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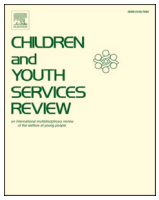

Acceptability and preliminary impact of a school-based SEL program for rural children in China: A quasi-experimental study

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ABSTRACT

While Social and Emotional Learning (SEL) as school-based mental health preventative interventions have been extensively examined in western contexts, they have not yet been studied much in China. Several SEL programs have been developed or adapted for Chinese contexts, but few studies have examined their intervention effects in resource constrained settings, especially rare in rural schools. This study serves as the first to examine the acceptability and preliminary impact of a school-based SEL intervention in rural Chinese elementary schools. A quasi-experimental pre- and post-intervention study with a two-level cluster design was adopted. The sample consisted of 1247 fifth graders nested within 28 classrooms in Southwest China. Students rated the SEL curriculum as highly satisfactory, interesting, helpful, and practical. Findings demonstrated significant SEL intervention effects on rural children's overall self-reported social and emotional competencies (ES = 0.213) and three subdomains including self-awareness (ES = 0.342), social awareness (ES = 0.25), and relationship skills (ES = 0.185). However, no intervention effects were found in the subdomains including self-management and responsive decision-making. Additionally, the subgroup analysis revealed that children of work-away parents, as well as boys, obtained greater benefits from the SEL intervention. These findings are interpreted in light of their practice, research, and policy implications to further strengthen school-based SEL efforts for improving rural children's wellbeing.

1. Introduction

In 2017, approximately 230 million children and adolescents attended Chinese schools, ranging from pre-school to high school (UNICEF, 2018). Among those children and adolescents aged 6–16, a recent study estimated 17.5 % experienced mental health disorders, including anxiety, depression, substance use, as well as attention-deficit and disruptive disorders (Li et al., 2021). More than half (138 million, or 51 %) of these children resided in rural areas (National Bureau of Statistics, 2016). These areas are commonly associated with family poverty, under investment, and education inequality. These factors contributed to higher school dropouts and lower academic performance for rural children, and more limited use of mental health services (Yi et al., 2012; Zhang et al., 2015). Compared with their urban Chinese counterparts, rural children and adolescents were more vulnerable to suffering from symptoms of anxiety and depression, other emotional symptoms, and had lower self-esteem (Chen et al., 2019; Hesketh & Ding, 2005; Liu et al., 2018). Among rural children, those of work-away parents[1] (Fu & Zhu, 2020) are particularly vulnerable. Compared with children with parents living with them, they are more likely to experience loneliness, depression, anxiety, school disengagement, and lower self-esteem (He et al., 2012; Jia, & Tian, 2010; Wen & Lin, 2012; Zhao & Yu, 2016). Besides the impact of parental migration status, the role of gender is also crucial. On the one hand, rural girls are more likely to encounter internalizing problems such as depression, suicidal ideation, and anxiety than compared with boys (Li & Zhang, 2008; Liu et al., 2005). On the other

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[1] Left behind children (LBC) was originally defined as children who stay in rural areas of China while one or both of their parents leave to work in urban areas for over 6 months (UNICEF, 2018). We prefer the term children of work-away parents rather than LBC because we consider it less stigmatizing. In this study, rural children of work-way parents also refers to those children with at least one parent working in urban areas for more than 6 months.

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hand, rural boys are more likely to display externalizing issues such as aggressive and anti-social behaviors (Jiang et al., 2020).

Despite undergoing adversities, not all rural children develop mental health disorders or end up with later life failure. Numerous prevention programs seeking to cultivate protective and promotive factors have been developed and examined in the past decades under the umbrella of resilience research (Joyce et al., 2018). Social and emotional competence (SEC) has been demonstrated as a promotive and protective factor, associated with key developmental tasks, and one that has moderated the relationship between accumulated risk factors and development outcomes both in the western and Chinese contexts (Domitrovich et al., 2017; Wang et al., 2019).

