Can Social–Emotional Learning Reduce School Dropout in Developing Countries?

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Abstract

An alarming number of students drop out of junior high school in developing countries. In this study, we examine the impacts of providing a social–emotional learning (SEL) program on the dropout behavior and learning anxiety of students in the first two years of junior high. We do so by analyzing data from a randomized controlled trial involving 70 junior high schools and 7,495 students in rural China. After eight months, the SEL program reduces dropout by 1.6 percentage points and decreases learning anxiety by 2.3 percentage points. Effects are no longer statistically different from zero after 15 months, perhaps due to decreasing student interest in the program. However, we do find that the program reduces dropout among students at high risk of dropping out (older students and students with friends who have already dropped out), both after eight and 15 months of exposure to the SEL program. © *2016 by the Association for Public Policy Analysis and Management.*

INTRODUCTION

High dropout rates reduce a nation's stock of human capital, ultimately leading to increased unemployment and even social instability (Hanushek, Lavy, & Hitomi, 2006; Oreopoulos, 2007). Although the high cost of attending school is often cited as the main explanation for why junior high school students in developing countries drop out (Angrist & Lavy, 2009; Banerjee et al., 2000), psychological factors such as learning anxiety may also play a significant role. A number of studies show a strong, positive relationship between learning anxiety and dropout among disadvantaged students. For example, analyses based on nationally representative data from the United States show that students who experience high levels of learning anxiety at school are more likely to drop out than those who do not (Reardon & Galindo, 2002). A meta-analysis of 126 small-scale studies further shows that high levels of learning anxiety are associated with reductions in academic achievement and increases in dropout (Seipp, 1991).

In developed countries, social–emotional learning (SEL) programs have been deployed to reduce learning anxiety (Durlak & Wells, 1997; Greenberg et al., 2003). SEL programs aim to foster student emotional intelligence (or noncognitive skills—Durlak et al., 2011; Elias et al., 1997). In fact, SEL programs have been shown to improve more-distal outcomes such as academic performance (Zins et al., 2007), drug use (Tobler et al., 2000), and disciplinary problems (Wilson, Gottfredson, & Najaka, 2001).

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In this study, our goal is to examine if SEL programs can reduce learning anxiety and dropout rates in developing countries. In pursuing this goal, we have three specific objectives. The first objective is to identify the causal impact of a government-implemented SEL program (consisting of a scripted set of 32 45-minute SEL lessons) on the dropout rates and learning anxiety of junior high students. The second objective is to explore why SEL works or does not work in this context. The third objective is to examine whether SEL affects students who are at the highest risk of dropping out (those who have reached the legal working age, have friends who have dropped out, or have lower academic achievement).

To fulfill these objectives, we analyze data from a randomized controlled trial (RCT) involving 70 schools and 7,495 students in rural China—to our knowledge it is the first large-scale randomized evaluation of an SEL program in a developing country context. Similar to other developing countries, dropout rates in junior high schools in rural China are high (Yi et al., 2012). Furthermore, one reason for the high rates of dropout may be that students face considerable learning anxiety as they compete to enter academic high school (Wang et al., 2015). Due to these similarities, exploring the impacts of SEL in rural China may have implications for students in other developing countries.

By exploring the impacts of SEL programs on school dropout, our study makes several contributions to the literature on SEL and, more generally, the literature on improving the educational outcomes of youth in developing countries. First, our study is one of the first to rigorously examine the causal impacts of a supply-side intervention (an SEL program as opposed to a demand-side intervention such as conditional cash transfers [CCTs]) on reducing dropout in junior high schools in a developing country (e.g., Tan, Lane, & Lassibille, 1999). Second, the vast majority of experimental evaluations of SEL programs in developed countries (and school-based randomized interventions in developing countries more generally) can be considered *efficacy* studies (Wilson, 1986). Efficacy studies are characterized by program interventions that are implemented with a high degree of fidelity (Gartlehner et al., 2006). By contrast, our study evaluates the impacts of an SEL program that was implemented under a more realistic, policy-relevant context—by local governments and schools. Third, our study not only examines the immediate impacts of an SEL program on student outcomes, but also impacts after one year. This fact is important because interventions can have novelty effects that wear off over time (Kulik & Kulik, 1982; Li & Ma, 2010). For example, novelty effects may occur if students, teachers, or school administrators are only temporarily excited about new programs. Fourth, we not only examine whether the SEL program has positive impacts on reducing school dropout and learning anxiety for the average student, but we also examine whether it works for students who are at risk of dropping out.

The remainder of the paper is organized as follows. In the next section, we provide background on junior high dropout rates, learning anxiety, SEL programs, and the rural Chinese context. In the third section we describe the sampling, intervention, data collection, and analytical approach of our study. The fourth section reports the results from our study and the fifth section concludes.

BACKGROUND

Dropout Rates and Learning Anxiety

Dropout at the junior high level remains a problem for a number of developing countries. In the context of this paper, junior high dropout is defined as leaving the school system before completion, conditional upon enrollment in junior high school (typically grades 7 through 9 in most developing countries). For instance, 31 percent

of children who enroll in junior high (also called lower secondary education) leave school before completion in Myanmar (United Nations Educational, Scientific, & Cultural Organization [UNESCO], 2012). This figure is high in a number of other developing countries. According to data from the UNESCO Institute for Statistics (2012), at one extreme is Tunisia, where the junior high dropout rate is 32 percent; another example is Paraguay, with a dropout rate of 17 percent: 70 percent of all children enroll in junior high, while only 58 percent complete junior high school. Other studies based on survey results yield statistics around 25 percent. The dropout rate is 25 percent in Honduras (Marshall et al., 2014) and 24 percent in rural China (Shi et al., 2015).

One reason for the high rates of dropout in developing countries is the high cost of attending school. Specifically, credit constraints combined with high tuition prices encourage students to prematurely leave school (Banerjee et al., 2000). In addition, students find it prohibitively expensive to stay in school when the opportunity costs of attending school are high (Angrist & Lavy, 2009). In response to these high costs, policymakers in some developing countries have provided students with CCTs to stay in junior high school. CCTs have reduced dropout in certain developing countries (see Chaudhury & Parajuli, 2010; De Janvry et al., 2006), but they have not been shown to work in all developing country contexts (Yi et al., 2015).

While the cost of attending school has been the focus of much research on dropout in developing countries, learning anxiety may also be an important contributor to dropout. In the context of this study, learning anxiety refers to systematic fearfulness or worries regarding school-based activities, accompanied by emotional distress (e.g., not wanting to go to school—Barrios & Hartmann, 1997; Spielberger & Vagg, 1995). This definition also encompasses test anxiety, which is considered a specific form of learning anxiety (McDonald, 2001). For example, Wang et al. (2015) find that each standard deviation (SD) increase in mental health problems is correlated with a 0.9 percentage point increase in the dropout rate, even after controlling for school fixed effects and student background characteristics. Other examples include Chen et al. (2000) and McLeod and Kaiser (2004).

Although learning anxiety is a natural aspect of schooling systems (and potentially even beneficial—DiLalla, Marcus, & Wright-Phillips, 2004), levels of anxiety bordering on or diagnosable as anxiety disorders or social phobias are believed to increase school dropout rates (Duchesne et al., 2008; van Ameringen, Mancini, & Farvolden, 2003). High rates of anxiety interfere with cognitive performance, recall (Eysenck et al., 2007), and reduce student motivation (Hancock, 2001). For these reasons, and particularly when faced with competitive learning environments, students with high learning anxiety tend to demonstrate less achievement or drop out (Ialongo et al., 1995; Woodward & Fergusson, 2001).

Prior Research on the Impact of SEL on Dropout and Learning Anxiety

SEL programs can have a range of different formats and goals. In the context of this paper, when we refer to SEL programs, we mean those that are targeted at whole-school contexts and deployed via classroom instruction by teachers (see Durlak et al., 2011 for a discussion of different implementation formats). Moreover, we limit our focus to SEL programs that are focused on reducing anxiety and dropout rates at the junior high school level. Such SEL programs theoretically accomplish their goals by equipping students with noncognitive skills to manage their anxiety and relationships at school, including tools to manage their emotions, seek help, and reduce common stressors (Greenberg et al., 2003; Zins et al., 2007).

Prior studies have shown a consistent effect of SEL programs on improving student anxiety (mental health) and disciplinary problems. In a meta-analysis, Durlak

et al. identify 20 programs that address *internalized mental health issues* (including anxiety) that are implemented by teachers in a classroom context (2011). They show that these SEL programs improved student mental health issues by 0.25 SDs (with a 95 percent confidence interval between 0.08 and 0.43).

More generally, a series of well-identified studies has shown that programs with a focus on student noncognitive skills (such as SEL or counseling programs) improve mental health and keep students in school. Using a fixed effects estimation strategy with data from Florida, Carrell and Carrell (2006) show that counseling increases student noncognitive skills and decreases behavioral and disciplinary problems. Similarly, using a difference-in-difference estimator on a national sample in the United States, Reback (2010) finds that mental health service programs improve student achievement and reduce truancy. In an RCT, providing services that helped students set goals and acquire financial aid between their transition from high school to college increased college enrollment by 3 percentage points (even more for low-income students—Castleman & Page, 2015). In another RCT, providing nonacademic supports to low-income students in Chicago increased graduation rates by 16 percentage points (Cook et al., 2014). In short, evidence suggests that programs that focus on improving student noncognitive skills—such as SEL or counseling—do improve mental health and behavioral outcomes.

Nonetheless, the literature is incomplete. First, most existing studies have not directly evaluated the impact of SEL programs on dropout behavior. One exception is a small ($n = 154$) RCT in a ninth-grade urban school in Chicago. The SEL program evaluated had no statistically significant impact on dropout (Reyes & Jason, 1991). Note that the lack of statistical significance may be attributable to the small sample size rather than the actual impact of the program. Second and more significantly, SEL programs are predominantly implemented and evaluated in developed countries (Durlak et al., 2011). We know of only one small experimental study on SEL programs ($n = 78$ in three schools) conducted in a developing country context (rural India). The study was clearly insufficiently powered, but the results suggest that SEL reduced test anxiety among fifth-grade students (Bhadwal & Panda, 1992).

The paucity of studies from developing countries is surprising, in part, because it could be argued that students in developing countries may have an even greater need for SEL. Students in developing countries typically face higher-stakes and highly competitive education systems (Carnoy et al., 2013). These competitive pressures can lead students to drop out when their chances of progressing are low and alternative pathways are either unavailable or of low quality. For instance, Hemelt and Marcotte (2013) show that the implementation of more competitive high school exit exams in the United States led 1.25 percent of 12th graders to drop out. One way that competitive pressures may increase dropout is by increasing rates of learning anxiety, as students face intense competition in accessing high school (White & Kelly, 2010). Moreover, students in developing countries may also receive less psychological support from parents, who often have migrated to cities in the search for higher-paying wages (Giles, Wang, & Zhao, 2010).

The Chinese Context

To study the effects of SEL on student dropout rates and learning anxiety, we conducted an RCT in rural China among junior high students. We chose China for the study because, similar to other developing countries, dropout rates in junior high schools in rural China are high—approximately 24 percent from the start of grade 7 to the end of grade 9 (Yi et al., 2012). The reasons for dropout in rural China—including high costs as well as psychological factors—are similar to those in other developing countries (Shi et al., 2015; Yi et al., 2012).

