

McQuillan, J., & Au, J. (2001). The effect of print access on reading frequency. *Reading Psychology*, 22(3), 225–248. https://doi.org/10.1080/027027101753170638

Ministry of Education of China. (2001). *Standards on the course of Chinese language in full-time compulsory education (pilot version)* [in Chinese]. Retrieved from http://www.ruiwen.com/news/21376.htm

Ministry of Education of China. (2011). *Standards on the course of Chinese language in compulsory education (2011 version)* [in Chinese]. Beijing, China: Beijing Normal University Publishing Group. Retrieved from http://old.moe.gov.cn//publicfiles/business/htmlfiles/moe/s8001/201404/167340.html

Mu, G.M., & Hu, Y. (2016). *Living with vulnerabilities and opportunities in a migration context: Floating children and left-behind children in China*. Dordrecht, Netherlands: Sense.

Mullis, I.V.S., Martin, M.O., & Foy, P. (2013). The impact of reading ability on TIMSS mathematics and science achievement at the fourth grade: An analysis by item reading demands. In M.O. Martin & I.V.S. Mullis (Eds.), *TIMSS and PIRLS 2011: Relationships among reading, mathematics, and science achievement at the fourth grade—Implications for early learning* (pp. 67–108). Boston, MA: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College; Amsterdam, Netherlands: International Association for the Evaluation of Educational Achievement.

Mullis, I.V.S., Martin, M.O., Foy, P., & Drucker, K.T. (2012). *PIRLS 2011 international results in reading*. Boston, MA: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College; Amsterdam, Netherlands: International Association for the Evaluation of Educational Achievement.

Mullis, I.V.S., Martin, M.O., & Gonzalez, E.J. (2004). *International achievement in the processes of reading comprehension: Results from PIRLS 2001 in 35 countries*. Chestnut Hill, MA: Boston College.

Mullis, I.V.S., Martin, M.O., & Sainsbury, M. (2015). PIRLS 2016 reading framework. In I.V.S. Mullis & M.O. Martin (Eds.), *PIRLS 2016 assessment framework* (2nd ed.). Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College; Amsterdam, Netherlands: International Association for the Evaluation of Educational Achievement.

National Bureau of Statistics of China. (2016). *China statistical yearbook 2016*. Beijing: China Statistics.

National Bureau of Statistics of China. (2017). *China statistical yearbook 2017*. Beijing: China Statistics.

National Center for Education Statistics. (2011). *The Nation's Report Card: Reading 2011* (NCES 2012-457). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

National Development Plan for Reading during the 13th Five-Year Plan. (2016). *Xinhuanet*. Retrieved from http://news.xinhuanet.com/politics/2016-12/27/c_129421928.htm

Nichols, A., & Schaffer, M. (2007). *The cluster-robust variance-covariance estimator: A (Stata) practitioner's guide*. Retrieved from http://fmwww.bc.edu/repec/usug2007/crse04.pdf

Overgaard, H.J., Alexander, N., Matiz, M.I., Jaramillo, J.F., Olano, V.A., Vargas, S., & … Stenström, T.A. (2016). A cluster-randomized controlled trial to reduce diarrheal disease and dengue entomological risk factors in rural primary schools in Colombia. *PLoS Neglected Tropical Diseases*, 10(11), article e0005106. https://doi.org/10.1371/journal.pntd.0005106

Phasha, N., Lisa, M., & Magano, D. (2012). The book and the banknote: Reading for leisure amongst 10th grade learners in South Africa. *The Anthropologist*, 14(4), 319–326. https://doi.org/10.1080/09720073.2012.11891253

Pretorius, E.J., & Currin, S. (2010). Do the rich get richer and the poor poorer? The effects of an intervention programme on reading in the home and school language in a high poverty multilingual context. *International Journal of Educational Development*, 30(1), 67–76. https://doi.org/10.1016/j.ijedudev.2009.06.001

Qiao, J., & Li, R. (2009). The analysis of Chinese national reading status quo [in Chinese]. *Library and Information Service*, 53(13), 8–11.

Reynard, M. (2018, January 3). Reading challenges can hinder math achievement [Web log post]. Retrieved from https://www.gemmlearning.com/blog/reading/reading-ability-can-hinder-math-achievement/

Ruijin People's Government. (2018, May 4). *Minority in Ruijin in 2017* [in Chinese]. Retrieved from http://www.ruijin.gov.cn/slrj/rjgl/rkmz/201805/t20180504_409483.html

Sheng, Z. (2014). Ways to improve the reading ability of rural primary school children [in Chinese]. *China Educational Technology & Equipment*, 2014(23), 100–101.