In the global west, schools often function as intervention sites to build social and emotional competence. Social and Emotional Learning (SEL) programs in school settings have been shown to be effective mental health and education interventions in the global west. Research demonstrated that SEL programs have increased social and emotional competencies (Coelho et al., 2015; Van de Sande et al., 2019), significantly decreased symptoms of depression and anxiety (Bierman et al., 2010; Burckhardt et al., 2016), lowered rates of disruptive and anti-social behaviors, as well as improved educational outcomes and later-life success (Corcoran et al., 2018; Domitrovich et al., 2017; Sklad et al., 2012), compared to children who did not receive SEL. Furthermore, the literature indicated that certain subgroups benefited more from SEL programs. For instance, Lee et al. (2023) found that students from racially marginalized groups experience greater gains from the universal SEL programs. Similarly, a *meta*-analysis conducted by Wilson and Lipsey (2007) reported enhanced outcomes for students from lower socioeconomic backgrounds.

2. SEL conceptual framework

The term "Social and Emotional Learning" was first introduced in 1997 by the Fetzer Institute in the US as a conceptual framework that stressed boosting the development of students' social-emotional competencies and academic performance, as well as preventing and lessening their mental health and behavioral problems (Elias et al., 1997). Meanwhile, the Collaborative for Academic, Social, and Emotional Learning (CASEL) was launched as a national organization to support evidence-based SEL programming, support policy changes that facilitate SEL implementation, and to set standards for SEL programming.

CASEL (2003), conceptualized five core SECs: 1) self-management (e.g., managing one's emotions); 2) self-awareness (e.g., recognizing present feelings and assessing own abilities); 3) social awareness (e.g., understanding other's feelings and emphasizing with them); 4) relationship skills (e.g., building and maintaining healthy relationships on account of cooperation); and 5) responsible decision-making (e.g., making decisions according to a careful consideration of all consequences of action). Based on this conceptualization, a refined SEL model developed by Weissberg et al. (2015) emphasized (1) these five competencies; (2) proximal outcomes (including social and emotional skills, positive attitudes, positive behaviors, reduced conduct problems and emotional distress, and improved academic performance) and distal outcomes of interest (including high school graduation, college and career preparation, mental health, reduced criminal behavior, and engaged citizenship) resulting from SEL programming; (3) classroom, school, family, and community strategies that facilitate children's social-emotional development and academic performance; and (4) district, state, and federal policies that enhance quality SEL implementation. In recent years, this framework has been further strengthened by the incorporation of the transformative Social and Emotional Learning (SEL) approach, which emphasizes integrating principles of equity, with a particular focus on racial justice, into SEL programming (Jagers et al., 2019).

While SEL research using this CASEL framework has become ubiquitous in Western contexts, it is minimal in China. With nine years of compulsory education in China, schools there also possess substantial potential as intervention sites for students to grow and thrive. The current education policy in China encourages schools to implement innovative mental health prevention and promotion programs (The State Council, 2023). This directive underscores the nation's commitment not only to enhancing students' academic outcomes, but also bolstering the psychological well-being of students. Several SEL programs have been developed, adopted, or adapted for Chinese contexts, but few studies have examined their impacts and implementation in local contexts. These studies are especially rare in rural schools. One study focused on SEL's impact on rural children's educational outcomes, demonstrating decreased high school dropout rates and learning anxiety (Wang et al., 2016). Another examined the impacts of the Promoting Alternative Thinking Strategies (PATHS) curriculum, a U.S.-developed program used in Hong Kong without any cultural adaption, but the study was limited by a small sample size and limited outcome measurements (Kam et al., 2011). In addition, the most recent SEL evaluation studies used a convenience sampling strategy to examine the intervention effects on urban Chinese children's social and emotional skills (An et al., 2021; Wu et al., 2021). Several research gaps and potential contributions of the current study have been identified from the current literature.

First, the current SEL literature lacks an equity lens to understand the acceptability and impact of SEL program on rural Chinese children. This study hopes to align with the calls from implementation scientists for the incorporation of an equity lens in conducting intervention or implementation research. This is in response to the existing and persistent gaps in the representation of vulnerable populations in clinical trials, which are crucial for understanding program impacts and implementation challenges (Baumann & Cabassa, 2020). The limited representation of vulnerable groups severely restricts the external validity of programs, hindering their scalability to larger, vulnerable communities. Adopting an equity approach is especially vital through the development, selection, and testing of interventions designed to support vulnerable groups in communities with limited resources. The current study is distinguished by its focus on selecting and testing a SEL program specifically tailored for rural Chinese children, prioritizing an equity perspective in the beginning.

