

## **Dormitory Management and Boarding Students in China's Rural Elementary Schools**

**Ai Yue, Yaojiang Shi, Fang Chang, Chu Yang, Huan Wang, Hongmei Yi, Renfu Luo, Chengfang Liu, Linxiu Zhang, James Chu, and Scott Rozelle**

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The overall goal of this paper is explore whether an in-service life teacher training program can improve boarding students' health, behavior, and academic performance. Drawing on results from a randomized controlled trial (RCT) of a life teacher training program conducted in 10 primary boarding schools in Northwest China, we find significant improvements in health and behavior. Specifically, compared to boarding students in control schools, 15% fewer students in treatment schools reported feeling cold while sleeping at night. The results also showed that student tardiness and misbehaviors after class declined significantly by 18 percent and 78 percent, respectively. However, the in-service life teacher training program had no measurable impact on boarding students' BMI-for-age Z-score, number of misbehaviors in class, and academic performance. Our analysis suggests that improved communication between life teachers and students might be one mechanism behind these results.

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**Keywords:** boarding, life teacher training program, primary school, rural China

**JEL Codes:** I20, I24, I28

# **Dormitory Management and Boarding Students in China's Rural Elementary Schools**

## **Introduction**

Because of the expansive geography and low population densities in many Western provinces of China, there have always been children that have had to board while going to public schools, including elementary schools (Wang, 2011). Recent research has shown that boarding students tend to have poorer health and behavior problems (Pang and Han, 2005; Xiong, 2007; Ye and Pan, 2008; Luo et al., 2009). Moreover, boarding students in poor, rural areas of China experience reduced academic performance relative to their non-boarding peers (Mo et al., 2011). Such findings on boarding students in China are not surprising, as studies of the impacts of boarding on poor children outside of China also yield similar results (Malcolm, 1970; Adams, 2007; Moswela, 2006).

Several reasons may underlie this problem. First, we know that students that board tend to be from relatively poor families living in remote villages (Luo et al., 2009). Because of this, boarding students may be undernourished and performing less well than their non-boarding counterparts even prior to arriving at school. However, once in school, they are not getting much help. Dormitory and student canteen facilities in boarding schools remain under-equipped and services are far below that needed for student development (Pang and Han, 2005; Lu, 2009; Wang and Li, 2009). Because school canteens offer food that is lacking in certain essential nutrients (such as iron), boarding students in Western China suffer from higher rates of anemia than their non-boarding peers. Anemia, in turn, reduces academic performance (Luo et al., 2009).

Aside from poor facilities and nutrition, one other possible reason for poor performance among boarding students is that school personnel are poorly trained in boarding

school management and lack sufficient time to provide care and support to boarding students—especially for ones as young as those in elementary school. In fact, it is not supposed to be like this. In China, the primary staff members that oversee the lives of boarding students are called *shenghuo laoshi* or *life teachers*. In theory, the responsibilities of the life teacher include dormitory management, boarding students' safety, logistics, psychological health and physical health (MoE, 2006). In other words, the life teachers are supposed to be taking care of boarding students during the time after class. According to policy, life teachers also are supposed to be trained on how to discipline and communicate effectively with students (MoE, 2006). They should be able to inculcate good sleeping and health habits among students and recognize common student illnesses.

Unfortunately, at present, life teachers—especially in poor rural areas—barely receive any training and are often overwhelmed with other duties. Zai and Xuan (2011) describe how life teachers are hardly ever trained. During our in-the-field interviews over the period of time that preceded this study, we did not find a single teacher that had received formal training in the skills needed to competently carry out their life teacher activities. Exacerbating the problem, life teachers are frequently overwhelmed with other responsibilities. A canvas survey conducted by the Rural Education Action Project found that only 5 percent of the boarding schools have full-time life teachers in Shaanxi province (Luo et al., 2009). In fact, nearly all life teachers work part-time, taking on additional responsibilities as homeroom teachers, classroom teachers and even workers in the school canteens (Su, 2007; Ye and Pan, 2008).

While this has always been a problem in rural China, the problem is being magnified greatly by the fact that, in recent years, more and more students are beginning to live in elementary schools as boarding students—especially in poor, rural areas of China. In the late

1990s, China's State Council launched the Rural Primary School Merger Program. The overall goal of the program was to utilize scarce educational resources to more efficiently improve the quality of primary school education for poor, rural students (State Council, 2001). A key aspect of the program was to close down remote village schools and merge them into centralized and larger schools, often selected towns and in the county seat (Liu et al., 2010). As a result of the merger program, more than 20,000 rural primary schools were closed down each year between 2001 and 2005 (NBSC, 2001; 2010). Because the program merged remote village schools into centralized town or county schools, many additional students had to begin boarding at their new schools to avoid long commutes (Liu et al., 2010). By 2006, 30 million primary school and junior high school students were boarding across China. Boarding students accounted for more than 10 percent of all primary students in Western China, including all of those students in Western China's cities and better off rural areas (Zhang, 2008). In many poor rural areas, up to 50 percent or more of primary students are boarding (Zhang, 2005).

Given the discussion above about boarding students (namely, they are currently are less healthy, frequently are misbehaving, and often demonstrate reduced academic performance), compounded by the fact that the recent merger program has sharply increased the number of boarding students, a critical policy question arises: what are ways to improve the outcomes of boarding students? Indeed, a number of studies have evaluated the impact of various measures that can improve the health, behavior and academic performance of boarding students. For example, Luo et al. (2012) evaluate a nutritional supplement program that improved student scores on standardized exams by 0.2 standard deviations. Glewwe et al. (2011) demonstrate that better eye care would raise grades—for all students, including

boarding school students. Lai et al. (2012) show that a computer assisted learning program in rural boarding schools improves academic performance by at least 0.12 standard deviations.

Surprisingly, despite the overwhelming importance of life teachers in ensuring student health, good behavior, and academic performance (especially in the case of elementary school-aged students), to our knowledge, no study has explored measures or activities or investments that are able to improve the welfare of boarding students via their life teachers. Because of the sudden increase in boarding students as a result of the merger program, it is almost certain that school personnel lack experience in managing boarding students. As such, one promising approach to improving student outcomes might be in-service training for life teachers, especially given the complexity of tasks that they are expected to perform and the absence of training prior to being assigned to the job.

The overall goal of this paper is to evaluate the impact of a life teacher training program on the health, behavior and academic performance of boarding students in poor, rural areas of China. Based on data from a cluster-randomized controlled field experiment in 10 rural Chinese primary boarding schools in Shaanxi province, we present three analytic exercises that seek to help us achieve our overall research aim. First, we analyze to what extent life teachers are currently equipped or trained to manage students in boarding schools. Second, we compare the health, behavior, and academic performance of boarding students in schools with life teacher training programs with boarding students in schools without such programs, examining both the directions and magnitudes of the impacts on a number of outcomes. Third, we examine one mechanism—better communication between students and life teachers—that may have led to these outcomes.