The RCT began when students were at the start of seventh and eighth grade and concluded when they reached the end of eighth and ninth grade, respectively. This period was chosen because students experience considerable learning anxiety during this time. One of the primary reasons for increased anxiety is because Chinese junior high students must take a high school entrance examination (HSEE) at the end of ninth grade (Loyalka et al., 2013). As with other developing countries, the high-stakes and competitive nature of the testing system increases anxiety among students (Liu et al., 2009; Reddy & Sinha, 2010). For instance, Song et al. (2013) track a cohort of junior high school students in rural areas of Shaanxi province. They find that the HSEE is highly competitive: conditional on graduation from junior high, only 41.9 percent of students qualify for academic high school. The others either enter vocational high school (25 percent), directly enter the labor market (19.3 percent), or stay in junior high an additional year to re-take the high school entrance exam (13.8 percent). To be sure, students can expect to attend vocational high schools without passing the HSEE. However, the payoffs are lower. That is, students who enter academic high school have a substantially higher probability of accessing college, which has high private returns (Carnoy et al., 2013). Students who enter vocational high school, by contrast, experience low levels of learning and have a low probability of entering college (Loyalka et al., 2016). As such, the availability of vocational high schools does not substantially reduce the competitive pressures that students face: only a minority of students can expect to obtain the educational opportunities with the highest payoffs.

We were also concerned with three types of students at particular risk for dropping out. First, students older than 16 can legally enter the labor force. They are substantially more likely to drop out because the opportunity costs of staying in school are higher (Yi et al., 2012). Moreover, a 16-year-old student in seventh or eighth grade is older than his or her peers. As such, older students may also feel as though they belong less at school than in the labor market. Second, those who report keeping in touch with friends who have already dropped out are also at risk. For example, Li, Zang, and An (2013) found that as peers' dropout rates increased by one percentage point, those still in school experienced a dropout rate that increased by 0.39 to 0.50 percentage points (Li, Zang, & An, 2013). This kind of peer effect is similar in spirit to other findings in the literature. For example, children exposed to domestic violence can reduce the academic achievement of their peers (Carrell & Hoekstra, 2012). Third, students with low academic achievement are at high risk of dropping out. As noted above, students in rural China face a highly competitive education system. Those with low academic performance are less likely to perform well on the HSEE and may give up earlier in their schooling (Yi et al., 2012).

In fact, we are not alone in identifying the potential for SEL to reduce learning anxiety and dropout rates. China's State Council has issued four documents since 2008, each requesting the Ministry of Education to find ways to decrease learning anxiety among junior high students from rural areas (China Ministry of Education, 2008, 2010, 2012). However, while evidence from developed countries suggests that SEL programs could be effective, there is little evidence from developing countries. Few local governments and schools in rural areas have provided SEL programs to their students. Furthermore, to the best of our knowledge, no public or private agency has evaluated whether providing SEL helps reduce learning anxiety or reduce dropout among rural students.

RESEARCH DESIGN, INTERVENTIONS, DATA, AND STATISTICAL APPROACH

To study the impacts of SEL programs on student outcomes, we conducted a cluster-randomized trial among 7,495 seventh- and eighth-grade students in 70 public junior

high schools located in Shaanxi province.[1] In choosing our sample, we first obtained a list of all counties in the prefecture. We collected the average per capita income for each of the 12 counties in the prefecture in 2011 (based on the Shaanxi Survey Office of the Shaanxi Statistics Bureau, 2011), ranking them from the richest to poorest. We then chose the eight poorest counties from among the 12 counties in the region.

Using official records, we created a sampling frame of all junior high schools in the sample counties. There were a total of 170 junior high schools. Based on administrative records, we applied two exclusion criteria to these 170 schools. First, because our interest is in rural schools, we excluded junior high schools that were located in county seats or prefecture seats (which primarily enrolled urban students). Second, because China's government is currently consolidating existing rural schools into new centralized schools, we excluded schools with fewer than 90 students to safeguard against excessive attrition. After applying these exclusion criteria, we had 74 schools as our sample of schools.

The next step of our study was to conduct a baseline survey at the end of the school year in December 2012.[2] In the survey, we collected data from all seventh- and eighth-grade students, their homeroom teachers, and school principals in these 74 schools. In particular, we asked each student to take a 15-item battery of learning anxiety scale. Enumerators also collected information on a series of individual and family characteristics (see Data Collection section below). Our sample is roughly representative of rural, public junior high schools in poor counties in Northwest China.

Following the baseline survey, and as part of our research design, we randomly allocated our sample schools into a treatment (SEL) or control group. To do so, we first stratified the 74 schools into equal size pairs within each county to increase the statistical power of our analyses (Imai et al., 2009). The pairs were created in the following steps. First, within each county, we ranked schools by seventh- and eighth-grade enrollments (from the lowest to highest). Second, within each county, we then chose the first two schools for the first block, the next two schools for the second block, and so on. In other words, each pair is within the same county and has similar enrollments. Although 74 schools participated in the baseline survey, our final sample only includes 70 schools.[3] This was because four counties had an odd number of schools, leaving four schools that could not be paired. After blocking, we randomly assigned one school in each pair to one of two experimental arms: a treatment and control arm. In total, 35 schools were assigned to receive an SEL intervention and 35 schools were not. A total of 7,495 students participated in this experiment.

Experiment Arms/Interventions

Although our research team randomly assigned schools to the SEL intervention, officials in the prefectural department of education implemented the intervention. In the case of the 35 treatment schools, officials sent an official document in December 2012 to each school principal explaining policymakers' intention to implement a new SEL program. The principal in each treatment school was asked to designate a music, art, or physical exercise teacher with previous experience as a homeroom

[1] The name of the prefecture omitted for confidentiality.
[2] We conducted the baseline at the end of the school year (instead of the beginning) to ensure sufficient time to notify teachers and principals assigned to the treatment arm (the SEL intervention).
[3] The study is sufficiently powered with 70 schools. Using rural junior high school data from previous studies, we assumed an intraclass correlation coefficient of 0.15 and an R-squared of 0.5. As is standard in much of the social science literature, we set alpha = 0.05 and beta = 0.8. We then calculated that we required at least 100 individuals per school and 33 schools per arm to detect a standardized effect size of 0.20.

teacher to serve as a part-time SEL teacher. Serving as a part-time SEL teacher was supposed to comprise 50 percent of each teacher's teaching workload. In the case of the 35 control schools, the prefectural department of education agreed to refrain from publicizing the program or notifying the control schools of the program until after the evaluation period to avoid potential spillovers between treatment and control schools. When we asked principals in the control schools to discuss whether they knew of any SEL programs, none of them identified the program described in our experiment.

The SEL classes were not supposed to crowd out instructional time.[4] As noted above, our government partner chose teachers of noncore courses such as music, art, and physical education to implement the SEL program. Noncore courses are only taught once a week, while core courses are taught each day. Since teachers of noncore courses have a lighter workload than teachers of core courses, they could more easily bear the extra workload associated with the project. Moreover, the SEL teachers were instructed to teach the class during an hour set aside from *weekly meetings* in the typical rural Chinese weekly calendar (usually on Friday afternoons before school ends). Homeroom teachers typically use the time to cover administrative issues and allow students time for self-study.

Before the beginning of the spring semester (January 2013), the selected teachers and their principals came to a centralized training location in the prefecture seat. The training was fully scripted and a professional trainer from Beijing Normal University conducted a five-day training for the teachers and a half-day training for the principals. The teachers were instructed on how to execute each of the 32 fully scripted, 45-minute sessions per week to their seventh- and eighth-grade students.

The 32 lessons were designed by four professional experts in clinical psychology (from Beijing Normal University). The goal of the curriculum was to help students address learning anxiety. Consistent with existing guidelines from the Collaborative for Academic, Social, and Emotional Learning (CASEL—Durlak et al., 2011), each of the lessons taught specific social–emotional skills, spanning topics such as emotion management, self-awareness, setting goals, and establishing positive relationships. The skills were taught mostly through activities and games rather than through lectures. For instance, one lesson teaches students to recognize how improperly controlled emotions (such as anxiety) can hurt others. In this specific lesson, students learn to recognize emotions as a natural part of life but something that can hurt others if not controlled. The lesson starts with an activity called the *stress balloon*. The class is divided into small groups, and each sends a representative in front of the class to blow into a balloon until the balloon bursts or flies away. The students discuss how stress is like the air in the balloon. Students are asked to consider how they are like balloons when they are stressed—and the consequences of losing control. In following lessons, students learn specific techniques to control their emotions. For the interested reader, Supporting Information Appendix Table A1 lists the contents and activities for each lesson.[5]

Significantly, our intervention did not include information on the returns to schooling. We did not include this kind of information for two reasons. First, the present study evaluates the impacts of SEL programs on learning anxiety and dropout. We did not include information on the returns to schooling as part of this intervention, since it would have been difficult to determine whether SEL, information, or a combination of the two was responsible for impacting student

[4] Nevertheless, we do test for potential crowd-out in our Results section below.
[5] All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's Web site and use the search engine to locate the article at http://onlinelibrary.wiley.com.

outcomes. In addition, a previous study in rural China has already examined the impact of providing such information on student outcomes. Loyalka et al. (2013) show that providing information on returns (or the importance of schooling in general) has no statistically significant effect on student dropout, academic achievement, or plans to go to high school.

To ensure that the curriculum was appropriate for the context of schools in rural China, the research team conducted a pilot before providing the materials to the implementing government agency. We piloted the teacher training protocol and curriculum at four rural junior high schools in a county in Shaanxi (these schools were not in our experimental sample). The pilot lasted for one school year. Our research team and curriculum developers made trips once every two months to interview teachers about their experience teaching the curricula. After the end of each of the two semesters, the curriculum developers conducted focus groups with students, and our research team met with the head of the Department of Education in each county to elicit opinions about the project.

Several adjustments were made on the basis of this feedback. The curriculum developers changed the frequency of the curricula to once per week (as opposed to twice per week). The SEL teachers were assigned on a half-time basis (as opposed to a full-time basis). In addition, the students found some of the activities unsuitable (e.g., taking a photograph of their *ideal teacher*), prompting adjustments in the activities (e.g., drawing a picture of their ideal teacher). The result of these adjustments was a program that was more suitable to students in rural China and feasible for the local bureau of education to implement.

In sum, the intervention evaluated in this paper was conducted by a government agency. The research team was only involved in the design of the intervention and evaluation. Along with the curriculum developers at Beijing Normal University, we were involved in the choice of which SEL topics would be included; we also negotiated with local government officials to develop realistic parameters for the intervention. However, we were primarily responsible for designing and implementing the evaluation of the program (i.e., the collection and analysis of data). Thus, as soon as the SEL program was launched in December 2012, the research team's role was strictly for data collection only. For example, we collected information on the degree to which teachers followed through with the intervention. However, at no time did we censure teachers for not following through with full implementation. The local Department of Education officials (our partners in this project) were the ones in charge of ensuring implementation.

Data Collection

The data for this study are drawn from a baseline (December 2012), a midline (August 2013), and an endline survey (February 2014). The baseline survey was administered in four blocks in December 2012. In the first block, students were asked to provide basic background characteristics, including their gender, age, parental education (whether their father or mother graduated from junior high school), parental migration status (whether their father or mother migrated to the cities at the time of the baseline), and number of siblings. In this block, we also asked a series of questions related to the student's household assets: whether the household owned certain common household items, livestock, small businesses, the material used to construct their home, and the size of their home. Most responses to household asset ownership variables in our data set were dichotomous, so we used polychoric principal components analysis (PCA—Kolenikov & Angeles, 2009) to construct a standard index for household wealth among our sample students. We did so because recent studies suggest using household asset indicators and

PCA to construct continuous measures for household wealth is more reliable than self-reported income (for a review, see Kolenikov & Angeles, 2009).