Second, it is important to acknowledge that children of work-away parents and boys residing in rural areas often encounter heightened mental challenges and have lower social emotional skills (Dong et al., 2019; Jiang et al., 2020). The existing literature on SEL has not extensively explored the question of 'for whom it works' within the Chinese context. Thus, an imperative question arises: which subgroup benefits more from participating in the SEL program? Specifically, we aim to investigate whether this program provides more benefits for children of work-away parents and boys in rural areas.

Third, the existing literature has not explored much on the students' buy-in of the SEL program in rural context. Considering that SEL programs represent a novel approach in rural China, it is crucial to explore implementation outcomes, including program acceptability, which is fundamental to successfully implementing interventions across diverse cultural contexts (Proctor et al., 2011). This study aims to bridge this gap by exploring how acceptable the SEL program is for rural Chinese children. Understanding the program's acceptability in this specific context is essential for ensuring its positive impacts and sustainability.

The scarcity of SEL research among rural Chinese school-aged children limits our understanding of the potential of school-based SEL programming in resource constrained contexts. More research on SEL programs in rural children is crucial for program improvements at the practice level as well for adoption and scale-up efforts at the policy level. To address the identified gaps in the current research and contribute meaningfully to the field, this study is guided by the following research hypotheses:

Research hypothesis 1: Children participating in the school-based SEL program will show more improvements in social-emotional

competencies compared to those who do not participate in the SEL program.

Research hypothesis 2: Rural children of work-away parents will see greater gains in social-emotional competencies compared to children who had both parents remain with them in rural areas.

Research hypothesis 3: Rural boys will see greater gains in social-emotional competencies compared to rural girls.

Research hypothesis 4: The school-based SEL program will be acceptable to the majority of children participating in the program.

3. Methods

3.1. Study design and participants

We adopted a two group quasi-experimental pre- and post-intervention study design with a two-level cluster design to examine the effects of a school-based SEL intervention developed in China on rural children's social emotional competencies. The sample consisted of 1247 children nested within 28 classrooms with children with an average age of 10.96 years. Specifically, the study drew on 648 fifth graders with a mean age of 10.94 years from two rural schools as the intervention group and 599 fifth graders with a mean age of 10.98 years from two matched schools who served as the comparison group. With the support and consent from the local educational bureau, two intervention schools were randomly selected by the research team from two different counties from Chongqing, a municipality in Southwest China. The two comparison schools were selected accordingly in each county based on their similarity to intervention schools in terms of school size, teacher-student ratio, school performance, distance to the county seat, and ratio of children of work-away parents. This selection criteria were designed to establish a comparable baseline and minimize selection bias and confounding variables, thereby reducing potential distortions in the study's outcomes. All four selected schools were located in rural areas and are categorized as town schools.[2] In addition, the comparison schools were chosen to be geographically distant from the intervention schools (at least 50 km away) to mitigate potential contamination effects arising from after-class interactions among students within the same or nearby communities. For example, selecting intervention school and comparison school within the same town could lead to potential spill-over effects due to children's daily interactions with peers in the community.

This study targeted all children in 28 classrooms in the fifth grade at the selected four schools. Children were able to participate in the study if they were able to read, write, and communicate using Chinese and were able to provide written assent beforehand. We also obtained informed consent from caregivers. We excluded students who could not read, write, and communicate, or those who were reported by their teachers to have intellectual and developmental disabilities, from the final data analysis. These students were included and engaged in all SEL activities if they chose to stay in the classroom and participate.

The flowchart describing the participant recruitment process is depicted in Fig. 1.

3.2. Intervention

Fifth graders in the two intervention schools received a SEL intervention that was developed by Rici Foundation (2023), a Chinese operating foundation[3] aiming at improving rural children's mental health and wellbeing. Rici's major program is a mental health prevention program named Flourish Magic School. Under that program, a series of curriculum packages have been developed to target rural children from grade 1 to grade 9 (elementary and secondary-levels) based on the CASEL's conceptual framework to promote rural children's social-emotional skills.

In this study, we used the eight-session SEL intervention named Positive Growth developed by Rici for fifth graders. The first and second authors are members of the SEL curriculum development team at Rici foundation, consisting of a group of psychologists, social workers, and rural teachers. The Positive Growth curriculum was designed to improve rural children's multiple social emotional competencies with a focus on their self-awareness, self-management, social awareness, and relationship skills. Responsible decision-making, a component of the CASEL framework, was not explicitly incorporated into its program development considering the current moral education curriculum in the Chinese education system might have already addressed this competency. The Positive Growth SEL curriculum is available at no cost to all rural teachers upon application. See Table 1 for more details on the eight-session SEL intervention. This study is the first to employ a rigorous research design to assess the impact of the Positive Growth SEL curriculum. In contrast, previous program evaluations were confined to pre- and post-tests without a comparison group.