As with any empirical study, we face several limitations. The most important limitation is that our dataset is restricted to 10 primary schools. Because of the small sample

there are at least three shortcomings. First, the statistical power of analysis is necessarily low and the results (especially those in which we do not find statistical significance) must be interpreted with caution. Second, the small sample size suggests that external validity needs to be carefully considered. Third, with so few schools, we are unable to run heterogeneity analyses that allow us to better understand what kinds of students are benefitting from the program.

Second, although we look at a number of different outcomes, we realize that boarding at school is a holistic experience that may affect the values, safety, self-esteem, and countless other outcomes of students. In this study we are only able to focus on three: health, behavior and academic performance. Moreover, among these three areas of outcomes, the exact measures are limited, too. Despite these limitations, especially as the merger program continues to accelerate and more students begin to board at school, we believe that this study does present useful empirical evidence that suggests new approaches and policy directions to improve education in rural China. We also hope it stimulates more research in this area.

The rest of the paper is organized as follows: Section 2 describes the sampling and experimental procedures that we implemented. Section 3 describes the methods used in this study by introducing the intervention arms, data collection procedures, and analytical approach used to analyze the data. Section 4 presents results on the effectiveness of training life teachers on student health, behavior, and academic performance. Section 5 concludes with a discussion of the results and possibilities for future research.

## **Methods**

We conducted a cluster-randomized controlled trial to measure the effect of life teacher training on student health, behavior, and academic performance among 839 boarding



students in 10 central primary boarding schools in Shaanxi. Shaanxi Province was chosen because it can be broadly categorized to three geographic regions, with each region representing a different area of Western China: Northern Shaanxi borders the Ordos desert; Central Shaanxi consists primarily of plains; and Southern Shaanxi is in a mountainous region.

From a list of all prefectures in Shaanxi, 10 prefectures were chosen. In each of the 10 prefectures, we ranked their counties in terms of their per capita income level in 2007. One county from each income tercile was randomly chosen. In total there were 30 counties randomly sampled across differing income terciles and prefectures of Shaanxi. Using official records, we then collected a list of all primary schools in the 30 sample counties: a total of 144 primary schools. Because our randomized controlled trial seeks to understand the effect of life teacher training on boarding students, we proceeded to draw on a combination of official records and a canvas survey to identify all schools with boarding students. Moreover, because we were interested in central schools (that is, those receiving new boarding students), we excluded any schools reporting that they would be merged into other schools in the next year. We identified a total of 25 central boarding schools among the original 144 schools.

Among these 25 central primary boarding schools, only 10 were randomly chosen to be included in the RCT and receive a baseline survey because of resource constraints. All students in grades 1 through 5 (2294 students in total) who attended the school during the 2007-2008 school year received the baseline survey. Because our focus is on boarding students, only 839 boarding students were included for future analysis. We also surveyed all life teachers and principals at the schools. In total we surveyed 26 life teachers and 10 principals. Despite our small sample size, because of careful randomization, our sample is representative of poor boarding schools in Shaanxi. Indeed, there are no systematic

differences among observable characteristics between the 10 sample schools and the remaining 15 schools that were not part of the study (Appendix Table 1). Table 1 represents the basic characteristics of the 10 sample schools and life teachers.

Following the baseline survey, our research team randomly assigned 5 schools to receive life teacher training (treatment group) and 5 schools to a control group. Within each treatment school, the principal told us who the life teacher in the school was and all life teachers were asked (and agreed) to participate in a life teacher training course. Figure 1 summarizes the flow of participants through each stage of the study, as well as the project timeline.

To confirm that our randomization was indeed successful, we checked to see if students were balanced on observable characteristics. Table 2 shows that, while treatment and control students were identical in most observable characteristics, they differed in terms of the incidence of diarrhea (significant at the 1% level), as well as grades in math class and the number of siblings (significant at the 10% level). We are careful to consider these differences in interpreting our later results.

Between the baseline and endline surveys there were a number of boarding students that attrited from the sample. This occurred for a number of reasons (for example, the student moved to the city with their parents or the family decided to live elsewhere). In total, 71 students (8.5%) who participated in the baseline survey did not participate in the endline survey. Of this number, 34 students (10.4%) were from treatment schools, and 37 students (7.2%) from control schools. The attrition rate between the treatment group and control group is not significant (p-value is equal to 0.120). Moreover, most observable characteristics are not systematically different between nonattritors and attritors (Appendix Table 2). As such, we believe the nature of the attrition does not bias our analysis.

Finally, to avoid possible biases or the Hawthorne Effect, during the baseline survey all study participants and enumerators were blind to which schools belonged to which arms of the study. Control students, teachers and principals did not know that they were being used as controls. Finally, if at any time during the study our research team visited a treatment school, we also visited a control school for the same amount of time.

### **The Intervention: *Life Teacher Training for the Treatment Group***

Our experiment split schools into treatment and control groups. The treatment schools received life teacher training in the form of an intensive two-week training program that lasted from July 20, 2008 to July 30, 2008. The overall goal of the program was to increase the knowledge and skills of life teachers on/about the management of boarding students. The control schools did not receive the life teacher training.

In-service teacher training is sometimes included as an important component in social development programs to improve teacher quality and student educational performance in developing countries. In developing countries, pre-service teacher preparation (that is, graduating from college with a teaching credential) is not always required. As a consequence, in-service training is often the only preparation teachers receive (Lai et al., 2012). Although, to our knowledge, in-service training for life teachers has not been implemented in other countries, in-service training has a long track record as a way for governments to improve the performance of teachers and students (Parsad, 2001; Angrist and Lavy, 2001).

The training materials for the life teacher training were created in cooperation with a number of different professors in education, psychology, and health from Northwest (Xibei) University of Xi'an and Xi'an Jiaotong University's School of Medicine. The professors (henceforth called the *teaching team*) worked intensively with the research team to design a curriculum (textbooks, exercise brochures, and teaching plans) appropriate to the needs of the

life teachers in rural primary boarding schools. The teaching team also consulted life teachers in primary boarding schools (in parts of China outside of the research area) for feedback and comments before finalizing the curriculum.

The training focused on dorm management, psychological education and health education. All of the specific units were carefully and systematically designed according to the needs of the life teachers. Specifically, the training course consisted of 10 modules, reflecting the needs of boarding students: boarding registration, morning hygiene, dining, morning management, nap time, afternoon management, afterschool play/activities, after dinner/before bed activities, sleeping, and health care.

Shortly after the baseline survey, life teachers in the treatment schools received an invitation letter to join the training program. They were asked to gather at a hotel conference room for a 10-day training in dorm management, psychological education and health education. All (100%) of life teachers that received the invitation attended the training program.

The teacher training sessions ran from 8:30 am to 6 pm (with two hours of lunch break at noon) in July 2008. A professor in psychology, who also led the development of the curriculum, was responsible for overseeing the implementation of the curriculum. Four psychology graduate students who were also involved in the development of the curriculum also assisted her. Specifically, the main responsibility of the professor was to deliver knowledge of dorm management, student psychology, and student health to life teachers. The graduate students also led life teachers in exercises to understand how to translate what they learned in theory to practice. A volunteer was also responsible to collect daily feedback on the training from trainees (life teachers) and report to the teaching team and the research team.