In a second block, students were asked to provide information on characteristics that might predict future dropout behavior: whether they skipped class in the previous week, whether they kept in touch with students who had dropped out before, whether they aspired to attend academic high school, and whether they aspired to attend vocational high school.

In a third block, we gave students a 30-minute standardized math test based on items we collected from the Chinese national curriculum framework (China Ministry of Education, 2011). We could ensure that students and teachers could not prepare for the test because we administered and printed the test ourselves. No one in the sample schools knew of the questions beforehand. The enumeration team closely proctored the students in order to minimize cheating, and we strictly enforced time limits for the exams. Finally, the scores were scaled into z-scores by subtracting the mean and dividing by the SD of the math score distribution of all students tested at the baseline. These normalized scores are our key measure for baseline math achievement.

Finally, we administered a variation of the Child Manifest Anxiety Scale (CMAS) called the Learning Anxiety Index (Reynolds & Richmond, 1978). The Learning Anxiety Index is a set of 15 questions from the Mental Health Test (MHT), the most widely used scale to measure the anxiety status of grade school students in China (Gan, Bi, & Ruan, 2007; Zhou, 1991). The MHT has a reliability of 0.84 to 0.88 and a retest reliability of 0.78 to 0.86 (Yao et al., 2011). The index was originally designed such that a score over 7 indicates the student is at risk for learning anxiety. Being at risk for learning anxiety means the student needs assessment and potential treatment by a clinical psychologist. This allowed us to construct a dichotomous variable that equals 1 for students with scores over 7. For completeness, we also use a standardized (subtracting the mean and dividing by the SD of the learning anxiety distribution) version of learning anxiety measure in all analyses below.

In our midline and endline surveys in August 2013 and February 2014, we collected information on two student outcome variables: (a) student dropout (a dichotomous variable) and (b) learning anxiety (measured using the Learning Anxiety Index described above). We adhered to the following protocol to collect information on student dropout rates. The enumerators were asked to record the attendance of each student during the midline and endline surveys. If a student was absent, the enumerators asked the class monitor regarding the whereabouts of the student. As an additional check, we called the student's home and asked the parents or the caregiver about the status of the student. Fortunately, in 100 percent of our cases, the students coded as dropped out by the class monitor were also described as having dropped out by the parents or caregiver.

In our midline and endline surveys, we also collected information from students about their engagement with and impressions of the SEL program. Specifically, we asked students to identify which lessons of the program they had actually attended. Moreover, we asked students to rank-order the SEL program in terms of the following: (a) importance and (b) interest with eight other common courses at school (music/art, physical education, Chinese, English, math, geography, history, and politics). We did so to examine the degree to which students found the SEL program important or interesting. We summarize these variables in Supporting Information Appendix Table A2.[6]

[6] All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's Web site and use the search engine to locate the article at http://onlinelibrary.wiley.com.

Tests for Balance and Attrition Bias

We also test for balance and attrition bias. Table 1 tests for imbalances in baseline covariates and outcomes across the treatment and control groups, controlling for other baseline covariates (as described in the Data Collection section above). As randomization occurred within blocks, we also include block fixed effects in the regression. We further adjust for clustering at the school level. The results show that the treatment had no statistically significant impact on any baseline covariates. For instance, the treatment group had baseline anxiety rates that were 2 percentage points lower than the control group (column 1), but this difference is not statistically significant at the 10 percent level. Nonetheless, to be sure that this difference does not bias our estimates of the impact of SEL on student outcomes at the midline and endline, we control for baseline learning anxiety and the other baseline covariates when testing for impacts of the treatment in our later regression analyses.

As noted above, after randomizing the schools into treatment and control groups, we followed up the students at the baseline at two subsequent time periods. After the end of one semester (August 2013, our midline survey), we asked students to fill out another survey form and a second learning anxiety scale. After the end of two semesters (February 2014, our endline survey), we again asked students to fill out a survey form and a third learning anxiety scale.

Figure 1 summarizes how we selected our school sample and depicts the flow of participants through each follow-up survey of the study. This figure shows 1,085 of the original 7,495 students (14.5 percent) were no longer present to fill out the midline survey (eight months after the baseline). Among students assigned to the treatment group, 494 of 3,694 students (13.37 percent) attritted. By contrast, 591 of the original 3,801 control students (15.55 percent) were not present to fill out the midline survey.

In addition, by the endline survey (15 months after the baseline), 1,537 of the original 7,495 students (20.5 percent) were no longer present. Among the treatment group, 728 of 3,694 students (19.71 percent) attritted. By contrast, 809 of the original 3,801 control students (21.28 percent) were not present to fill out the endline survey.

Note that, for our first and main outcome variable (dropout), we did not have any attrition in either the midline or endline survey. We were able to contact all students who were not present during the midline or endline surveys by phone and were able to confirm whether they had dropped out. However, the attritors did not fill out the learning anxiety scale (our second outcome variable—see Data Collection below) during the midline and endline surveys, respectively. These were students who had dropped out (470 students by midline/703 students by endline survey) were on sick leave (58 students/63 students) or had transferred to other schools (557 students/771 students).

Due to attrition, the sample of students for whom we have a measure of learning anxiety at the midline and endline is smaller than the full sample of students at the baseline. We therefore test whether the estimates of the impacts of SEL on learning anxiety are subject to attrition bias. To do so, we first construct indicators for attrition at the midline or endline (1 = missing the anxiety outcome). Note that this definition does not differentiate dropouts from those who had missing data for other reasons (e.g., who were sick that day or chose to skip the questions). We then regress different baseline covariates on a treatment indicator, the attrition indicator (one for the midline and endline, respectively), and the interaction between the two (again with block fixed effects and clustering at the school level). The results are shown in Table 2.

Overall, we find that there are no statistically significant differences between the attrition patterns between treatment groups and control groups on a variety of baseline covariates as of the midline. There are two exceptions. Compared with

Table 1. Test of treatment balance at the baseline, including block fixed effects and other controls.

	(1) Female	(2) Age in months	(3) Grade	(4) Dad's education	(5) Mom's education	(6) Dad migrated	(7) Mom migrated	(8) #Sibs
Treatment school (1 = yes)	–0.006	–0.044	–0.004	0.005	0.021	0.013	–0.005	–0.001
	(0.008)	(0.393)	(0.011)	(0.011)	(0.014)	(0.017)	(0.009)	(0.038)
Constant	0.704***	176.78***	–3.090***	0.624***	0.579***	0.438***	–0.120**	–0.375
	(0.117)	(0.663)	(0.080)	(0.100)	(0.079)	(0.091)	(0.060)	(0.240)
R^2	0.074	0.340	0.298	0.124	0.123	0.191	0.161	0.131

	(9) Family asset	(10) Skip class	(11) Go Acad. HS	(12) Go Voc. HS	(13) #Friends	(14) Math 2012	(15) Learning anxiety 2012	(16) Learning anxiety 2012 (continuous)
Treatment school (1 = yes)	–0.035	–0.015	0.009	–0.016	–0.012	0.004	–0.020	–0.039
	(0.043)	(0.015)	(0.011)	(0.018)	(0.016)	(0.028)	(0.013)	(0.032)
Constant	0.599***	0.226**	1.818***	0.804***	2.073***	1.199***	0.417***	–0.641***
	(0.166)	(0.087)	(0.076)	(0.098)	(0.266)	(0.183)	(0.089)	(0.166)
R^2	0.256	0.021	0.122	0.080	0.022	0.102	0.033	0.044

Notes: $n = 7{,}495$. Robust standard errors (adjusted for clustering at the school level) reported in parentheses. All estimates include block fixed effects and all (other) baseline control variables. Full description of variables in Supporting Infprmation Appendix Table A2. All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's Web site and use the search engine to locate the article at http://onlinelibrary.wiley.com.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

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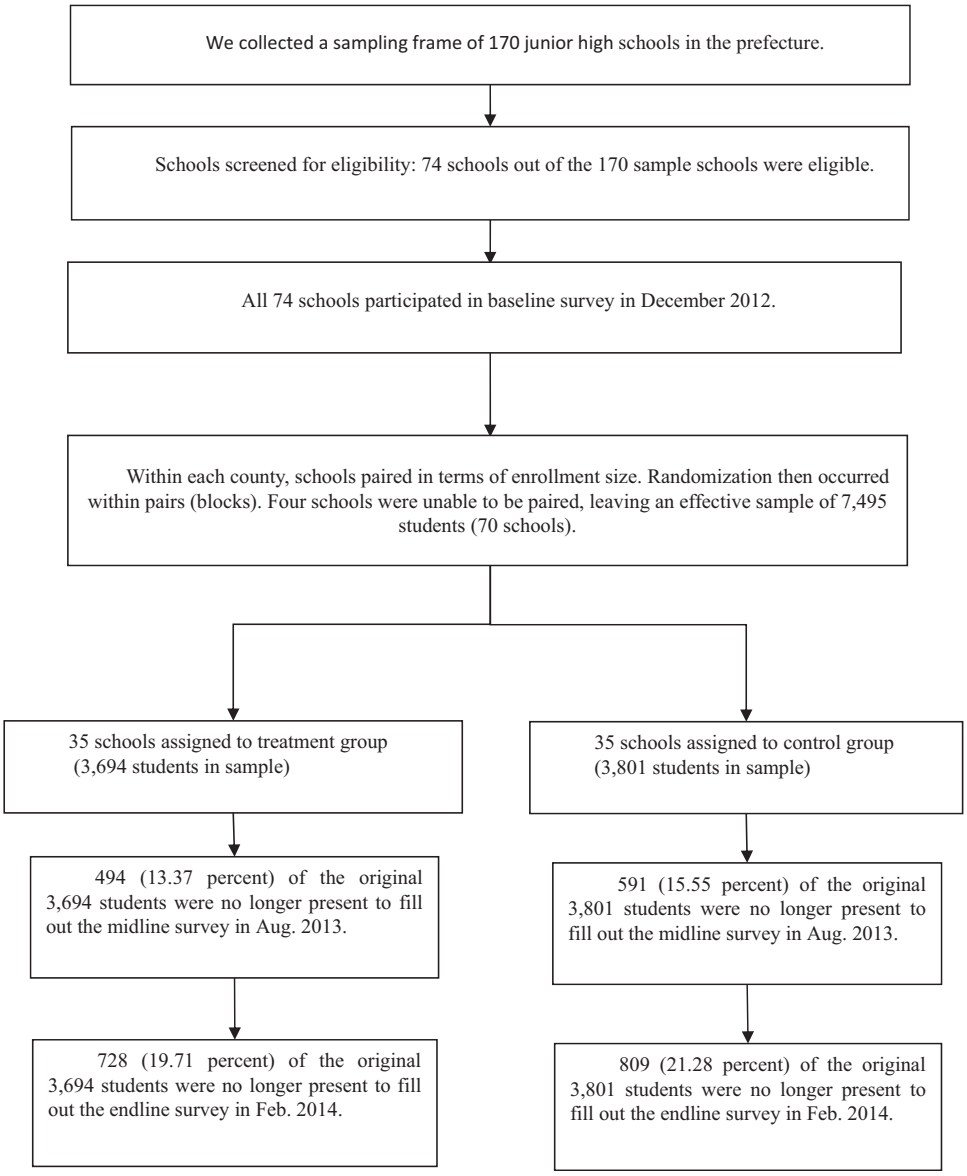

Figure 1. Trial Profile.

attritors in the control group, attritors in the treatment group had mothers who were 4.9 percentage points less likely to have a junior high education (Table 2, panel A, row 3, column 5). This difference is significant at the 10 percent level. Moreover, attritors in the treatment group had 0.15 more siblings than attritors in the control group. This difference is also significant at the 10 percent level.