In the comparison schools, students are under conditions of business as usual. The activity most relevant to SEL is participation in the moral education class, a mandatory curriculum for all graders in Chinese elementary schools, which is part of the required curriculum for students in both comparison and intervention condition. This course emphasizes traditional Chinese virtues such as honesty, kindness, respect for others, and love for the community and nation. However, the pedagogical approach in moral education program tends to be more traditional and didactic, with the curriculum predominantly delivered through direct instruction from teachers. This method places less emphasis on interactive or engaging activities that involve student participation, limiting opportunities for students to actively engage in discussions, role-plays, or collaborative learning experiences that could enhance their understanding and application of moral principles in diverse real-life contexts.

3.3. Procedure

The 8-session Positive Growth Curriculum was implemented from March 2022 to June 2022. The program delivery model was to provide training for schoolteachers who are responsible for teaching the SEL curriculum in classroom settings. We trained 13 schoolteachers who were also taking on additional responsibilities in mental health services in the two intervention schools to deliver the Positive Growth SEL curriculum. Under current Chinese education policy, all schools are mandated to appoint mental health teachers or counselors. However, constrained by limited resources and funding, these positions often fall to existing classroom teachers who assume these responsibilities in addition to their regular duties. Such teachers either have a demonstrated interest in student mental health or are assigned to these roles by necessity. For our study, we intentionally selected these dual-role teachers from the intervention schools, given their unique position and existing engagement with mental health. Their dual capacity as both mental health facilitators and regular classroom teachers ensures they are already well-acquainted with the students, offering a solid foundation for the SEL intervention.

The full-day training was conducted one week before teachers delivered the curriculum and a WeChat group platform (similar to WhatsApp) was then created to provide continuous teaching support for schoolteachers. In addition, the WeChat group was also used to track the teaching progress and make sure all teachers were making the same progress in completing the curriculum. The SEL intervention manuals, student textbooks, materials for SEL activities, slides, and videos were delivered to the schools in early February, a month before the initiation

[2] Rural schools in China are categorized as town or village schools. Town schools have a larger number of students.

[3] In mainland China, based on their primary goal, charitable foundations can be categorized into two types, grant-making or operating foundations. Grant-making foundations aim at providing funding support for NGOs. Besides offering funding support, operating foundations also provide direct services.