Shoulder Action. (2009). [Development of reading lists of in-class library program]. Unpublished project implementation document.

Slavin, R.E., Lake, C., Chambers, B., Cheung, A., & Davis, S. (2009). Effective reading programs for the elementary grades: A best-evidence synthesis. *Review of Educational Research*, 79(4), 1391–1466. https://doi.org/10.3102/0034654309341374

Stanovich, K.E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly*, 21(4), 360–407. https://doi.org/10.1598/RRQ.21.4.1

State Council Leading Group Office of Poverty Alleviation and Development. (2012, November 14). *Statement on issuing the list of poor counties in contiguous areas with extreme poverty* [in Chinese]. Retrieved from http://www.gov.cn/gzdt/2012-06/14/content_2161045.htm

Sussman, J.B., & Hayward, R.A. (2010). An IV for the RCT: Using instrumental variables to adjust for treatment contamination in randomised controlled trials. *BMJ*, 340, c2073. https://doi.org/10.1136/bmj.c2073

Tang, W. (2003). Status quo of after-class reading among urban primary school students in Nanchang, Nanjing, and Kaili [in Chinese]. *Jiangxi Educational Research*, *2003*(5), 17–19.

Tian, C. (2015). Practices and innovation of Chinese teaching in primary school [in Chinese]. *Modern Education Science*, *2015*(6), 160–161.

Top 500 primary schools in Mainland China [in Chinese]. (2013, October 20). *Sina*. Retrieved from http://ln.sina.com.cn/news/shenghuo/2013-10-20/074563852.html

Topping, K.J., Samuels, J., & Paul, T. (2007). Does practice make perfect? Independent reading quantity, quality and student achievement. *Learning and Instruction*, *17*(3), 253–264. https://doi.org/10.1016/j.learninstruc.2007.02.002

Tunmer, W.E., Chapman, J.W., Greaney, K.T., Prochnow, J.E., & Arrow, A.W. (2013). Why the New Zealand National Literacy Strategy has failed and what can be done about it: Evidence from the Progress in International Reading Literacy Study (PIRLS) 2011 and Reading Recovery monitoring reports. *Australian Journal of Learning Difficulties*, *18*(2), 139–180. https://doi.org/10.1080/19404158.2013.842134

van Bergen, E., van Zuijen, T., Bishop, D., & de Jong, P.F. (2017). Why are home literacy environment and children's reading skills associated? What parental skills reveal. *Reading Research Quarterly*, *52*(2), 147–160. https://doi.org/10.1002/rrq.160

Wang, H. (2012). Thoughts on the construction of libraries in primary schools and middle schools in Zhejiang Province [in Chinese]. *Educational Equipment and Experiment*, *28*(9), 53–55.

Wang, H., Mo, D., Yi, H., Seevak, E., Manheim, R., Boswell, M., & Rozelle, S. (2015). *Independent reading in rural China's elementary schools: A mixed-methods analysis* (REAP Working Paper 284). Stanford, CA: Rural Education Action Program.

Wang, L. (2012). Research on how to instruct extracurricular reading effectively among primary school students [in Chinese]. *Educational Practice and Research–A*, *2012*(8), 30–33.

Wen, S. (2007, April 13). *Fei Hai: Set up a reading day for children to promote reading in China* [in Chinese]. Retrieved from http://culture.people.com.cn/GB/42496/42499/5613230.html

Whitehead, N. (2004). The effects of increased access to books on student reading using the public library. *Reading Improvement*, *41*(3), 165.

World Bank. (2016, May 17). *World Bank study shows Shanghai's #1 global ranking in reading, math, and science rests on strong education system with great teachers* [Press release]. Retrieved from http://www.worldbank.org/en/news/press-release/2016/05/16/world-bank-study-shows-shanghais-1-global-ranking-in-reading-math-science-rests-on-strong-education-system-with-great-teachers

Yue, Q. (2016). Cultivation of reading ability in primary school Chinese teaching. *Learning Weekly*, *2016*(14), 148–149.

Zhang, X. (2014). Status quo of extracurricular reading among rural primary school students and instruction strategies [in Chinese]. *Scientific Consultation*, *2014*(45), 87–88.

Zhang, X., & Zheng, G. (2009). On the separation and integration of the Chinese Curriculum in the early 20th century and a discussion on the connotation of "reading instruction" [in Chinese]. *Journal of Educational Studies*, *5*(6), 45–54.