Differential patterns of attrition are more pronounced in the endline. Attritors from the treatment group are 11.7 percentage points more likely to be in eighth grade, 5.4 percentage points less likely to have fathers with junior high degrees, 8 percentage points less likely to have mothers with junior high degrees, and have 0.13 more siblings (compared with attritors in the control group—Table 2; panel B;

Table 2. Test of differential attrition at midline (2013) and endline (2014) surveys.

	(1) Female	(2) Age in months	(3) Grade	(4) Dad's education	(5) Mom's education	(6) Dad migrated	(7) Mom migrated	(8) #Sibs	(9) Family asset	(10) Skip class	(11) Go Acad. HS	(12) Go Voc. HS	(13) #Friends	(14) Math 2012	(15) Learning anxiety 2012
Panel A: Balance between treatment and control group in 2013 (midline), with and without attrition															
Treatment	–0.001	0.014	–0.012	0.016	0.031*	0.011	–0.001	–0.029	–0.030	–0.014	0.009	–0.015	–0.017	0.013	–0.017
	(0.011)	(0.413)	(0.013)	(0.016)	(0.016)	(0.018)	(0.008)	(0.037)	(0.050)	(0.016)	(0.012)	(0.021)	(0.021)	(0.033)	(0.015)
Attrited_mid	–0.10***	6.738***	0.065***	0.037*	0.065***	0.017	0.045***	–0.013	0.080	0.067***	–0.15***	–0.019	–0.22***	–0.13***	0.035
	(0.021)	(0.626)	(0.019)	(0.020)	(0.015)	(0.018)	(0.013)	(0.046)	(0.050)	(0.018)	(0.021)	(0.021)	(0.058)	(0.033)	(0.025)
Treatment × Attrit_mid	–0.044	–1.137	0.043	–0.030	–0.049*	0.016	–0.002	0.154*	0.049	–0.007	0.006	–0.026	0.070	–0.005	–0.040
	(0.035)	(0.827)	(0.032)	(0.033)	(0.026)	(0.032)	(0.020)	(0.086)	(0.069)	(0.025)	(0.033)	(0.035)	(0.096)	(0.065)	(0.032)
Constant	0.484***	179.0***	0.515***	0.417***	0.214***	0.311***	0.107***	1.436***	–0.000	0.244***	0.822***	0.725***	1.767***	0.013	0.656***
	(0.007)	(0.258)	(0.009)	(0.010)	(0.011)	(0.011)	(0.005)	(0.027)	(0.033)	(0.011)	(0.008)	(0.015)	(0.016)	(0.022)	(0.010)
R^2	0.016	0.052	0.013	0.024	0.031	0.071	0.035	0.090	0.194	0.012	0.050	0.043	0.004	0.057	0.008
Panel B: Balance between treatment and control group in 2014 (midline), with and without attrition															
Treatment	–0.006	–0.419	–0.031*	0.022	0.040**	0.014	–0.001	–0.033	–0.022	–0.015	0.020	–0.014	–0.001	0.025	–0.024
	(0.012)	(0.433)	(0.014)	(0.016)	(0.017)	(0.019)	(0.009)	(0.040)	(0.054)	(0.015)	(0.013)	(0.022)	(0.025)	(0.035)	(0.015)
Attrited_end	–0.11***	5.259***	0.017	0.025	0.066***	0.023	0.035**	–0.003	0.101*	0.083***	–0.14***	0.012	–0.21***	–0.13***	0.042*
	(0.023)	(0.750)	(0.020)	(0.021)	(0.016)	(0.017)	(0.013)	(0.046)	(0.052)	(0.019)	(0.021)	(0.019)	(0.061)	(0.033)	(0.022)
Treatment × Attrit_end	–0.008	1.108	0.117***	–0.054*	–0.08***	–0.005	–0.001	0.128*	–0.006	0.001	–0.044	–0.019	–0.024	–0.059	0.007
	(0.032)	(0.997)	(0.035)	(0.028)	(0.022)	(0.026)	(0.018)	(0.073)	(0.065)	(0.025)	(0.031)	(0.030)	(0.083)	(0.060)	(0.029)
Constant	0.492***	179.0***	0.521***	0.418***	0.210***	0.309***	0.106***	1.434***	–0.009	0.236***	0.830***	0.719***	1.778***	0.019	0.653***
	(0.008)	(0.259)	(0.009)	(0.010)	(0.012)	(0.012)	(0.006)	(0.031)	(0.037)	(0.011)	(0.009)	(0.015)	(0.020)	(0.022)	(0.010)
R^2	0.016	0.056	0.015	0.025	0.031	0.071	0.034	0.090	0.195	0.015	0.061	0.042	0.005	0.058	0.009

Notes: Robust standard errors (adjusted for clustering at the school level) reported in parentheses. All estimates include block fixed effects. $n = 7{,}495$.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

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row 3; columns 3, 4, 5, and 8). Due to these differential attrition rates at the endline, we estimate Lee Bounds when estimating the impact of the treatment on learning anxiety.

Statistical Approach

We use adjusted ordinary least squares (OLS) regression analysis to estimate how dropout and learning anxiety changed for students in the intervention arm relative to students in the control arm. The basic specification of our model is as follows:

$$Y_{ij} = \alpha_0 + \alpha_1 T_j + X_{ij}\alpha + \varphi_b + \varepsilon_{ij} \quad (1)$$

where Yij represents the outcome variable of interest of student i in school j (either an indicator for dropout, an indicator for being at risk for learning anxiety, or a standardized score for learning anxiety). T_j is the treatment variable, taking on a value of 1 if the school that the student attended had the SEL program and 0 if the school that the student attended was in the control arm. As randomization occurred within blocks, we include a fixed effect for blocks f_b, and ε_{ij} is a random error term. Finally, to control for the potential confounding effects of student and family characteristics, we also include X_{ij}, a vector of baseline student and family covariates. These characteristics include gender (equals 1 if the student is female and 0 otherwise), age (in months), grade (equals 1 if the student is in grade 8 and 0 if the student is in grade 7), the education level of parents (equals 1 if the father/mother of the student has graduated from junior high school and 0 otherwise), parental migration status (equals 1 if the father/mother of the student migrated to the cities and 0 otherwise), number of siblings, and household asset value (equals 1 if the student's household is the lowest quartile and 0 otherwise). The characteristics also include dummy variables for whether the student skipped class in the previous week (1 = yes, 0 = no), aspired to attend academic high school (1 = yes, 0 = no), or aspired to attend vocational high school (1 = yes, 0 = no). Finally, X_{ij} also includes measures of baseline math achievement and whether the student was at risk of facing learning anxiety (1 = yes, 0 = no).

To examine whether the SEL intervention affected certain subgroups of students more than others, we estimate treatment parameters in the following heterogeneous effects model:

$$Y_{ij} = \beta_0 + \beta_1 T_j + \beta_2 T_j \times H_{ij} + X_{ij}\beta + \varphi_{3b} + \varepsilon_{3ij}. \quad (2)$$

In equation (2), we interact the treatment variable with a student background indicator (H_{ij}). To facilitate comparison across categories, the student background indicators were constructed by taking cutoffs near the 20th percentile for each of the at-risk groups (older students, those keeping in touch with friends who had already dropped out, and low achievement). We chose the 20th percentile because it nearly coincides with the 16-year-old cutoff—an age that is socially meaningful because students are able to work after this age. In addition, this cutoff coincides roughly with the proportion of students with friends outside of school who already dropped out (17.5 percent). Following this approach, we created indicators for the following: (a) whether the student is in the oldest 20 percent of the age distribution; (b) whether the student keeps in touch with friends who already dropped out of school; and (c) whether the student has poor academic achievement (in the lowest 20 percent of math score distribution). The indicator H_{ij} is also included in the vector of covariates X_{ij} in equation (2) above. In all regressions, we accounted for the clustered nature of our sample by constructing Huber–White standard errors corrected for school-level clustering.

RESULTS

Impacts of the SEL Program on Student Outcomes

According to a simple comparison of means, the SEL program reduced dropout and learning anxiety rates at the midline. At the time of the midline survey, the average dropout rate among control group students was 7.2 percent (Table 3, row 1, column 1), compared to a 5.4 percent dropout rate experienced by treatment group students. In the control group, the percentage of students at risk for learning anxiety was 64 percent (row 1, column 2), compared with 61 percent in the treatment group. According to the continuous measure of learning anxiety, the control group average was 0.019 SDs (row 1, column 3), compared to –0.038 SDs in the treatment group.

Our regression results, which control for block fixed effects, student characteristics, and family characteristics, suggest a similar story: the SEL program yields positive impacts in the midline. Specifically, our results show that the program reduced dropout by 1.6 percentage points at the time of our midline survey (Table 3, row 2, column 1). This is a decrease of 22 percent, and significant at the 10 percent level. Our adjusted results also show that the SEL program reduced the percentage of anxious students by 2.3 percentage points (row 2, column 2). This effect remains consistent even if the learning anxiety outcome variable is continuous. The SEL program reduced learning anxiety by 0.048 SDs (row 2, column 3).

As of our endline survey, a simple comparison of means suggests that the program had no statistically significant impacts on dropout or learning anxiety. By the time of the endline survey, the average dropout rate among control group students was 10.2 percent (Table 3, row 1, column 4), compared with 8.7 percent among the treatment group. According to a *t*-test, the difference in dropout rates between the treatment and control groups is not statistically significant. The percentage of students who were at risk for learning anxiety was 60.3 percent (row 1, column 5) in the control group and 60.0 percent in the treatment group. According to the continuous measure for learning anxiety, the control group mean was –0.007 SDs (row 1, column 6) and the treatment group mean was –0.032. None of these differences is statistically significant.

Our adjusted regression results also show that the intervention had no measurable impact on either student dropout rates or learning anxiety at the time of the endline survey. The SEL program reduces dropout rates by 1.2 percentage points, but the difference is not statistically significant (Table 3, row 2, column 4). The program also reduces learning anxiety by 0.3 percentage points, but again the results are not statistically significant (row 2, column 5). This effect remains consistent even if the learning anxiety outcome variable is continuous: the SEL program reduces learning anxiety by 0.027 SDs, but this effect is not statistically significant (row 2, column 6).

One concern is that the SEL program crowded out other school-based activities (since teachers were being asked to take on additional responsibilities). Although we do not have data on exactly how much time students spent on different activities, we do have a measure of math achievement at the endline. Our results show that the SEL treatment did not decrease math achievement. The point estimate of the score of the math achievement exam in the treatment group was positive (0.013 SDs). The magnitude of the estimate is close to zero and the result is not statistically significant (Supporting Information Appendix Table A3).[7] Thus, even if the intervention did crowd out other activities, it did not appear to do so in a way that negatively impacted student achievement in one of the core courses of the students (mathematics).

[7] All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's Web site and use the search engine to locate the article at http://onlinelibrary.wiley.com.

Table 3. Impact of SEL intervention on main student outcomes.