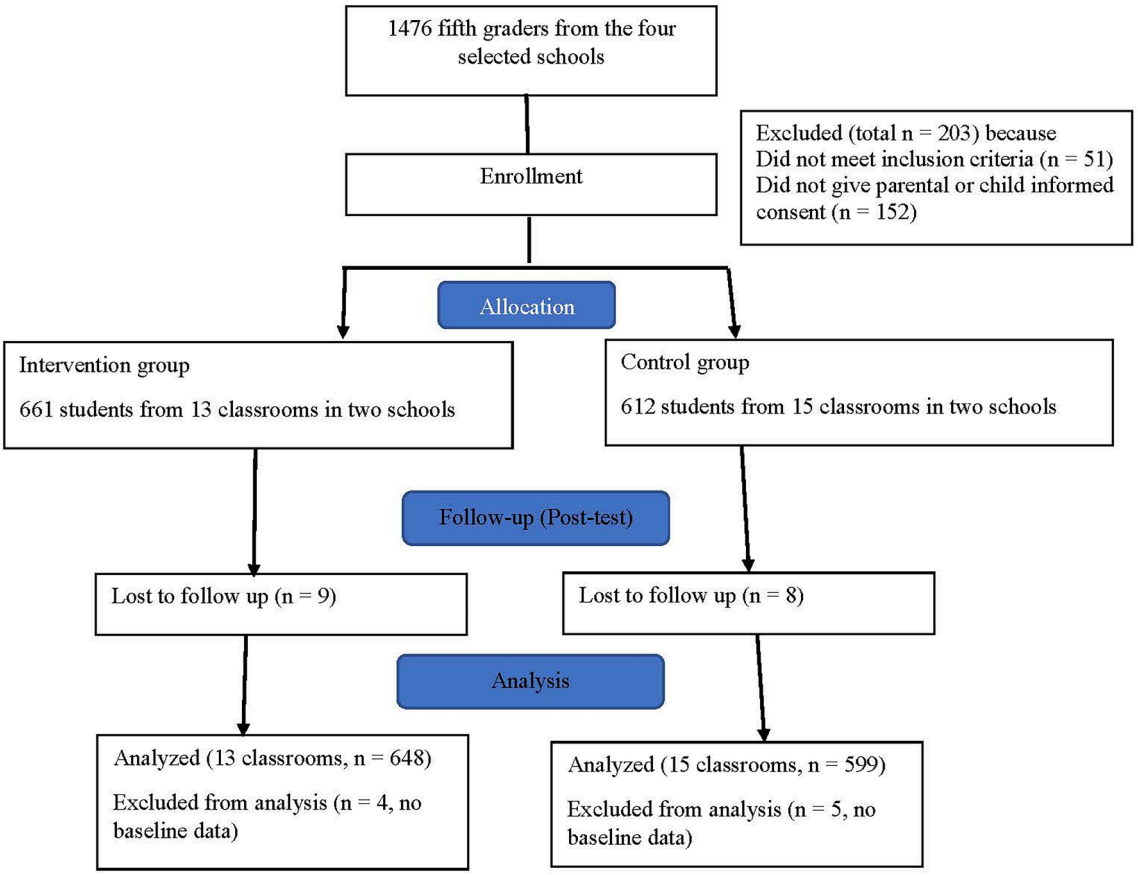

Fig. 1. Flowchart of the study

of the SEL intervention. 13 teachers delivered all 8 sessions within the required time frame on a weekly basis tracked by the research team with each participating teacher. The completion of all eight sessions was also confirmed by the student-reported completion rate of the SEL curriculum.

3.4. Data collection

Baseline data were collected in early March 2022, one week prior to the intervention, and the follow-up data was collected in late June and early July 2022, which is one or two weeks after the intervention. The pre- and post-tests were completed by fifth graders in a quiet classroom setting. Students were given 40 min to complete the questionnaire and trained program staff were in the class to answer any questions regarding the survey. The schoolteachers who delivered the SEL intervention were purposively informed not to show up during these assessments.

3.5. Instruments

Baseline characteristics were collected in the pre-intervention stage based on children's self-report. Information was collected on gender, age, family structure (two parents, other family type), number of siblings, parental residential status (one or two parents working in urban areas, both parents stayed in rural areas), health status ranging from very poor (1) to very good (5) and family SES ranging from very poor (1) to very good (5).

The Chinese WCSD Social–Emotional Competency Assessments. The original scale is The Washoe County School District Social and Emotional Competency Assessments (WCSD-SECAs), which is a free, open-sourced scale designed to evaluate the social and emotional skills of students from grades 5 through 12 based on their own perceptions in the US (Crowder et al., 2019; Davidson et al., 2018). We used the Chinese translated and adapted version of WCSD-SECAs. This scale has been validated among Chinese children aged 8–13 through confirmatory factor analysis, which showed that the Chinese version of WCSD-SECAs scale fitted adequately to the data ($\chi^2(698) = 1116.16$, $p > .001$, CFI = 0.91, TLI = 0.90, RMSEA = 0.04.) (Cheung and Ng, 2021). In addition, this scale was associated with Chinese children's emotional and behavioral problems, indicating its construct validity. The tool also covers all five areas of the SEC from the CASEL conceptual framework. It is one of the few free and open-source social emotional competence measurement tools that comprehensively covers all five CASEL SEL domains including self-awareness, social awareness, self-management, relationship skills and responsible decision-making. It is based on student self-report, which may lessen administrative measurement burden. Considering the new "double reduction"[4] policy in China that requires teachers to offer after class services in schools, it is more feasible for schools to adopt a self-reported scale rather than a teacher-reported scale, eliminating an extra layer of burden to teachers. Comprising 40 items, this scale is more concise than many existing measures. Each item asks children to evaluate the difficulty or ease associated with various social-emotional skills. For instance, to assess Self-Awareness, one item asks students, "Knowing what my strengths are." Students assess their

[4] The 'double reduction' policy in China, implemented in 2021, aims to alleviate the academic pressure on school-age children by reducing their homework load and regulating after-school tutoring. This policy emphasizes on schools providing additional academic support to students, including requiring school teachers to stay longer for tutoring classes. This approach aims to shift the focus from external after-school tutoring services to support within the school system itself.