Monetary incentives were also used to increase compliance during the training. All expenditures in room and board, transportation, and course materials for the training were covered by the research team. Conditional on full attendance in all training sessions, each trainee would be offered a two-day free sightseeing tour in Xi'an City after the end of the training program. One of graduate students recorded attendance at each session, including whether a trainee arrived late or left the session early. The time sheet showed that no one missed any course. Note that, because the training was held during the summer vacation, no additional stipend was given to the trainees.

In March 2009 (at the beginning of the second semester), the life teachers were invited again to attend to a one-week refresher course. The training team was identical to the first round of training. The training material was also the same (although the delivery of the material was abbreviated to fit into the shorter training period). In addition to covering all expenditures in room and board, transportation, and course materials, this time each trainee received 300 yuan as compensation for his/her time at the end of the training program (since they were attending during the school year). This amount is equivalent to one-third of the typical monthly wage of a full time life teacher. The assistant-trainers deducted 60 yuan each time a trainee missed a session and deducted 30 yuan each time a trainee arrived late or left the session early.

### **Data Collection**

Our enumeration team visited each of the 10 central primary boarding schools in Shaanxi and undertook a two-part survey effort: a baseline survey, conducted before the announcement of the program; and an endline/evaluation survey, which was conducted one year after the first part of the intervention. During both surveys, survey instruments were

administered to students, homeroom teachers, life teachers, and principals of the schools. The objective of the surveys was to collect information on health, behavior and academic performance outcomes as well as a set of control variables (to increase the precision of the analysis).

#### *Student survey*

At the student level, the survey instrument was composed of three blocks. The first block was used to collect information on boarding. Specifically, we asked students whether he/she was boarding at school during the semester, and if so, whether they ever felt cold at night when they were sleeping. These variables are used to identify the boarding status and health of each student. In the second block, students were asked to answer a series of questions to measure the quality of communication between students and life teachers, including “What do you think about the relationship between you and your life teacher?” “Does the life teacher know who your friends are?” “Will you look for help from your life teacher when you feel unhappy?” We use this information ultimately to explore the mechanism behind how the life teacher training program worked. In the third block, enumerators asked students to provide basic information about themselves and their families, including age and gender, their parents’ migration status, the number of their siblings, the distance from home to school, and the value of their families’ house. These variables served as control variables in the analysis to increase the precision of estimation.

#### *Homeroom teacher’s diary*

Another source of information about students came from dairies that were kept by the teachers of each student. In particular, we asked homeroom teachers (*banzhuren*) to keep weekly dairies on all students on a student-by-student basis. The dairies documented things such as bad behavior (misbehavior during class including talking excessively in class and not

paying attention; misbehavior after class including fighting and bullying in the school yard), absences from school (being late for school, leaving early from class; missing class altogether) and health problems (whether the student had diarrhea or not). Because this was such an intense exercise, we only asked the homeroom teachers to keep the dairies for four weeks during the baseline survey (prior to the time that the first session of the life teacher training was given). Exactly a year later (after the two life teacher training sessions) we asked the homeroom teachers to keep the dairies one more time (again, for four weeks). These data are used to measure the behavior and health of each boarding student.

#### *Nursing team's measurement*

With the assistance of nursing teams from Xi'an Jiaotong University's School of Medicine, we measured students' height and weights. A team of four nurses visited each of the sample schools. To collect the anthropometric data, the nursing teams used high quality sets of equipment approved by the Chinese Center for Disease Control for measuring the physical development of sample students. Age information was taken from the birth records that are part of each student's school matriculation folder. These data are primarily used to create the Body Mass Index (BMI)-for-age Z-score as one of the measures of health outcomes in our analysis.<sup>1</sup>

#### *Life teacher survey*

We also collected information about life teachers in the school. Specifically, we surveyed all life teachers in sample schools. In addition to collecting demographics of each

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<sup>1</sup> For additional information on the calculation of BMI-for-age Z-score, please refer to De Onis (2006).

life teacher, we were interested in understanding their working experience, training, and qualifications as life teachers. These data were used to help us understand the nature of life teachers in rural boarding schools.

### *Principal survey*

At the school level, we conducted a two-hour sit-down survey with the principal of each sample school. The main focus of the survey was targeted at collecting information about each school's boarding facilities and services. These were mainly used to help us understand the nature of boarding schools. We also supplemented the information contained in the principal questionnaire with records from the school. The main purpose of this data collection effort was to collect the academic records of each student in the past two semesters. With these data, we measure the academic performance of boarding students with math test scores.

### **Analytical Approach**

We used both unadjusted and adjusted ordinary least squares (OLS) regression analysis to estimate how the academic and non-academic outcomes were changed by the life teacher training program. Our unadjusted analysis regressed changes in the student outcome variables on a dummy variable of the treatment status. We used adjusted analysis as well to control for some accidental differences after randomization between the treatment group and control group and improve precision. In all regressions, we accounted for the clustered nature of our sample by reporting adjusted standard errors.

The models are presented in order of increasing comprehensiveness.

First, the unadjusted model is:

$$\Delta Y_{is} = \beta_0 + \beta_1 T_i + \varepsilon_{is} \quad (1)$$



where  $\Delta Y_{is}$  is the change in the outcome variables that we are interested in evaluating.

Specifically, the variable  $\Delta Y_{is}$  represents the health, behavior or academic performance for student  $i$  in school  $s$ . The dummy variable,  $T_i$ , is variable for the students attending a school assigned to the treatment group (equals one for the treatment group and zero for the control group), and  $\varepsilon_{ts}$  is a random disturbance term (clustered at school level). By this construction,  $\beta_1$  is equal to the unconditional difference in the change in the outcome between the treatment and control groups over the program period. In other words,  $\beta_1$  measures how the treatment group changed in the outcome levels during the program period relative to the control group.

Each  $\Delta Y_{is}$ , or the change in outcome variable (health, behavior or academic performance) is actually represented by several different variables. For outcomes relating to health, we have three measurements: whether a boarding students reported feeling cold at night sleeping; the incidence of diarrhea recorded by homeroom teachers; and BMI-for-age Z-score collected by the nursing teams. For the behavioral outcomes, we have three variables: the number of times a student was tardy or left early from class; the number of times that a student misbehaved in class (defined as excessive fidgeting, excessive talking in class or not paying attention); and the number of times that a student misbehaved after class (defined as bickering, fighting or bullying). The academic outcome was measured by the average score of each student's math test score over the two semesters of the RCT.

We also used three variables to measure the quality of communication between life teachers and students as a way to understand one of the mechanisms of how the life teacher training program worked. The three variables are reported by boarding students: whether the student felt he/she had a good relationship with the life teacher; whether the life teacher knew

most of the students' friends; and whether the student would look for help from life teachers if unhappy.

To improve the efficiency of the estimation, we built on the unadjusted model in equation (1) by including a set of control variables ( $X_{isBase}$ ):

$$\Delta Y_{is} = \beta_0 + \beta_1 T_i + \delta' X_{isBase} + \varepsilon_{ts} \quad (2)$$

where all the variables and parameters are the same as those in equation (1), except for the addition of  $X_{isBase}$ . When the variables in the X matrix are included, we control for the student's and his/her family's characteristics in the baseline survey to increase the precision of analysis, including each student's age, gender, number of siblings, migration status of parents, distance from school, and assets of students,

## Results

We present both the descriptive and multivariate results in the following three parts. First, we report on the current levels of training and preparation among life teachers. Second, we show the impact of the life teacher training intervention on student outcomes of health, behavior and academic outcomes. Third, we try to understand the possible mechanisms by which the life teacher training program is affecting students.