Zhao, P. (2015). The study and inspiration method of primary school Chinese reading teaching [in Chinese]. *Journal of Heilongjiang College of Education*, *34*(1), 85–87.

Zhuang, J. (2010, May 31). Status quo of children reading in China: More reading for academic success, few reading for pleasure [in Chinese]. *Guangming Ribao*. Retrieved from http://www.chinanews.com/cul/news/2010/05-31/2312636.shtml

Zhuang, Q., & Du, X. (2007). Study on the extracurricular reading of rural primary school students in the context of new curriculum [in Chinese]. *Modern Education Science*, *2007*(5), 72–73.

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Students Like Reading Scale

What do you think about reading? Tell how much you agree with each of these statements.				
	Agree a lot	Agree a little	Disagree a little	Disagree a lot
1. I like talking about what I read with other people.				
2. I would be happy if someone gave me a book as a present.				
3. I think reading is boring.[a]				
4. I would like to have more time for reading.				
5. I enjoy reading.				

Note. The five items in this scale are from the PIRLS 2011 Students Like Reading scale (Mullis et al., 2012, p. 205).
[a]Reverse-coded.

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items on the Students Like Reading Scale

	Cronbach's alpha reliability coefficient	Percentage of variance explained	Factor loadings				
			Item 1	Item 2	Item 3	Item 4	Item 5
Baseline	.67	44%	.35	.35	.43	.53	.53
Endline	.74	50%	.36	.39	.46	.50	.51

Students Confident in Reading Scale

How well do you read? Tell how much you agree with each of these statements.				
	Agree a lot	Agree a little	Disagree a little	Disagree a lot
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.[a]				
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.[a]				
6. My teacher tells me I am a good reader.				
7. Reading is harder for me than any other subject.[a]				

Note. The scale is from the PIRLS 2011 (Mullis et al., 2012, p. 209).
[a]Reverse-coded.

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items on the Students Confident in Reading Scale

	Cronbach's alpha reliability coefficient	Percentage of variance explained	Factor loadings						
			Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7
Baseline	.60	30%	.44	.41	.36	.32	.34	.35	.41
Endline	.66	34%	.46	.43	.35	.29	.33	.35	.41

TABLE B1
Baseline Characteristics of Nonattrited Students, by Treatment Group

Definition	Control group	Treatment group	Difference	*p*
Individual student characteristics				
Fifth-grade student (1 = *yes*)	.52 (3,587/6,935)	.51 (1,751/3,410)	−.00	.9551
Age (in years)	11.09 (0.90)	11.08 (0.95)	−.01	.8937
Male (1 = *yes*)	.52 (3,592/6,935)	.51 (1,750/3,410)	−.00	.6513
Boarding student in the spring 2015 semester (1 = *yes*)	.11 (775/6,933)	.06 (213/3,409)	−.05**	.0204
Family characteristics				
At least one parent held a university degree or higher (1 = *yes*)	.17 (1,082/6,510)	.17 (564/3,224)	.01	.3779
At least one parent had a professional occupation (1 = *yes*)	.21 (1,351/6,511)	.20 (642/3,221)	−.01	.4058
Left-behind children (1 = *both parents migrated away for work*)	.46 (3,175/6,935)	.48 (1,638/3,410)	.02	.1625
Students from low-income families (1 = *no refrigerator at home*)	.12 (828/6,933)	.12 (422/3,410)	.00	.6714
Reading resources				
Have library or reading room at school (1 = *yes*)	.75 (5,193/6,935)	.79 (2,677/3,410)	.09	.1550
Have some kinds of books available in the classroom (1 = *yes*)	.22 (1,552/6,935)	.31 (1,061/3,410)	.00	.5078
Have more than 25 children's books at home (1 = *yes*)	.08 (533/6,404)	.09 (281/3,194)	.00	.9089
Student attitudes toward reading				
Scaled score on the Students Like Reading scale	.01 (1.49)	−.04 (1.44)	−0.05	.4120
Scaled score on the Students Confident in Reading scale	−.01 (1.44)	.01 (1.44)	0.02	.7882
Perceived negative effect of reading on Chinese (1 = *yes*)	.10 (700/6,926)	.10 (348/3,402)	−.01	.7061
Perceived negative effect of reading on math (1 = yes)	.19 (1,312/6,921)	.18 (625/3,401)	−.03	.4893
Student reading habits				
Never borrow books from the school library (1 = *yes*)	.82 (5,653/6,935)	.78 (2,664/3,409)	−.07	.1776
Never borrow books from the classroom (1 = *yes*)	.82 (5,719/6,935)	.75 (2,573/3,410)	−.01	.8293
Read for 30 minutes or more each day after class (1 = *yes*)	.42 (2,920/6,929)	.42 (1,416/3,406)	.04	.2766
Talk about readings with friends (1 = *yes*)	.40 (2,756/6,903)	.43 (1,473/3,391)	.01	.5979
Read together with friends (1 = *yes*)	.37 (2,579/6,928)	.39 (1,317/3,403)	.01	.6701
Borrow books that friends read (1 = *yes*)	.49 (3,406/6,928)	.50 (1,716/3,401)	−.00	.7952
Student achievement in reading, Chinese, and math				
Standardized reading score (0–1)	−.01 (0.99)	.00 (1.01)	.01	.7520
Standardized Chinese score (0–1)	.00 (1.00)	−.01 (0.99)	−.01	.8044
Standardized math score (0–1)	−.01 (1.00)	−.01 (1.00)	−.01	.9084