Table 1
Overview of the positive growth SEL curriculum.

Session	Content	Targeted SEC	Key Activities	Minutes
Session 1: Establishing classroom rules	Introduction of the course and the formation of class rules	Self-management	1. Hear the story of Rule Star. 2. Discuss the possible chaotic situations when the Rule Clock stops working. 3. Play the role of Dragon and Sheep and complete all the challenges to restore school order. 4. Co-create and establish class rules.	40–60
Session 2: Guessing who I am	Enhancement of students' self-awareness through self-exploration and others' feedback	Self-awareness	1. Write down three self-descriptions and let others guess which one is fake. 2. Draw a self-portrait and write down 3 characteristics alongside, then let others guess and name their reasons.	40–60
Session 3: Identifying my strengths	Understanding and exploration of strengths	Self-awareness	1. Work in groups to read the story and discuss which 4 animals to choose and their strengths. 2. Share group discussion results in class. 3. Every student makes an *Energy Wristband* with strengths written on it.	40–60
Session 4: Understanding my emotions	Understanding five basic emotions and the importance of emotion management	Self-awareness	1. Watch an animation clip to gain a preliminary understanding of 5 basic emotions. 2. Choose one emotion and draw a picture to describe it. 3. Share the picture and related life events with the class.	40–60
Session 5: Controlling my emotions	Introduction and practice of skills to regulate negative emotions	Self-management	1. Read and discuss the story called the *Emotion Balloon of a Fire Dragon*, an animal figure in a Chinese context developed for this course. 2. Work in groups to discuss how to restore the fire dragon's emotion balloon. 3. Practice skills to regulate negative emotions.	40–60
Session 6: The power of genuine compliment	Learn ways to express genuine compliments.	Social awareness; relationship skills	1. Discuss the ways to send friendly signals in interpersonal communications. 2. Distinguish sincere and insincere compliments. 3. Learn how to express genuine compliments.	40–60
Session 7: Dealing with conflicts	Practice methods to resolve interpersonal conflicts.	Relationship skills	1. Watch an animation clip and discuss ways to resolve interpersonal conflicts. 2. Learn to use the conflict analysis card. 3. Work in groups to analyze common conflicts in daily lives and how to deal with these conflicts.	40–60
Session 8: Reviewing and celebration session	Review class content and celebrate skill improvement.	Self-awareness; social awareness; self-management; relationship skills	1. Review all the knowledge and skills learned throughout the program. 2. Design a certificate of course completion and sing a song together to celebrate achievements.	40–60

proficiency in each skill using a scale ranging from 1 (Very Difficult) to 4 (Very Easy). The total Social-Emotional Competence (SEC) average scores were calculated by summing the scores of all 40 items and then dividing by 40, the total number of items on the scale. Additionally, the average scores for the five subdomains were determined by summing their respective item scores and dividing by the number of items in each subdomain. These six newly derived variables served as the primary outcomes in our study.

Student Reported Acceptability of the Intervention. We adapted items from a study examining the acceptability of a psycho-educational intervention for children in Taiwan (Wu et al., 2014), comprised of five items using a ten-point scale. 1) How would you rate the overall satisfaction with the SEL program? 2) How interesting or attractive was the SEL program to you? 3) How would you rate the satisfaction with the contents of each SEL session (add titles of the nine class sessions for students to rate each of them) 4) How helpful was this program for you? 5) How much did you apply what you have learned from the program into your daily life? In addition, a Y/N question on "Do you want to attend a similar program again?" was also included. This scale was added to the post-intervention survey. A teacher-reported acceptability form was also included in the larger research project; however, it is beyond the focus of this paper and is discussed in another manuscript, which concentrates on the implementation barriers and facilitators of this intervention.