### **The Boarding Facilities of the Schools and Training of Life Teachers**

As detailed in the existing literature, the facilities are poor in boarding schools. On average, each dorm room accommodates about 13 students (=147/11, Table 1, column 1, rows 2 and 3) and the area used by each student is 2.56 m<sup>2</sup> (=377/147, rows 2 and 4). Given that the average use area of a dorm room by each student does not meet the standard of 3 m<sup>2</sup> required by Ministry of Education (2011), this is both dangerous and unhealthy for students.

More troubling, in an area where nightly temperatures fall below freezing for over half the year, one of the 10 centralized primary schools reported not having any heating facilities (row 5).

Although facilities are poor, well-trained and experienced life teachers can work around such limitations. On average, the participating teachers were 36 year old. 65 percent of them were male (Table 1, column 1, rows 8 and 9). The hope is that they might be well equipped and trained to manage boarding students.

Unfortunately, in almost every dimension they come up short. Each school had 4.1 life teachers, that is to say, each life teacher would have to take care of 36 boarding students ( $=147/4.1$ , Table 1, column 1, rows 2 and 6). Even worse, 74 per cent of life teachers work part-time (row 7). Only 69 per cent of them had a college diploma (row 10). The average experience of being a life teacher was only 4.23 years (row 11). Only 8 percent of them reported that they ever participated in trainings on health (row 12) and only 19 per cent of them ever participated in training on student psychology (row 14). Furthermore, not one had a professional qualification (required among life teachers in rich urban areas) in physiological health (row 13) and only 9 percent of them had a professional qualification in psychological health (row 15).

In sum, centralized boarding schools in poor areas of China are not equipped and their staff not qualified to ensure the proper development of students in terms of behavior, health and academic performance. We now turn to consider whether a life teacher training program can rectify some of these problems.

### **The Impact of a Life Teacher Training Program**

As mentioned, we are interested in the impact of a teacher training program on three kinds of student outcome variables: health, behavior, and academic performance. We begin

by exploring results from the unadjusted model (without including control variables) before turning to the multivariate model.

### *Unadjusted Model*

The life teacher training program appears to have moderate benefits for the health of students. Specifically, it improves the sleep quality of students and reduces the incidence of diarrhea at school (Table 3, columns 1 and 3), but it has no effect on the BMI-for-age Z-score of students (Table 3, column 5). When comparing boarding students in schools with the life teacher training program with boarding students in control schools, treatment students are on average 16% less likely to report feeling cold while sleeping at night (significant at the 1% level) and 2% less likely to experience diarrhea at school (significant at the 1% level).

Although, on average, boarding students in schools with life teacher training demonstrated slight increases (0.06) in their BMI-for-age z-score, this finding is not significant. One possible explanation for these results is that sleeping quality and the incidence of diarrhea are closely related to dorm management and can be improved by life teacher's efforts in the short run. However, the BMI-for-age Z-score is heavily dependent on the provision of other factors such as nutrition, which is usually out of the control of life teachers (or changing this measure takes longer than the period of our study).

Student behavior also improves as a result of the life teacher training program. Student behavior is measured by three indices: the incidences of student tardiness (arriving late or leaving early from class), the number of student disruptions in class (defined as fidgeting, talking in class, not paying attention) and the number of disciplinary problems out of class (defined as bickering, fighting, and bullying in class). On average, the program improved student punctuality in arriving and leaving on time to class, reducing incidences of student

tardiness by 0.17 (Table 4, column 1). This result is significant at the 10% level. The program also improved student behavior outside of the classroom, reducing the number of disciplinary problems by 0.78, a result significant at the 1% level (Table 4, column 5). However, the program seems to have no effect on behavior in class (Table 4, column 3). Of course, given that the program was designed to train life teachers on how to manage the daily life and behavior of boarding students, the fact that in-class behavior was not altered in the short run perhaps is not surprising.

A third outcome of interest was student academic performance. In addition to improving health and behavioral outcomes of students, the life teacher training program might have improved boarding students' ability to learn. However, the results indicate that the life teacher training program had no measurable effect on boarding students' academic performance (Table 5, column 1). Compared to students in control schools, boarding students in schools receiving the life teacher training program demonstrated a gain of 2.4 points more on their math scores over the period between the baseline and endline surveys. However, this result is not significant. Of course, the short duration between the program implementation and evaluation survey may have provided insufficient time for students to improve their scores.

Taken together, the results demonstrate that the life teacher training program yielded significant improvements for student health and behavior—just after one year of implementation. Of course, given the concerns about power, the results of the unadjusted model may be supplemented (and made more precise) by controlling for other variables (that is, using the adjusted model).

#### *Multivariate Model (Adjusted Model)*

To further explore the impact of the life teacher training program, we add a set of control variables to the unadjusted model. When analyzing the effect of the life teacher training program using a multivariate approach, we find that the results are largely consistent with the unadjusted model in terms of the overall impacts of the program (Tables 3 to 5). Indeed, after controlling for the age, gender, number of siblings, migration status of parents, distance from school, and assets of students, we find that the program improves the health and behavior of students, but has no measurable impact on student academic performance (similar in sign and magnitude to those results in the unadjusted model).

Specifically, in terms of health outcomes, the multivariate analysis also shows that the life teacher training program improved student sleep quality. In fact, the coefficient on the adjusted model (-0.15—Table 3, column 2, row 1) is almost identical to that on the unadjusted model (-0.16—Table 3, column 1, row 1). The result is significant at the 1% level. In sum, providing life teacher training reduces the average student's rate of reporting feeling cold at night by roughly 15%.

However, when controlling for other variables, the coefficient for changes in the incidence of diarrhea loses its statistical significance (Table 3). More specifically, like the unadjusted model, the adjusted model shows that the teacher training program reduced the incidence of diarrhea by 2%. However, unlike the unadjusted model, the multivariate result is not significant. Finally, the multivariate results parallel the unadjusted model in suggesting that the program indeed had no measurable impact on students BMI-for-age Z-score. Taking these results together, our interpretation is that, in the year following the life teacher training program, teachers were able to provide better living standards for students. However, they were unable to change the physical environment—poor facilities, nutrition, and hygiene—that led to diarrhea and low BMI-for-age Z-score. The final interpretations, of

course, must be tempered because of the low power of the statistical evaluation. It is possible that had the number of intervention and control schools been increased, the ability to detect statistical significant differences would be greater.

In terms of behavior, the multivariate results also mirror the unadjusted results. In fact, the coefficient on the multivariate models for student tardiness (-0.18—Table 4, column 2, row 1) and number of misbehaviors after class (-0.78—column 6) are almost identical to those in the unadjusted model (-0.17 and -0.78, respectively). Moreover, when adding controls, the coefficient representing changes in number of misbehaviors during class changes from 0.63 to -0.07 (columns 3 and 4), although this finding is still not significant. This result is consistent with our original interpretation, that trained life teachers—not being responsible for the behavior of students in the classroom—had no additional impact on students versus untrained life teachers. The data thus provide evidence that the life teacher training program improved student behavior, at least outside of the classroom.