	Dropout at midline (1)	Learning anxiety at midline (dichotomous) (2)	Learning anxiety at midline (continuous) (2)	Dropout at endline (3)	Learning anxiety at endline (dichotomous) (4)	Learning anxiety at endline (continuous) (2)
Control group mean	0.072	0.640	.0185	0.102	0.603	–0.007
	(0.259)	(0.48)	(0.971)	(0.302)	(0.489)	(0.968)
Treatment school (1 = yes)	–0.016*	–0.023*	–0.048*	–0.012	–0.003	–0.027
	(0.009)	(0.013)	(0.028)	(0.008)	(0.011)	(0.028)
Student characteristics controlled	YES	YES	YES	YES	YES	YES
Family characteristics controlled	YES	YES	YES	YES	YES	YES
Block fixed effects included	YES	YES	YES	YES	YES	YES
Constant	–0.536***	0.389***	–0.746***	–0.698***	0.091	–1.286***
	–0.07	–0.099	(0.178)	–0.087	–0.11	(0.200)
Observations	7,495	6,410	6,410	7,495	5,958	5,958
R^2	0.104	0.138	0.183	0.138	0.133	0.161

Notes: Robust standard errors (adjusted for clustering at the school level) reported in parentheses. The student characteristics being controlled for include gender (1, female; 0, male), age (in months), grade (1, grade 8; 0, grade 7), the education level of parents (1, father/mother of the student has graduated from junior high school; 0, otherwise), parental migration status (1, the father/mother of the student migrated to the cities; 0, otherwise), number of siblings, and household asset value (1, the student's household is the lowest quartile; 0, otherwise). The characteristics also include dummy variables for whether the student skipped class in the previous week (1, yes; 0, no), aspired to attend academic high school (1, yes; 0, no), or aspired to attend vocational high school (1, yes; 0, no). Finally, the controls include student self-reported number of friends and measures of baseline mathematics achievement and whether the student was at risk of facing learning anxiety at the baseline (1, yes; 0, no).
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

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We also test for the robustness of our results in two ways. First, one potential concern is that the estimates are sensitive to the covariates that we included. To test this concern, we run nested regression models where we start with no covariates before adding student covariates; student and family covariates; and student, family, and lagged outcomes. The results do not substantively change depending on the covariates added. For the sake of brevity, we have omitted these tables, but they are available upon request.

Second and more importantly, although treatment assignment was random, the estimated treatment effects may be biased if our sample experiences nonrandom attrition. For example, if students who attrit from the SEL group tend to have higher learning anxiety, the learning anxiety results (only measured among those who did not attrit) would be biased. To address this issue, we use a nonparametric bounding approach developed by Lee (2009). The intuition is as follows. In our context, the control group had a higher rate of attrition than the SEL group. Lee Bounds trim observations from the treatment group until the groups are of equal size. The key is that trimming starts either from individuals with the highest or lowest anxiety in the group (for the upper and lower bounds). This corresponds with extreme assumptions that all of the attritors would have been the most or least anxious. The bottom line is that if the upper and lower Lee Bounds remain statistically significant, then nonrandom attrition is not biasing the estimates.

We estimate Lee Bounds (Lee, 2009) with bootstrapped standard errors (with 500 replications) adjusted for clustering at the school level (Supporting Information Appendix Table A4).[8] For the midline, the 95 percent confidence intervals for the Lee Bound estimates are [–0.192, 0.020]. For the endline, the confidence intervals are [–0.185, 0.042]. Both bounds cross 0. Thus, the estimated bounds suggest that we cannot rule out the possibility that receiving SEL may not reduce learning anxiety in the midline or endline. Stated differently, although the SEL program was designed to reduce learning anxiety, the fact that individuals attrited from this study means we cannot rule out the possibility that the observed effects on learning anxiety are due to differential attrition.

If there is indeed no effect of SEL on learning anxiety, how do we explain why SEL still reduces dropout, especially among those at risk for dropping out? While there are many possible arguments, one argument is that the SEL program did not cause students to feel less anxious but successfully taught them how to cope with their anxiety. For completeness, we present evidence that is suggestive of this possibility. In the midline survey, we included an index of 17 questions asking students to self-report on how they would cope with certain challenges. (The questions asked students to indicate how likely they would agree with statements such as the following: "When I need attention from my teacher, I reach out to ask for help from him or her.") Examples of questions in this index and how the questions were coded are given in Supporting Information Appendix Table A5.[9] The results show that students who received the SEL program were 0.061 SDs more likely to choose more appropriate responses to such challenges ($p = 0.008$). However, the 95 percent confidence intervals for the Lee Bound estimates in this index are [–0.0260, 0.1829]. Thus, while the effects are suggestive of effects on student ability to cope with anxiety, we also cannot rule out the possibility that the observed effects are due to differential attrition.

[8] Note that we must use the continuous measure for learning anxiety here because, to our knowledge, the published literature does not provide a way to estimate Lee-type Bounds with a dichotomous outcome. All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's Web site and use the search engine to locate the article at http://onlinelibrary.wiley.com.

[9] All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's Web site and use the search engine to locate the article at http://onlinelibrary.wiley.com.

Table 4. Testing for differences in treatment effect over time (pooled sample).

Variable	Learning anxiety (1)	Dropout (2)
Treatment school (1 = yes)	–0.028**	–0.015*
	(0.013)	(0.009)
Year = 2014 (Endline)	–0.036***	0.030***
	(0.010)	(0.006)
Treatment × Year 2014 (Endline)	0.030**	0.003
	(0.014)	(0.009)
Student characteristics controlled	YES	YES
Family characteristics controlled	YES	YES
Block fixed effects included	YES	YES
Constant	0.266***	–0.632***
	(0.085)	(0.074)
Observations	12,368	14,990
R^2	0.133	0.122

Notes: Robust standard errors (adjusted for clustering at the school level) reported in parentheses. The student characteristics being controlled for include gender (1 = female, 0 = male), age (in months), grade (1 = grade 8, 0 = grade 7), the education level of parents (1 = father/mother of the student has graduated from junior high school, 0 = otherwise), parental migration status (1 = the father/mother of the student migrated to the cities, 0 = otherwise), number of siblings, and household asset value (1 = the student's household is the lowest quartile, 0 = otherwise). The characteristics also include dummy variables for whether the student skipped class in the previous week (1 = yes, 0 = no), aspired to attend academic high school (1 = yes, 0 = no), or aspired to attend vocational high school (1 = yes, 0 = no). Finally, the controls include student self-reported number of friends and measures of baseline mathematics achievement and whether the student was at risk of facing learning anxiety at the baseline (1 = yes, 0 = no).
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Treatment Effects over Time

The effects were statistically significant at the midline but not at the endline. However, these results only imply that there was no measurable effect of the treatment on either learning anxiety or dropout as of the endline. They do not imply that the effects from the midline actually fell in magnitude or faded out. Indeed, the point estimates of the impact of the SEL program on dropout are similar between the midline (1.6 percentage points) and endline (1.2 percentage points).

To test whether there was truly a decline in impacts, we must test for differences between the midline and endline effects. To do so, we pool the learning anxiety and dropout outcomes such that each student has two outcomes—one at the midline (2013) and one at the endline (2014). The control variables remain the same, and we continue to add block fixed effects and adjust for clustering at the school level. We then include an indicator for the endline (2014) and interaction terms between the treatment indicator and the endline indicator (see Table 4).

The results show that the treatment effects for learning anxiety declined between the midline and endline. In our adjusted model, the treatment reduced learning anxiety by 2.8 percentage points (significant at the 5 percent level—Table 4, column 1, row 1). The treatment effect, however, was reduced by 3 percentage points by the endline (also significant at the 5 percent level—column 1, row 3). This roughly reverses the treatment impact from the midline.

For the dropout outcome, we do not have sufficient evidence to conclude that there was a decline in impacts. In the adjusted model, the treatment reduced dropout rates by 1.5 percentage points. As of the endline, the treatment effects were reduced by 0.3 percentage points, but this change is not statistically significant (Table 4, column 2, row 1). Thus, while the endline results were not statistically different from zero, we

Table 5. Differences in student interest in SEL between midline and endline surveys.

Midline (1)		Endline (2)		Difference (1)-(2)	
Mean	SE	Mean	SE	Mean	SE
*1. How many classes students think **are more important** than SEL?*					
3.409	0.043	3.898	0.044	–0.488***	0.051
*2. How many classes students **like** more than SEL?*					
3.475	0.036	3.208	0.036	0.267***	0.042
3. Lessons for each semester attended, reported by students					
11.538	0.093	9.106	0.110	2.431***	0.117
$N = 3{,}200$		$N = 2{,}966$			

Notes: Significance test of difference in means between midline and endline is a two-tailed *t*-test. Respondents are limited to those in the treatment group (who received the SEL program) who were also present during the midline and endline survey. Students in the treatment group were asked to compare the importance of and their interest in SEL and other eight subjects in school (English, math, Chinese, physical education, art, music, history and politics, and physics and biology).
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

also cannot definitively say that the endline results represent a decline in treatment effects from the midline.

The bottom line is that there is evidence of fade out in the learning anxiety. One explanation for these results may be novelty effects in the program. In other words, while the program initially may have caught the interest of students, teachers, or school administrators, they may have lost interest in the SEL program in the second semester. For example, students may have lost interest if the program became institutionalized/routine. Alternatively, students also may have lost interest from the program if teachers decreased their effort or received less support from school administrators to effectively teach the program. In this section, we further explore whether the potential decline in treatment effect might be due to novelty effects by comparing student interest and engagement in the program across the time of the midline and endline surveys.

We present evidence that suggests students found the SEL program somewhat less important and interesting by the time of our endline survey. At the time of our midline survey, students reported that approximately 3.4 subjects were more important than SEL (primarily Chinese, English, and math—Table 5, row 1). However, after our endline survey, students reported that approximately 3.9 subjects were more important (now including subjects covered in the HSEE—history and politics). This indicates that the SEL program was diminishing in importance in the minds of students. The difference is significant at the 1 percent level.

In terms of student interest in the SEL program, students reported liking an average of approximately 3.2 subjects more than the SEL program. However, after 14 months, this number increased to approximately 3.5 subjects, meaning that student interest in SEL was also diminishing relative to other subjects (Table 5, row 2). The difference is significant at the 1 percent level.

In terms of their engagement in the SEL program, students appeared to demonstrate slightly less engagement over time. In the midline survey, an average of 78 percent of students participated in activities during SEL class, whereas in the endline survey this number declined to 73 percent. This difference is significant at the 1 percent level. More importantly, we found that students attended fewer SEL classes in the second semester (compared to the first semester). At the midline survey, students reported that they had finished 11.5 lessons of the 16 required lessons, but at

the endline survey, they only finished 9.1 lessons. This difference is significant at the 1 percent level (Table 5, row 3).

The evidence suggests that student, teacher, or school administrator novelty effects were indeed at play in the intervention. One possibility is that the SEL program improved outcomes in large part because it was exciting and new for students. Of course, another possibility is that student interest per unit of teacher effort was constant. However, teachers and school administrators no longer exerted as much effort. While we cannot be sure which interpretation is most accurate, the evidence does suggest that (at the time of the endline survey) the program was no longer as exciting for students, teachers, or school administrators.