Note. Data source: Authors' survey. The sandwich method was used to calculate robust standard errors for the class-level cluster sampling data.
**Significant at 5%.

TABLE B2
Summary Statistics of Student Outcomes at Eight Months After the Intervention

	Mean	Standard deviation	Minimum	Maximum
Student attitudes toward reading				
Scaled score on the Students Like Reading scale	0.00	1.57	−5.93	2.28
Scaled score on the Students Confident in Reading scale	−0.00	1.54	−3.45	6.29
Perceived negative effect of reading on Chinese (1 = *yes*)	.07	.25	0	1
Perceived negative effect of reading on math (1 = *yes*)	.15	.36	0	1
Student reading habits				
Never borrow books from the school library (1 = *yes*)	.69	.46	0	1
Never borrow books from the classroom (1 = *yes*)	.47	.50	0	1
Read for 30 minutes or more each day after class (1 = *yes*)	.55	.50	0	1
Talk about readings with friends (1 = *yes*)	.53	.50	0	1
Read together with friends (1 = *yes*)	.41	.49	0	1
Borrow books that friends read (1 = *yes*)	.61	.49	0	1
Student achievement in reading, Chinese, and math				
Standardized reading score	0.00	1.00	−2.73	3.31
Standardized Chinese score	0.00	1.00	−5.03	2.05
Standardized math score	0.00	1.00	−3.02	2.32

Note. Data source: Authors' survey.

TABLE B3
Comparison of Results Between Linear and Nonlinear Models: Intention-to-Treat Effect

	Perceived negative effect of reading on Chinese (model 1)	Perceived negative effect of reading on math (model 2)	Never borrow books from the school library (model 3)	Never borrow books from the classroom (model 4)	Read for 30 minutes or more each day after class (model 5)	Talk about readings with friends (model 6)	Read together with friends (model 7)	Borrow books that friends read (model 8)
Panel A: Ordinary least square								
Treatment group	−.00 (.921)	−.02* (.054)	−.05 (.349)	−.61*** (.000)	.10*** (.000)	.13*** (.000)	.07*** (.009)	.09*** (.001)
Panel B: Probit								
Treatment group	−.00 (.931)	−.02* (.063)	−.05 (.400)	−.49*** (.000)	.10*** (.000)	.13*** (.000)	.07*** (.009)	.09*** (.001)

Note. Average marginal effects are reported for the Probit model. Student characteristics, family characteristics, lagged outcome variables, and town dummies are controlled for. Student characteristics are whether the student was in fifth grade (1 = *yes*), age (in years), gender (1 = *male*), and whether the student was boarding at school in the spring 2015 semester (1 = *yes*). Family characteristics are whether at least one parent held a university degree or higher (1 = *yes*), whether at least one parent had a professional occupation (1 = *yes*), whether the student was a left-behind child (1 = *both parents migrated away for work*), and whether the student was from a low-income family (1 = *no refrigerator at home*). The lagged outcome variable from models 1–8 is respectively whether the student perceived a negative effect of reading on Chinese at baseline, whether the student perceived a negative effect of reading on math at baseline, whether the student never borrowed books from the school library at baseline, whether the student never borrowed books from the classroom at baseline, whether the student read for 30 minutes or more each day after class at baseline, whether the student talked about readings with friends at baseline, whether the student read together with friends at baseline, and whether the student borrowed books that friends read at baseline. The sandwich method was used to calculate robust standard errors for the class-level cluster sampling data. The *p*-values are in parentheses.
*Significant at 10%. ***Significant at 1%.