Finally, the unadjusted and adjusted models both suggest that the teacher training program had no impact on student academic performance. When looking at changes in math test scores and adding control variables, we note that boarding students in schools with the life teacher training program experienced a 2.18 point gain (Table 5, column 2) over students in control schools. However, like the results from the unadjusted model, this is not significant. Again, this result might be explained by two facts: life teachers are not responsible for managing the academics of students and the benefits of improved behavior and health on student performance might not be measurable in one year.

In summary, and perhaps most policy relevant, we find that a mere 17 days worth of training for life teachers not only measurably improves student health, it helps ensure better behavior among boarding students. While the program did not improve academic

performance, these results do show that training life teachers truly can improve the outcomes of poor, rural boarding students.

### **Improved Life Teacher-Student Communication as a Mechanism of Impact**

Thus far in the paper, our results show that life teacher training programs benefit students in terms of improved health and behavior. As an additional empirical exercise, in this section we attempt to explore one of the potential mechanisms for why this might be the case: improved communication with life teachers.

In our interviews with students (in the control schools), we frequently heard rural boarding students complain that their life teachers left them confused about expectations, did not care about them, or punished them too severely/inappropriately. In turn, the students said they were unwilling to listen to life teachers when they were told to behave and did not want to seek help from teachers. This fact is not surprising, as life teachers are responsible for managing so many aspects of students' day-to-day lives, yet have very little time or training to accomplish this goal.

Hence, one possible mechanism that might aid life teachers in helping students improve their lives (in the case of this study—health, behavior, and academic performance) is better communication. Because of this possibility, in this section we examine if the life teacher training program helped teachers communicate more effectively with students. If so, it might be that students would report having better relations with the teacher, which in turn, would lead to better outcomes.

We draw on three variables collected during our surveys to proxy improved communication with students. First, does the student report having a good relationship with



the life teacher? Second, does the student believe the life teacher knows his or her friends? Third, would the student seek help from the life teacher if he or she felt unhappy?

In all three measures, the life teacher training program appears to have a positive impact. Boarding students in schools with life teacher training programs demonstrated an 18% gain over students in control schools in reporting good relations with life teachers. The gain was significant at the 5% level. This result is true for both the multivariate and unadjusted models (Table 6, columns 1 and 2, row 1).

These same results hold for the other two measures. With the implementation of the life teacher training program, the number of boarding students who reported that their life teachers knew their friends in treatment schools was more than their peers in control schools by over 10% (the results were nearly identical in the adjusted and unadjusted models and in both models were significant at the 1% level—Table 6, columns 3 and 4). Moreover, the life teacher training program increased the number of boarding students reporting they would seek help from life teachers when they felt unhappy by 14%. Indeed, the coefficient for the unadjusted model is 0.14, and 0.15 for the multivariate model and significant at the 5% level (columns 5 and 6).

Taken together, the results suggest that the life teacher training program indeed helped teachers communicate more effectively with their students. That is, students are reporting having better relationships with life teachers, seeing them as understanding their social lives, and more willing to reach out for help when unhappy. One way to think about these results is that the life teacher training helped life teachers more consciously care for their students. Although our intervention was unable to change any structural constraints—facilities, the number of life teachers working part-time versus full-time or even salaries—the life teacher training clearly improved their interactions with students. Given that students are far more

willing to obey the demands of teachers they perceive as caring and understanding (Wang, 2011), in turn, life teachers were able to more effectively manage the day to day needs and behavior of students, in spite of the limited time and facilities.

### **Discussion and Conclusion**

With the implementation of the school merger program in rural China, more and more poor, rural elementary students are now boarding in centralized schools. Unfortunately, studies show that boarding students suffer reduced health, tend to misbehave, and perform less well academically than their non-boarding peers. One key finding of this paper is that life teachers, who are supposed to provide the majority of care for boarding students, receive insufficient training are not providing the care that they should (if they received better training). Reporting on the results of a cluster randomized controlled trial across 832 students in 10 schools randomly chosen across Shaanxi Province, this paper arrived at this conclusion by estimating the impact of a life teacher training program on a number of health, behavioral and academic outcomes of boarding students.

According to the findings, we have shown that boarding schools in poor, rural areas are indeed inadequately equipped to support the healthy development of boarding students. In addition to having poor facilities, boarding school life teachers were indeed undertrained. Around three-quarters (74%) of the life teachers were working part-time and almost none of them had professional certifications or had ever participated in trainings before entering the job.

We have also shown that when life teachers participated in a short (2 part, 17 day) training program, their students experienced improved health and behavior. There was no measured significant effect on student academic performance.

So what caused this? In the paper we have shown that one likely mechanism by which the life teacher training improved student outcomes is by helping life teachers communicate more effectively with students. Significantly more students in schools receiving life teacher training reported having good relations with life teachers, reported that the teacher knew of their peer group, and said they would seek help from life teachers.

While we are aware of the limitations of this study, at the very least this work suggests that the life teacher training program has potential for future policy action. We only examined three possible outcomes, and more importantly, our sample size included only 10 schools. In light of the fact that such a small sample size limited our statistical power and external validity, our findings are particularly noteworthy. Even with a sample size of just 10 schools, we found robust results significant at the 1% level. While we are cautious in extending our results, our careful randomization means that such positive results are statistically valid for poor rural elementary schools in Shaanxi Province. As such, we believe this kind of study should be repeated in more areas of China, and at the very least considered as a potential policy approach to reduce gaps in health and behavior among boarding and non-boarding students.

Will this happen? Currently, most influential voices in the Ministry of Education (MOE) suggest that investment into rural education should take the form of better books, classrooms, or facilities. However, our results at least suggest new options to support poor, rural students, who will be more and more likely to be boarding at schools as the Merger Program continues. Top policymakers should consider how ensuring well-trained staff members can actually lead

to better health and behavioral outcomes. In addition, while we were unable to show a link between better-trained staff and academic performance, we believe that such a causal connection is likely if the study were repeated with a larger sample size over a longer period of time. As such, it is our hope that this work broadens the possibilities available to China's top policymakers as they seek to invest in rural education.