Effects on At-Risk Students

Even though the impact of the SEL program on the learning anxiety and dropout behavior of the average student was no longer statistically significant at the endline, perhaps there was sustained and differential impact for disadvantaged or at-risk students. As noted above, we identified older students, those keeping in touch with friends who had dropped out, and students with low academic achievement as at risk for dropout. Note that, to test if our theorized assumptions regarding at-risk groups were correct, we also ran a regression of dropout at the midline and endline on all of our covariates (among the control group only). The results show that being in the top 20 percent of the age distribution and keeping in touch with friends who have already dropped out are significant predictors of dropout in the midline and endline. Having poor academic achievement (in the lowest 20 percent of the math score distribution) is a statistically significant predictor of dropout in the midline but not the endline (Supporting Information Appendix Table A6).[10]

We find that the SEL program had an additional effect in reducing the dropout rates of older students (students in the top 20 percent of the age distribution), both in the midline and endline. According to the results (Table 6, panel A), the program reduced dropout rates an additional 6.3 percentage points by our midline survey (significant at the 5 percent level—row 3, column 1). More importantly, the effect was sustained over time. At the time of the endline survey, the program continued to reduce dropout rates by an additional 6.1 percentage points among older students (significant at the 5 percent level—row 3, column 3). However, the SEL program did not reduce learning anxiety among older students in the midline or endline (row 3, columns 2 and 4).

In terms of students who reported having (and keeping in touch with) friends who had already dropped out, the intervention appears to have a persistent and significant impact on their dropout rates. For such students, the SEL program reduced dropout rates by 5.5 and 6.1 percentage points by our midline and endline surveys (significant at the 1 percent and 5 percent levels, respectively—Table 6, panel B, row 3, columns 1 and 3). The SEL program did not, however, reduce the levels of learning anxiety for students with friends who had previously dropped out, either (row 3, columns 2 and 4).

One concern is that students who keep in touch with friends who have already dropped out are also older students. Thus, the heterogeneous treatment effects for such students is really just due to a correlation with age. To test this possibility, we run an additional model including three-way interactions for being older (top 20 percent of age distribution), being in touch with friends who have dropped out,

[10] All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's Web site and use the search engine to locate the article at http://onlinelibrary.wiley.com.

Table 6. Heterogeneous effects of treatment among categories of at-risk students.

	(1) Dropout at midline	(2) Learning anxiety at midline	(3) Dropout at endline	(4) Learning anxiety at endline
Panel A: 20 percent oldest students (Older = student in top 20 percent of age distribution)				
Treatment	–0.004	–0.030**	–0.001	–0.004
	(0.007)	(0.014)	(0.008)	(0.012)
Older (1 = yes)	0.097***	–0.023	0.081***	–0.001
	(0.017)	(0.028)	(0.025)	(0.032)
Treatment × Older	–0.063**	0.040	–0.061**	0.009
	(0.024)	(0.031)	(0.031)	(0.036)
Observations	7,495	6,410	7,495	5,958
R^2	0.112	0.139	0.141	0.133
Panel B: Students with friends who had dropped out (Dropout peer = student kept in touch with a peer who already dropped out of school)				
Treatment	–0.006	–0.026*	–0.002	–0.001
	(0.008)	(0.014)	(0.008)	(0.011)
Dropout peer (1 = yes)	0.060***	0.009	0.085***	0.018
	(0.016)	(0.016)	(0.016)	(0.027)
Treatment × Dropout peer	–0.055***	0.012	–0.061**	–0.011
	(0.019)	(0.025)	(0.025)	(0.034)
Observations	7,495	6,410	7,495	5,958
R^2	0.108	0.139	0.144	0.133
Panel C: Students with low achievement (Lower achievement = math score in lowest 20 percent)				
Treatment	–0.013	–0.020	–0.014*	–0.001
	(0.009)	(0.015)	(0.008)	(0.013)
Lower achievement (1 = yes)	–0.005	0.023	–0.013	–0.007
	(0.012)	(0.024)	(0.013)	(0.025)
Treatment × Lower achievement	–0.011	–0.012	0.011	–0.007
	(0.014)	(0.024)	(0.016)	(0.029)
Observations	7,495	6,410	7,495	5,958
R^2	0.104	0.139	0.138	0.133

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Table 6. Continued.

	(1) Dropout at midline	(2) Learning anxiety at midline	(3) Dropout at endline	(4) Learning anxiety at endline
Panel D: Students with high anxiety (Higher anxiety = learning anxiety level in highest 20 percent)				
Treatment	–0.015*	–0.025*	–0.015*	–0.001
	(0.009)	(0.014)	(0.008)	(0.012)
Higher anxiety (1 = yes)	0.005	0.132***	–0.012	0.132***
	(0.011)	(0.021)	(0.012)	(0.017)
Treatment × Higher anxiety	–0.002	0.016	0.021	–0.007
	(0.015)	(0.027)	(0.017)	(0.023)
Observations	7,495	6,410	7,495	5,958
R^2	0.104	0.149	0.138	0.141
Panel E: Students with high dropout risk (following Giné, Goldberg, & Yang, 2012)				
Treatment	–0.002	–0.035**	0.0017	–0.007
	(0.005)	(0.014)	(0.006)	(0.015)
In highest risk quintile (1 = yes)	0.148***	–0.0309	0.189***	0.002
	(0.016)	(0.028)	(0.022)	(0.028)
Treatment × In highest risk quintile	–0.070**	0.018	–0.074**	–0.017
	(0.021)	(0.036)	(0.024)	(0.038)
Observations	7,481	6,399	7,481	5,947
R^2	0.115	0.139	0.147	0.133

Notes: Block fixed effects are included for all regressions. Robust standard errors (adjusted for clustering at the school level) reported in parentheses. All student and family characteristics listed in Table 3 are included as control variables. Panels A and B: As of the baseline survey, 1,427 (19 percent) students were older (percentages not exactly 20 percent because the age distribution is not fully continuous), and 1306 (17.5 percent) students kept in touch with friends who had dropped out. Panels C and D: Among the total sample, 1,792 (23.9 percent) students scored under the 20th percentile in their baseline mathematics examination, and 1,314 (17.5 percent) students were above the 80th percentile in their learning anxiety levels (percentages not exactly 20 percent because the age distribution is not fully continuous). Panel E: We report bootstrapped robust standard errors (adjusted for clustering at the school level) in parentheses. To do so, we create a program that incorporates our step of generating the regressor before the regression and bootstrap 500 times over the program. Among the total sample, 3,905 (52 percent) students were in the eighth-grade cohort as of the baseline survey, and 1,510 (20.2 percent) students scored above the 80th percentile in their dropout probabilities.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

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and the treatment indicator. The results show that the heterogeneous effects persist for both factors. For instance, the treatment reduces dropout among older students in the midline by an additional 4.6 percentage points. The treatment also reduces dropout among students who kept in touch with their friends by an additional 3.3 percentage points. The point estimate of the three-way interaction suggests that the treatment further reduced dropout among students who were older and kept in touch with dropped out friends by an additional 6.5 percentage points. However, this estimate is not statistically significant (Supporting Information Appendix Table A7).[11]

By contrast, the program did not have differential impact among students ranking at the bottom 20 percent of their class in terms of math achievement. Specifically, the coefficients for our interaction term between our treatment assignment and an indicator variable for whether the student ranked in the bottom 20 percent of their class are all statistically insignificant (Table 6, panel C, row 3, columns 1 through 4).

Two puzzles arise from this pattern of results. First, why were students with low academic achievement unable to benefit from the intervention? One conjecture is that students with low academic achievement felt that the intervention failed to address their root problem: their inability to compete with others in the HSEE. Indeed, the SEL intervention was not designed to improve academic achievement.

Second, the treatment had no robust effect on decreasing learning anxiety among older students (those in the top 20 percent of the age distribution) and those keeping in touch with friends who had dropped out of school. How then, did it reduce dropout rates among these groups? The evidence suggests that, as with students in general, SEL may have improved the ability of at-risk students to cope with anxiety. While this outcome is only measured at the midline, it may be that at-risk students also improved in their ability to cope with anxiety. In fact, our results (Supporting Information Appendix Table A8) show that older students and students keeping in touch with friends outside of school (termed *at-risk* students for brevity) do indeed experience improvements in their ability to cope with anxiety.[12] Supporting Information Appendix Table A8 shows that, when the sample is restricted only to at-risk students, the SEL program improves their coping ability by 0.11 SDs (significant at the 1 percent level—column 1, row 1). In terms of point estimates, this is more than double the treatment effect among non-at-risk students 0.05 SD (significant at the 10 percent level—column 2, row 1). Note that when we first run a regression and include the interaction effect, both the average effect and the interaction effect are statistically insignificant (column 3, rows 1 and 3). However, we believe this is a problem of statistical power, as the coefficients are consistent with those found when we examine the groups separately.

For completeness, we also conduct heterogeneous analyses by baseline learning anxiety (Table 6, panel D). We do so because the treatment is explicitly designed to reduce learning anxiety. To maintain consistency across other indicators of risk, we create an indicator for whether the student was in the top 20 percent of the learning anxiety distribution. However, when we do heterogeneous analyses by baseline learning anxiety, we do not find larger effects among more anxious students. The point estimates are negative but not statistically significant. The lack of significant results is also consistent with our previous conjecture (from our discussion of Lee Bounds) that the SEL program did not necessarily reduce learning anxiety as much as it improved students' ability to cope with learning anxiety.

[11] All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's website and use the search engine to locate the article at http://onlinelibrary.wiley.com.

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We also conduct an additional robustness check for our heterogeneous analyses (Table 6, panel E). As we test for multiple dimensions of risk—some with statistically significant results and others without—we adopt a strategy outlined by Giné, Goldberg, and Yang (2012) to see if the results hold more generally. First, we limit our sample to students in the control group ($n = 3{,}796$). Second, we regress the outcome of dropping out by the midline or endline on the student, family, and background characteristics outlined in Supporting Information Appendix Table A2.[13] Third, we create a dropout index by predicting the probability of dropout for each student in our sample based on this regression. As Giné, Goldberg, and Yang (2012) note, this approach should avoid any bias introduced by our treatment because it only draws on coefficients from a regression in the control group. We then split the predicted probabilities into quintiles; in essence, we create a variable to indicate whether a student was among those with 20 percent highest predicted probability for dropping out (we call these at-risk students). We finally test whether there was an interaction effect of the treatment and this indicator on our outcomes of interest. Note that the regressor for dropout risk is generated and thus we are measuring dropout risk with error. Without proper adjustments, the standard errors are likely to be biased. To address this problem, we create a program that incorporates our step of generating the dropout risk indicator before the regression and bootstrap 500 times over the program.

The results show that the SEL program reduced dropout rates an additional 6.6 percentage points among at-risk students who received the treatment (Table 6, panel E). This is significant at the 5 percent level. Moreover, at-risk students who received the treatment were an additional 6 percentage points less likely to drop out even as of the endline survey (again, compared with students in the control group who are not at risk). This is significant at the 10 percent level and suggests that the treatment effects are sustained over time for at-risk students. The results remain consistent even if we limit the sample only to at-risk students (Supporting Information Appendix Table A9).[14] Here, the comparison group is at-risk students in the control group. That is, we limit the sample only to those in the top quintile of dropout risk and assess treatment impacts among this group only. We find that at-risk students who receive SEL are 6.5 percentage points less likely to dropout at the midline (significant at the 10 percent level) and 5.3 percentage points less likely to dropout at the endline (significant at the 10 percent level). The bottom line is that the SEL program differentially benefitted at-risk students. In other words, the intervention helps those who most need to be helped and (perhaps not surprisingly) does not improve the outcome of students who are less likely to drop out in the first place.