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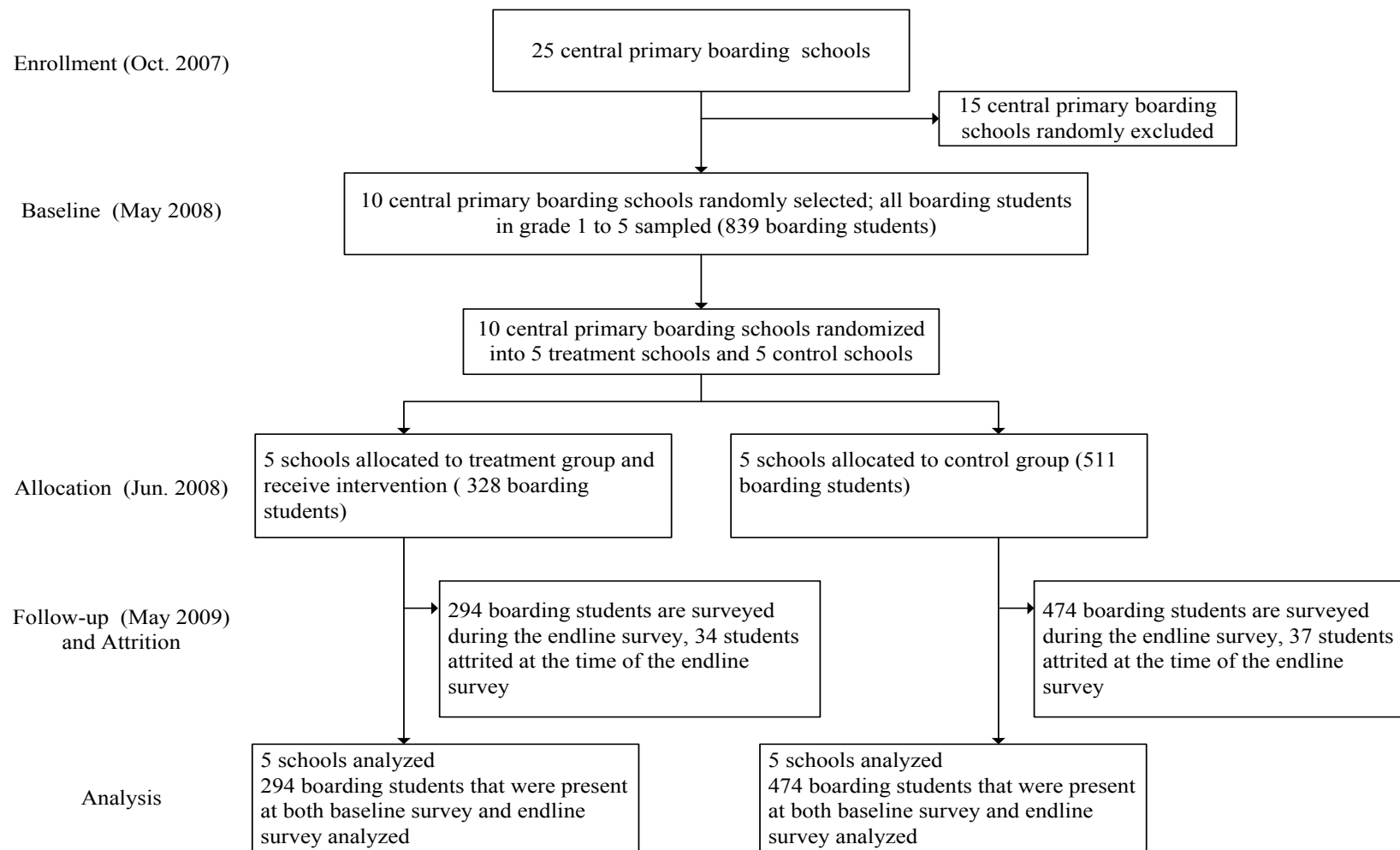


Figure 1. Trial Profile



Table 1. Characteristics of sample schools and life teachers in baseline survey

Variable	Mean	Standard Deviation	Min	Max
<b>SCHOOL CHARACTERISTICS</b>				
(1) Number of students	357	176	130	762
(2) Number of boarding students	147	102	48	404
(3) Number of boarding rooms	11	6.5	4	24
(4) Areas of dorms (m <sup>2</sup> )	377	296	80	1000
(5) Whether warming facilities are available in dorms (Yes =1)	0.90	0.32	0	1
(6) Number of life teachers (including full-time and part-time life teachers)	4.10	3.31	0	9
(7) Of which, ratio of part-time life teachers	0.74	0.42	0	1
<b>LIFE TEACHER CHARACTERISTICS</b>				
(8) Sex (male =1; female =0)	0.65	0.49	0	1
(9) Age (Year)	36.19	10.08	23	56
(10) Has a diploma of college or above (yes =1;no =0)	0.69	0.47	0	1
(11) Years of being a life teacher	4.23	3.35	0.4	12
(12) Ever participated in physiological health training (yes =1;no =0)	0.08	0.27	0	1
(13) Has a professional qualification of physiological health (yes = 1;no =0)	0.00	0.00	0	0
(14) Ever participated in psychological health training (yes =1;no =0)	0.19	0.40	0	1
(15) Has a professional qualification of psychological health (yes = 1;no =0)	0.09	0.29	0	1

Data source: Authors' survey.

Table 2. Comparison of boarding students' characteristics between treatment group and control group in baseline survey

Variables	Treatment	Control	Difference	P-value
<b>Health</b>				
Ever feel cold while sleeping at night? (Yes = 1; No = 0)	0.74	0.67	0.07	0.413
Incidence of diarrhea (yes = 1; no = 0)	0.03	0.01	0.02***	0.001
Z-score of BMI	-0.61	-0.56	0.05	0.660
<b>Behaviors</b>				
Number of being later or leave early for class	0.15	0.03	0.13	0.151
Number of misbehaviors at class <sup>a</sup>	5.23	3.72	1.52	0.689
Number of misbehaviors after class <sup>b</sup>	1.05	0.69	0.36	0.475
<b>Academic performance</b>				
Math test score (Full score = 100) <sup>c</sup>	64.5	52.4	12.1*	0.082
<b>Control variables</b>				
Age (Year)	11.72	12.13	-0.41	0.268
Male (male = 1, female = 0)	0.54	0.52	0.02	0.559
Number of siblings	1.78	2.40	-0.62*	0.092
His/her dad ever migrated out for work for more than 1 year (yes =1; no =0)	0.21	0.19	0.02	0.697
His/her mom ever migrated out for work for more than 1 year (yes =1; no =0)	0.06	0.03	0.02	0.316
Distances from home to school (km)	6.57	8.91	-2.34	0.175
His/her family's house value is more than 50 000 yuan (yes = 1; no =0 )	0.09	0.08	0.01	0.558

Data source: Authors' survey.

Significant level: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Note:

- a. The misbehaviors at class include excessive fidgeting, excessive talking in class or not paying attention.
- b. The misbehaviors after class include bickering, fighting, and bullying.
- c. The score is the average score of boarding student math test scores in the last two semesters.