DISCUSSION AND CONCLUSIONS

In this study, we estimated the impact of providing an SEL intervention on student dropout behavior and learning anxiety. Analyzing data from an RCT involving 70 schools and 7,495 students in rural China, we found that the SEL intervention reduces dropout by 1.6 percentage points and decreases learning anxiety (for the average student) by 2.3 percentage points after the first semester only. The evidence shows that the effect of SEL fades out for learning anxiety after the second semester. Furthermore, we provide evidence suggesting that this decline in impacts could be

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due to declining interest and engagement with the program (raising the possibility that student, teacher, or school administrator novelty effects were driving impacts in the midline). In spite of the absence of endline impacts on the average student, we did find both midline and endline impacts on dropout among at-risk students.

We hasten to add that we could not rule out the possibility that the learning anxiety effects were due to differential attrition (using Lee Bounds). In addition, the treatment did not consistently reduce learning anxiety among the at-risk students. We thus cannot be certain that the treatment reduced dropout by reducing learning anxiety. That said, even if it is truly the case that SEL failed to reduce learning anxiety, we found evidence supporting the possibility that it equipped students with better skills and knowledge to cope with learning anxiety.

Significantly, these impacts are based on an SEL program that was implemented by a government agency. The majority of experimental evaluations of SEL programs in developed countries can be considered *efficacy* studies (Wilson, 1986). Efficacy studies are characterized by program interventions that are monitored closely for deviations in protocol (Zvoch, 2009). By contrast, the SEL program evaluated in this study (to our knowledge the first rigorous evaluation of SEL in a developing country context) was run by a government agency. Even though the government agency implemented the SEL program within real resource constraints, the SEL program was still able to keep at-risk students from dropping out. As such, we contend that these findings imply the policy relevance of SEL programs in reducing dropout in rural China (and possibly other developing country contexts as well).

The impacts from the SEL program are particularly noteworthy when compared with those from CCT programs. The main finding in this study is that SEL programs can reduce dropout in junior high, but this effect is sustained and robust only for at-risk students. The effect sizes measured for at-risk students range from 6.1 percentage points (for older students) to 7.3 percentage points (for those in the highest-dropout-risk quintile). We identified three RCTs of the effects of providing CCTs in rural Chinese junior high schools: Yi et al. (2015), Li et al. (2015), and Mo et al. (2013). Among the three studies, only Mo et al. (2013) finds positive impacts from providing CCTs. The study ($n = 300$) was conducted in one of the poorest counties in China, where two of the four poorest students in seventh-grade classrooms were randomly assigned to receive a CCT to stay in school. The CCT reduced the dropout rate of these students by 7.6 percentage points. Granted, our subgroup results are not directly comparable to those from Mo et al., since they do not define identical subgroups as we do. However, insofar as they targeted the poorest students (who are plausibly also at risk for dropping out), the results provide an approximate benchmark to compare impacts between our SEL program and CCT programs. This suggests that the impacts of the SEL program are comparable to CCT programs. Moreover, we provide evidence in the Supporting Information Appendix suggesting that SEL programs are more cost-effective than CCT programs.[15]

More generally, this study shows that supply-side dropout interventions may complement demand-side interventions. In fact, our study is one of the first to rigorously examine the causal impacts of a supply-side intervention (SEL as opposed to a demand-side intervention such as CCTs) on reducing dropout and learning anxiety in junior high schools in a developing country. Supply-side dropout interventions complement demand-side interventions because they actually improve the quality of schooling that students experience. Demand-side interventions such as CCTs can incentivize students to stay in school, but they do not improve the quality of

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schooling received. If what students experience and learn in school matters as much as staying in school (Hanushek & Woessmann, 2012), supply-side interventions such as SEL programs could be important and complementary approaches to reduce dropout and, in turn, improve economic development.

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APPENDIX

COST EFFECTIVENESS ANALYSIS OF SEL VERSUS CONDITIONAL CASH TRANSFERS

The main costs of the SEL program were personnel and equipment. The time teachers spent teaching and preparing for SEL was compensated by the bureau of education, amounting to $1,780 per school for the school year. Each student and SEL teacher needed a textbook for two semesters (an estimated $400 per school for the school year) and materials such as markers, paper, and posters for the activities (an estimated $50 per school). Taking these together, the SEL program cost roughly $2,230 for each school per school year or a total cost of $78,050 (for the 35 treatment schools).

The SEL program evaluated here lasted for two semesters (one school year). Of the 3,801 students in the control group, 10.2 percent had dropped out by the end of the program. By contrast, of the 3,694 treatment students, only 8.6 percent had dropped out by the end of the program. Using the control group as a counterfactual for estimating the number of dropouts in the absence of intervention, the SEL program reduced dropout rates by 1.6 percentage points (or by 70 students). Thus, we estimate that the yearly cost to reduce dropout by one student is $1,115 ($78,050/70 students).

How much money would these students have earned if they had not dropped out? Unfortunately, it is difficult to obtain reasonable estimates of the returns to education for rural students. Existing estimates for China are based on urban samples (e.g., Li et al., 2012), and salaries have doubled every seven years on average. That said, De Brauw and Rozelle (2008) estimate that the returns to education increase 10 percent per year of education for young workers under 35 years old. Given that the average annual wages for rural and migrant workers in 2009 (National Bureau of Statistics, 2009) was roughly $5,050, each year of education increases wages by $505. This means the SEL program would pay for itself in three years ($505*3 years = $1,515) if it keeps students in school for just one additional year.

The SEL program had a cost-effectiveness of $1,115 per dropout prevented. How does this program compare to demand-side interventions like conditional cash transfers? As noted above, the only example (out of three) of a successful CCT intervention in junior high schools in rural China was in a randomized controlled trial conducted by Mo et al. (2013). Each treatment student was promised $162 if they remained in school the following year. The CCT reduced the dropout rate of these students by 7.6 percentage points. Specifically, the control group's (n = 150) dropout rate was 13 percent and the treatment group's (n = 150) dropout rate was 5.4 percent. This implies that the treatment kept 11.4 students from dropping out (150*0.13-150*0.054). Ignoring the administrative costs and only counting the cost of the payouts to the 142 students (150*0.054) who stayed in school, the total cost of the CCT intervention was $23,004 ($142*$162). Taking all of these calculations together, we estimate that it cost roughly $2,000 ($23,004/11.4 students) to keep one student from dropping out over a school year. This is 1.8 times more expensive than the per dropout prevented cost of the SEL program.

Table A1. Major learning outcomes and activities for each of the 32 SEL lessons.

Major learning outcomes	Example activity
1st semester	
1. Recognize problem of learning anxiety	Brainstorming common stressors
2. Recognize importance of social-emotional learning	Small group puzzle activity
3. Identify ways that anxiety is tied to teachers	Draw a picture of an ideal teacher
4. Recognize that teachers do not automatically know when students feel unhappy	Charades
5. Understand that teachers do not deliberately cause students to feel anxious	Make a schedule for teacher.
6. Identify ways that the teacher is supportive at present	Basketball activity
7. Recognize importance of seeking help	Bingo
8. Identify three individuals who can help when the student feels stressed	Role-play
9. Rehearse 12 sentences that can be used to seek help	Draft a letter "asking for help"
10. Recognize the importance of self-awareness and how the student's own behavior affects others too	
11. Identify 3 ways that stress comes from holding grudges	Folding paper airplanes
12. Rehearse ways to forgive others for wrongdoing	Outdoor "tag" activity
13. Recognize how emotions are natural but can cause harm when uncontrolled	Balloon simulation
14. Recognize the traffic light model of emotion control—slow down, stop and think, then act	
15. Rehearse 2 actual ways to control emotions	Role-play
16. Recap of semester	Jeopardy
2nd semester	
17. Recognize how friends and classmates can be a source of learning anxiety	Brainstorming common stressors
18. Recognize how friends and classmates can help alleviate learning anxiety	
19. Understand the importance of having friends to solve problems (e.g., homework) together	Tower-building exercise
20. Recognize that test performance is not everything; identify 3 personal positive traits	Treasure hunt (for own positive traits)
21. Rehearse ways to encourage others for their positive traits	Color mixing exercise
22. Recognize how learning anxiety can occur because of classroom comparisons and bullying	
23. Understand that unwanted competition and bullying can be stopped	
24. Rehearse script for intervening when someone is being teased; recognize that a supportive classroom climate requires collective engagement	Role-play
25. Identify 3 situations where conflict with peers can drive learning anxiety	Drawing out situations
26. Identify importance of having personal space	
27. Rehearse ways to express feelings to peers	Replacing "you're wrong" with "I feel"
28. Recognize that friends do not always have perfect advice	Friendship cards
29. Rehearsing ways to say no to peers	
30. Rehearsing ways to thank peers who gave support or good advice in the past	Writing thank you letters to friends
31. Semester review	
32. End-of-year celebration	Jeopardy

Table A2. Summary statistics.

	N	Mean	SD	Min	Max
Demographic and family characteristics at baseline					
1. Female students, 1 = yes	7,495	0.466	0.499	0	1
2. Student age, in months	7,495	180.247	13.228	135	251
3. Grade, 1 = 8th grade	7,495	0.521	0.500	0	1
4. Father graduated from junior high school, 1 = yes	7,495	0.428	0.495	0	1
5. Mother graduated from junior high school 1 = yes	7,495	0.236	0.424	0	1
6. Father ever migrated, 1 = yes	7,495	0.320	0.466	0	1
7. Mother ever migrated, 1 = yes	7,495	0.113	0.316	0	1
8. Number of siblings, person	7,495	1.430	1.048	0	16
9. Standardized family asset value	7,495	0.000	1.000	−2.636	2.933
10. Skip class, 1 = yes	7,495	0.246	0.431	0	1
11. Plan to attend academic high school after JH, 1 = yes	7,495	0.806	0.395	0	1
12. Plan to attend vocational high school after JH, 1 = yes	7,495	0.713	0.453	0	1
13. Number of friends, in persons	7,495	1.732	1.470	0	11
Baseline measures of outcome variables					
14. Standardized math test score	7,495	0.000	1.000	−3.410	2.809
15. At risk for learning anxiety in 2012	7,495	0.650	0.477	0	1
Student outcomes at midline and endline					
16. Dropped out in 2013	7495	0.063	0.242	0	1
17. Dropped out in 2014	7495	0.094	0.292	0	1
18. At risk for learning anxiety in 2013	6410	0.646	0.478	0	1
19. At risk for learning anxiety in 2014	5958	0.640	0.480	0	1

Table A3. Effect of SEL on mathematics test scores at the endline (test of crowd-out from SEL program).

Variable	(1) Math at endline
Treatment school, 1 = yes	0.013
	(0.056)
Student characteristics controlled	YES
Family characteristics controlled	YES
Block fixed effects included	YES
Constant	2.242***
	(0.226)
Observations	6,173
R-squared	0.263

Notes: 1. Robust standard errors (adjusted for clustering at the school level) reported in parentheses.
2. The student characteristics being controlled for include gender (1 = female; 0 = male), age (in months), grade (1 = grade 8; 0 = grade 7), the education level of parents (1 = father/mother of the student has graduated from junior high school; 0 = otherwise), parental migration status (1 = the father/mother of the student migrated to the cities; 0 = otherwise), number of siblings, and household asset value (1 = the student's household is the lowest quartile; 0 = otherwise). The characteristics also include dummy variables for whether the student skipped class in the previous week (1 = yes; 0 = no), aspired to attend academic high school (1 = yes; 0 = no), or aspired to attend vocational high school (1 = yes; 0 = no). Finally, the controls include student self-reported number of friends and measures of baseline mathematics achievement and whether the student was at risk of facing learning anxiety at the baseline (1 = yes; 0 = no).
***p<0.01, **p<0.05, *p<0.1

Table A4. Lee bound estimates for the impact of SEL on learning anxiety at the midline (2013) and endline (2014).

	Effect 95 percent conf. interval	Effect	
		Lower bound	Upper bound
Midline (2013) Learning anxiety	[−0.1917, 0.0198]	−0.143***	−0.031
		(0.052)	(0.069)
Endline (2014) Learning anxiety	[−0.1850, 0.0421]	−0.133***	−0.015
		(0.082)	(0.064)

Notes: 1. n = 7,495.
2. Bootstrapped standard errors (1,000 repetitions, adjusted for clustering at the school level) in parentheses.
3. The learning anxiety measures used are continuous.
***p<0.01, **p<0.05, *p<0.1

Table A5a. Impact of SEL on student ability to cope with learning anxiety.

Variable	(1) Social-emotional skills at midline
Treatment school, 1 = yes	0.061***
	(0.022)
Student characteristics controlled	YES
Family characteristics controlled	YES
Block fixed effects included	YES
Constant	−1.076***
	(0.225)
Observations	6,624
R-squared	0.024

Notes: 1. Robust standard errors (adjusted for clustering at the school level) reported in parentheses.
2. Ability to cope with learning anxiety was not measured at the endline survey.
3. The student characteristics being controlled for include gender (1 = female; 0 = male), age (in months), grade (1 = grade 8; 0 = grade7), the education level of parents (1 = father/mother of the student has graduated from junior high school; 0 = otherwise), parental migration status (1 = the father/mother of the student migrated to the cities; 0 = otherwise), number of siblings, and household asset value (1 = the student's household is the lowest quartile; 0 = otherwise). The characteristics also include dummy variables for whether the student skipped class in the previous week (1 = yes; 0 = no), aspired to attend academic high school (1 = yes; 0 = no), or aspired to attend vocational high school (1 = yes; 0 = no). Finally, the controls include student self-reported number of friends and measures of baseline mathematics achievement and whether the student was at risk of facing learning anxiety at the baseline (1 = yes; 0 = no).
***p<0.01, **p<0.05, *p<0.1.

Table A5b. Questions to assess student social-emotional skills.

Questions	Appropriate response?
1. When dealing with something that makes me feel very anxious, I will try to control my emotions by changing how I perceive the issue.	Y
2. When I feel misunderstood, I become so angry that I want to leave school.	N
3. There is nothing I can do to control my own behavior.	N
4. Even if I am very angry, I will still remind myself to calm down and think of a solution.	Y
5. To apologize to classmates for a mistake is to lose face.	N
6. I will find a good friend to talk with me when I feel sad.	Y
7. In some cases, the teacher may look like he or she does not care for students.	Y
8. Sometimes the teacher ignores me on purpose.	N
9. When the teacher ignores me, it is because he or she does not like me.	N
10. When I think that the teacher is doing something wrong, it is important for me to try and communicate how I feel.	Y
11. If my teacher does not seem to care about me, I lose interest in learning.	N
12. When I feel a teacher doesn't care about me, I will try to put myself in the teacher's role and understand him or her.	Y
13. When a teacher does something wrong, I know the teacher isn't doing it on purpose.	Y
14. When I need help, I feel confident in my ability to reach out to ask for help.	Y
15. People will care for or ignore me, but my behavior will not influence other's actions.	N
16. I won't apologize to my teacher, even if he or she fairly criticizes me for not handing in the homework on time.	N
17. My difficulties are totally unique and different from what others are facing.	N

Notes: 1. These questions were constructed to assess student attitudes and behaviors toward common situations at school. Appropriate responses are those that imply empathy, self-awareness, help-seeking behaviors, and other kinds of social-emotional skills.
2. The questions are asked on a Likert scale of one through five, where one is "strongly disagree" and five is "strongly agree." The inappropriate responses are reverse coded, and the total score is the sum of the responses. The sum is then standardized across all respondents (subtracting the mean and dividing by the standard deviation).

Table A6. Baseline correlates of dropout (control group sample only).

Variable	Dropout at midline	Dropout at endline
Age in oldest 20 percent, 1 = yes	0.089***	0.090***
	(0.017)	(0.024)
Keep in touch with dropped out peers, 1 = yes	0.054***	0.082***
	(0.015)	(0.015)
Math score in lowest 20 percent, 1 = yes	0.017*	0.012
	(0.009)	(0.009)
Anxiety level in highest 20 percent, 1 = yes	0.004	−0.008
	(0.010)	(0.012)
1. Female student, 1 = yes	−0.014	−0.035***
	(0.008)	(0.011)
2. Student age, in months	0.002***	0.003***
	(0.001)	(0.001)
3. Grade, 1 = 8th grade	−0.013	−0.018
	(0.010)	(0.011)
4. Dad graduated from junior high school, 1 = yes	0.002	−0.006
	(0.009)	(0.008)
5. Mom graduated from junior high school 1 = yes	0.016	0.032**
	(0.010)	(0.012)
6. Dad ever migrated at baseline survey, 1 = yes	−0.001	0.001
	(0.011)	(0.010)
7. Mom ever migrated at baseline survey, 1 = yes	0.000	0.006
	(0.016)	(0.016)
8. Number of siblings	0.001	−0.005
	(0.004)	(0.006)
9. Standardized family asset value	0.012**	0.013**
	(0.005)	(0.005)
10. Has ever skipped class, 1 = yes	0.031***	0.028**
	(0.010)	(0.012)
11. Plan to attend academic high school after JH, 1 = yes	−0.083***	−0.100***
	(0.016)	(0.019)
12. Plan to attend vocational high school after JH, 1 = yes	−0.022*	−0.006
	(0.011)	(0.009)
13. Number of friends, self-reported	−0.006***	−0.006**
	(0.002)	(0.003)
Block fixed effects included	YES	YES
Constant	−0.270**	−0.432***
	(0.102)	(0.105)
Observations	3,796	3,796
R-squared	0.159	0.176

Notes: robust standard errors (adjusted for clustering at the school level) reported in parentheses.
***p<0.01, **p<0.05, *p<0.1.

Table A7. Three-way heterogeneous effects among older students and those keeping in touch with dropped out friends.

	(1) Dropout at midline	(2) Learning anxiety at midline	(3) Dropout at endline	(4) Learning anxiety at endline
Treatment	0.001	−0.030**	0.005	−0.001
	(0.007)	(0.015)	(0.009)	(0.012)
Older	0.079***	−0.007	0.056**	0.008
	(0.018)	(0.033)	(0.023)	(0.030)
Treatment * Older	−0.046*	0.027	−0.045	0.003
	(0.025)	(0.037)	(0.030)	(0.040)
Dropout peer	0.040**	0.023	0.058***	0.024
	(0.015)	(0.017)	(0.017)	(0.030)
Treatment * Dropout peer	−0.033*	−0.001	−0.043*	−0.015
	(0.017)	(0.026)	(0.022)	(0.037)
Older * Dropout peer	0.070*	−0.070	0.102**	−0.033
	(0.041)	(0.051)	(0.047)	(0.049)
Treatment * Older * Drop-out peer	−0.065	0.057	−0.057	0.022
	(0.052)	(0.070)	(0.063)	(0.076)
Observations	7,481	6,399	7,481	5,947
R-squared	0.117	0.139	0.150	0.133

Notes: 1. Older = student in top 20 percent of age distribution; Dropout peer = student kept in touch with a peer who already dropped out of school.
2. Block fixed effects are included for all regressions.
3. Robust standard errors (adjusted for clustering at the school level) reported in parentheses.
4. All student and family characteristics listed in Table A6 are included as control variables.
5. As of the baseline survey, 1,427 (19 percent) students were older, and 1,306 (17.5 percent) students kept in touch with friends who had dropped out.
***p<0.01, **p<0.05, *p<0.1.

Table A8. Heterogeneous impacts of SEL on student ability to cope with learning anxiety.

Variable	(1) Older students and those with dropped out friends only	(2) Regular students only	(3) Social-emotional skills at midline
Treatment school, 1 = yes	0.107***	0.047*	0.047
	(0.039)	(0.027)	(0.029)
Older or Dropout Peer			0.044
			(0.049)
Treatment*Older or Dropout Peer			0.042
			(0.057)
Student characteristics controlled	YES	YES	YES
Family characteristics controlled	YES	YES	YES
Block fixed effects included	YES	YES	YES
Constant	−0.411	−1.348***	−0.901***
	(0.315)	(0.340)	(0.236)
Observations	1,872	4,538	6,410
R-squared	0.035	0.026	0.025

Notes: 1. Robust standard errors (adjusted for clustering at the school level) reported in parentheses.
2. Ability to cope with learning anxiety was not measured at the endline survey.
3. The student characteristics being controlled for include gender (1 = female; 0 = male), age (in months), grade (1 = grade 8; 0 = grade7), the education level of parents (1 = father/mother of the student has graduated from junior high school; 0 = otherwise), parental migration status (1 = the father/mother of the student migrated to the cities; 0 = otherwise), number of siblings, and household asset value (1 = the student's household is the lowest quartile; 0 = otherwise). The characteristics also include dummy variables for whether the student skipped class in the previous week (1 = yes; 0 = no), aspired to attend academic high school (1 = yes; 0 = no), or aspired to attend vocational high school (1 = yes; 0 = no). Finally, the controls include student self-reported number of friends and measures of baseline mathematics achievement and whether the student was at risk of facing learning anxiety at the baseline (1 = yes; 0 = no).
***p<0.01, **p<0.05, *p<0.1.

Table A9. Heterogeneous impacts for at-risk students, sample limited to at-risk students only.

Variable	(1) Dropout at midline	(2) Learning anxiety at midline	(3) Dropout at endline	(4) Learning anxiety at endline
Treatment school, 1 = yes	−0.0571**	0.0248	−0.0521**	0.0105
	(0.0216)	(0.0279)	(0.024)	(0.0325)
Student characteristics controlled	YES	YES	YES	YES
Family characteristics controlled	YES	YES	YES	YES
Block fixed effects included	YES	YES	YES	YES
Constant	−0.2794	0.2575	−0.0401	0.5807
	(0.1929)	(0.2584)	(0.2236)	(0.3077)
Observations	1,496	1,094	1,496	953
R-squared	0.106	0.138	0.133	0.137

Notes: 1. Bootstrapped robust standard errors (adjusted for clustering at the school level) reported in parentheses. We create a program that incorporates our step of generating the regressor before the regression and bootstrap 500 times over the program.
2. Sample restricted to students who rank among the top 20 percent in terms of risk for dropping out.
3. The student characteristics being controlled for include gender (1 = female; 0 = male), age (in months), grade (1 = grade 8; 0 = grade 7), the education level of parents (1 = father/mother of the student has graduated from junior high school; 0 = otherwise), parental migration status (1 = the father/mother of the student migrated to the cities; 0 = otherwise), number of siblings, and household asset value (1 = the student's household is the lowest quartile; 0 = otherwise). The characteristics also include dummy variables for whether the student skipped class in the previous week (1 = yes; 0 = no), aspired to attend academic high school (1 = yes; 0 = no), or aspired to attend vocational high school (1 = yes; 0 = no). Finally, the controls include student self-reported number of friends and measures of baseline mathematics achievement and whether the student was at risk of facing learning anxiety at the baseline (1 = yes; 0 = no).
***p<0.01, **p<0.05, *p<0.1.