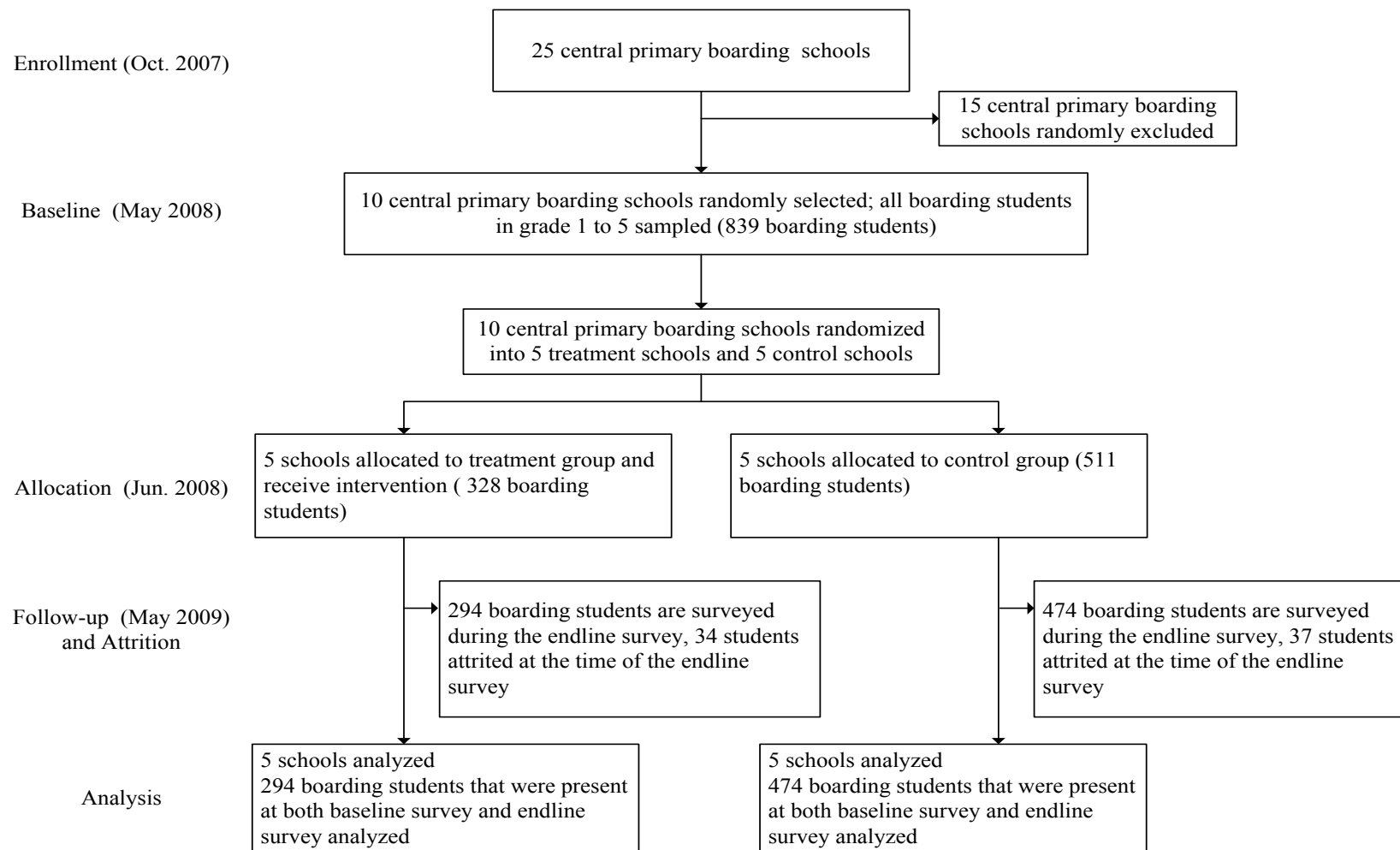


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Significant level: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

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- b. The misbehaviors after class include bickering, fighting, and bullying.
- c. The score is the average score of boarding student math test scores in the last two semesters.

Table 3. OLS estimators of impact of life teacher training program on the boarding student's health

Variables	Dependent variables: $\Delta Y_{is} = Y_{is2009} - Y_{is2008}$					
	Changes in ever feel cold while sleeping at night		Changes in incidence of diarrhea		Changes in BMI-for-age Z-score	
	(1)	(2)	(3)	(4)	(5)	(6)
(1) Training Intervention group (yes = 1; no = 0)	-0.16*** (0.029)	-0.15*** (0.032)	-0.02* (0.010)	-0.02 (0.013)	0.06 (0.132)	0.08 (0.139)
(2) Age in 2008 (Year)		-0.01 (0.015)		-0.01 (0.004)		0.06** (0.018)
(3) Male (Male = 1; female = 0)		0.08 (0.057)		0.01 (0.007)		-0.09 (0.059)
(4) Number of siblings in 2008		0.02 (0.017)		0.01 (0.004)		-0.03 (0.022)
(5) His/her dad ever migrated out for work for more than 1 year by 2008 (yes = 1, no = 0)		0.01 (0.082)		0.02 (0.024)		0.00 (0.066)
(6) His/her mom ever migrated out for work for more than 1 year by 2008 (yes = 1, no = 0)		-0.29** (0.128)		-0.05 (0.044)		-0.26* (0.130)
(7) Distance from home to schools in 2008 (km)		0.00 (0.002)		0.00** (0.000)		0.00 (0.005)
(8) Her/his family's house value is more than 50 000 yuan in 2008 (yes=1, no = 0)		0.05 (0.075)		-0.00 (0.007)		0.09 (0.108)
Constant	0.11*** (0.018)	0.16 (0.207)	0.01 (0.007)	0.04 (0.055)	-0.06 (0.108)	-0.67** (0.248)
Obs	768	768	679	679	644	644
R2	0.018	0.038	0.004	0.019	0.002	0.038

Robust standard errors (clustering at school level) are reported in parentheses.

Significant level: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Table 4. OLS estimators of impact of life teacher training program on the boarding student's behaviors

Variables	Dependent variables: $\Delta Y_{is} = Y_{is2009} - Y_{is2008}$					
	Change in number of being later or leave early for class		Changes in number of misbehaviors at class <sup>a</sup>		Changes in number of misbehaviors after class <sup>b</sup>	
	(1)	(2)	(3)	(4)	(5)	(6)
(1) Training Intervention group (yes = 1; no = 0)	-0.17*	-0.18*	0.63	-0.07	-0.78**	-0.78***
	(0.088)	(0.091)	(3.211)	(2.738)	(0.267)	(0.181)
(2) Age in 2008 (Year)		-0.01		-0.52		0.08
		(0.018)		(0.590)		(0.062)
(3) Male (Male = 1; female = 0)		-0.03		-0.32		-0.25*
		(0.048)		(0.624)		(0.127)
(4) Number of siblings in 2008		-0.01		-0.06		0.06
		(0.016)		(0.224)		(0.069)
(5) His/her dad ever migrated out for work for more than 1 year by 2008 (yes = 1, no = 0)		-0.07		-0.04		-0.49**
		(0.094)		(0.339)		(0.199)
(6) His/her mom ever migrated out for work for more than 1 year by 2008 (yes = 1, no = 0)		0.13		1.42		-0.12
		(0.075)		(1.045)		(0.339)
(7) Distance from home to schools in 2008 (km)		-0.00		-0.19**		-0.04**
		(0.001)		(0.068)		(0.014)
(8) Her/his family's house value is more than 50 000 yuan in 2008 (yes=1, no = 0)		0.02		-4.68		-0.71*
		(0.063)		(3.206)		(0.371)
Constant	0.03	0.19	-1.70	6.91	0.12	-0.40
	(0.022)	(0.280)	(2.372)	(5.998)	(0.152)	(0.755)
Obs	679	679	679	679	679	679
R2	0.024	0.030	0.001	0.050	0.031	0.097

Robust standard errors (clustering at school level) are reported in parentheses.

Significant level: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Note:

- The misbehaviors at class include excessive fidgeting, excessive talking in class or not paying attention.
- The misbehaviors after class include bickering, fighting, and bullying.

Table 5 OLS estimators of impact of life teacher training program on the boarding student's academic performance

Variables	Dependent variable (Changes in math test score <sup>a</sup> ): $\Delta Y_{is}=Y_{is2009}-Y_{is2008}$	
	(1)	(2)
(1) Training Intervention group (yes = 1; no =0)	2.40 (3.690)	2.18 (3.515)
(2) Age in 2008 (Year)		0.13 (0.544)
(3) Male (Male = 1; female = 0)		1.77 (1.479)
(4) Number of siblings in 2008		-0.99* (0.454)
(5) His/her dad ever migrated out for work for more than 1 year by 2008 (yes = 1, no = 0)		0.98 (2.269)
(6) His/her mom ever migrated out for work for more than 1 year by 2008 (yes = 1, no = 0)		1.79 (5.119)
(7) Distance from home to schools in 2008 (km)		0.17*** (0.034)
(8) Her/his family's house value is more than 50 000 yuan in 2008 (yes=1, no = 0)		-0.61 (2.830)
Constant	5.50 (3.663)	3.64 (8.155)
Obs	673	673
R2	0.004	0.021

Robust standard errors (clustering at school level) are reported in parentheses.

Significant level: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Note:

a. The score is the average score of boarding student math test scores in the last two semesters.



Table 6. OLS estimators of impact of life teacher training program on the communication between life teacher and boarding students

Variables	Dependent variables: $\Delta Y_{is} = Y_{is2009} - Y_{is2008}$					
	Changes in whether the boarding student had good relation with life teachers		Changes in whether life teacher know most of the boarding student's friends		Changes in whether the boarding student would look for help from life teacher if he/she felt unhappy	
	(1)	(2)	(3)	(4)	(5)	(6)
(1) Training Intervention group (yes = 1; no = 0)	0.18**	0.19**	0.12***	0.12***	0.14**	0.15**
	(0.070)	(0.068)	(0.023)	(0.023)	(0.055)	(0.057)
(2) Age in 2008 (Year)		-0.01		0.01		0.00
		(0.024)		(0.013)		(0.017)
(3) Male (Male = 1; female = 0)		-0.10		-0.06**		-0.04
		(0.072)		(0.018)		(0.053)
(4) Number of siblings in 2008		0.00		-0.00		0.00
		(0.014)		(0.012)		(0.026)
(5) His/her dad ever migrated out for work for more than 1 year by 2008 (yes = 1, no = 0)		0.03		-0.00		-0.04
		(0.050)		(0.050)		(0.061)
(6) His/her mom ever migrated out for work for more than 1 year by 2008 (yes = 1, no = 0)		-0.16		0.02		-0.05
		(0.097)		(0.065)		(0.094)
(7) Distance from home to schools in 2008 (km)		0.00		0.00		-0.00
		(0.004)		(0.001)		(0.001)
(8) Her/his family's house value is more than 50 000 yuan in 2008 (yes=1, no = 0)		-0.07		-0.09**		0.00
		(0.067)		(0.033)		(0.081)
Constant	-0.15***	0.01	-0.12***	-0.17	-0.16***	-0.16
	(0.046)	(0.260)	(0.018)	(0.156)	(0.018)	(0.220)
Obs	674	674	674	674	674	674
R2	0.021	0.039	0.022	0.034	0.014	0.016

Robust standard errors (clustering at school level) are reported in parentheses.

Significant level: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Appendix Table 1. Comparison of mean characteristics of sample schools and other schools in canvas survey

Variables	Sample <sup>a</sup> (1)	Others <sup>b</sup> (2)	Difference (3)=(1)-(2)	p-value (4)
Number of observations	10	15		
School size				
Number of classes	8.80	7.53	1.26	0.1644
Number of students	357	312	45	0.4227
Number of teachers	28.2	21.7	6.47	0.1203
Infrastructure				
Area (m <sup>2</sup> )	6138	6769	-631	0.7091
Number of classrooms	16.1	12.6	3.5	0.4275
Whether equipped with multimedia	1.40	1.27	0.13	0.6131
Whether warming facilities are available in classroom	1.00	0.93	0.07	0.4259
Whether there is student canteen	1.00	0.93	0.07	0.4259
Whether there is tables for dinner	0.70	0.38	0.34	0.1062
Whether the canteen provide lunch to students	1.00	0.93	0.07	0.4101
Boarding				
Number of boarding students	147	155	-9	0.8323
Areas of dorms	377	371	5	0.9792
Number of boarding rooms	11.1	8.3	2.8	0.2637
Whether warming facilities are available in dorms (Yes =1)	0.90	0.53	0.37	0.0573*
Number of life teachers (including full-time and part-time life teachers)	4.10	5.27	-1.17	0.4322
Of which, ratio of part-time life teachers	0.74	0.86	-0.12	0.4579

Data source: Authors' survey.

Significant level: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Note:

- a. With canvas survey, 25 central primary boarding schools are identified from 144 primary schools in rural Shaanxi. Of which, 10 schools (including both 5 treatment schools and 5 control schools) are randomly chosen to be included in RCT.
- b. Of 25 central primary boarding schools, 15 schools are excluded from RCT due to resources constraint.

Appendix table 2. Comparison of student characteristics between attrited students and non-attrited students

Variables	Nonattriters (1)	Attriters (2)	Difference (3)=(1)-(2)	P-values (4)
<b>Health</b>				
Ever feel cold while sleeping at night? (Yes = 1; No = 0)	0.70	0.61	0.09	0.176
Incidence of diarrhea (yes = 1; no = 0)	0.01	0.04	-0.03	0.385
Z-score of BMI	-0.57	-0.64	0.06	0.634
<b>Behaviors</b>				
Number of being later or leave early for class	0.08	0.32	-0.24	0.146
Number of misbehaviors at class <sup>a</sup>	4.30	7.52	-3.22	0.158
Number of misbehaviors after class <sup>b</sup>	0.83	1.22	-0.39	0.244
<b>Academic performance</b>				
Math test score (Full score = 100) <sup>c</sup>	57.04	57.20	-0.16	0.938
<b>Control variables</b>				
Age (Year)	11.98	11.23	0.74***	0.004
Male (male = 1, female = 0)	0.53	0.46	0.07	0.271
Number of siblings	2.17	2.02	0.16	0.407
His/her dad ever migrated out for work for more than 1 year (yes =1; no =0)	0.19	0.31	-0.11**	0.030
His/her mom ever migrated out for work for more than 1 year (yes =1; no =0)	0.04	0.03	0.01	0.619
Distances from home to school (km)	8.08	6.99	1.09	0.367
His/her family's house value is more than 50 000 yuan (yes = 1; no =0)	0.07	0.12	-0.05	0.281

Data source: Authors' survey.

Significant level: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

- a. The misbehaviors at class include excessive fidgeting, excessive talking in class or not paying attention.
- b. The misbehaviors after class include bickering, fighting, and bullying.
- c. The score is the average score of boarding student math test scores in the last two semesters.