3.6. Statistical analysis

A balance check of covariates was conducted using multiple bivariate statistical tests. Independent sample t-tests were applied for continuous variables and chi-square tests for categorical variables. A p-value less than 0.05 indicated an imbalance on the corresponding variables. The next step was to examine the interventional effects. A series of multilevel modeling analyses were adopted to understand the intervention effects on rural children's overall SECs and five subdomains. This method was applied in school-based evaluations of students' social capital and depression (Niesche & Haase, 2012; Stjernqvist et al., 2018). The data had a hierarchical structure where students (level 1) were nested within classes (level 2). Given only four selected schools with limited statistical power, we did not consider school as another level of analysis. Thus, two-level mixed modeling was used to account for random effects and fixed effects. Independent variable included group assignment (treatment vs. control) and dependent variables included pre-post change scores for overall social and emotional competencies, self-awareness, social awareness, self-management, relationship skills, and responsible decision-making (all are mean scores on a 1–4 range). Considering that the study design is not a randomized controlled trial (RCT), the pre-post change scores were tested as the dependent variable instead of controlling for the pre-test scores. We controlled for demographic variables consisting of gender (male vs. female), age, family structure (two-parent vs other types), number of siblings, parental residential status (parents working in urban areas vs parents stayed in rural areas), self-reported health status and self-reported family SES. All analyses used a 0.05 significance level. Additionally, we employed the same multilevel modeling in the subgroup analysis to examine whether there were differences in intervention effects in terms of gender and parental migration status. All the statistical analyses were conducted in the software package Stata Version 17.

3.7. Ethical approval

Ethical approval was obtained through the corresponding author's institution prior to the implementation of the study. Written informed consent was obtained from both students and caregivers before conducting the study.

4. Results

4.1. Baseline characteristics

Table 2 shows the results of sample descriptive statistics and balance checks. Results indicated that the two groups (i.e., intervention and control groups) were not significantly different before intervention, given the p-values for all balance check tests were greater than 0.05. As expected, owing to the purposive matching process we employed in terms of school size, teacher-student ratio, school performances, distance to the county seat, and ratio of children of work-away parents, there were no statistically significant differences in mean levels of the demographic variables at baseline between the two groups. Differences observed from the change scores on outcome measures are therefore unlikely to be due to selection biases related to observed variables.

As shown in Table 2, a total of 648 fifth graders in the intervention group and 599 fifth graders in the comparison group completed baseline assessment and post intervention assessment. The study sample consisted of slightly more girls (50.2 %) than boys (49.8 %), the average age of children at the time of intervention was 10.96 years, the average number of siblings was 1.23, 18.5 % of the children lived in non-traditional family structure (single parent, parental divorce, etc.), and 76.9 % of the children were children of work-away parents (at least one parent working away). Children's self-reported health status ranged from very poor (0.2 %), poor (4.7 %), fair (27.8 %), good (34.4 %), and very good (32.9 %). Their self-reported family SES varied from very poor (0.6 %), poor (6.5 %), fair (65.0 %), good (21.8 %), to very good (6.1 %).

As shown in Table 3, the Cronbach's alpha for the WCSD-SECAs scale was greater than 0.9 in both the pretest and post-test for the total sample. Cronbach's alpha coefficients for subscales are shown in Table 3. They ranged from 0.6 to 0.86.

Table 3 also showed the pre and post mean scores of overall SEC and each SEC domain with a range from 1 to 4 points. There were no statistically significant differences on the baseline scores of SECs, self-awareness, self-management, relationship skills and responsive decision-making between the intervention group and comparison group. Children from the control group had significantly higher baseline scores for social awareness ($p < 0.01$) compared to children from the intervention group.

Fig. 2 below illustrates the change of mean scores of the overall social emotional competency score and its five subdomains from baseline to post intervention between the intervention group and control group. Children in the intervention group improved on the overall score for social emotional competence and all five domains. Specifically, self-awareness and social awareness increased the most. On the other hand, children's social emotional competencies in the comparison group improved more slowly or even decreased on some domains. However, the descriptive analysis could not draw statistical conclusions on the intervention effects, which are illustrated in the multilevel mixed-effect modeling.

4.2. Impact of the intervention on Children's overall social emotional competencies and subdomains

Multilevel mixed-effect models were conducted to examine the impact of the SEL intervention on children's overall social emotional competencies and its five subdomains, controlling for children's demographic variables. Significant findings are reported in Table 4. Four change scores of the social emotional competency outcomes showed that

Table 2
Baseline demographic characteristics of study children and balance check.

	Sample Descriptive Statistics				Balance Check		
Variable	N	%	Mean	SD	% Control, % Treated	Mean Control, Mean Treated	p-value From Bivariate Test
Treatment condition							
Control	599	48.0					
SEL treated	648	52.0					
Gender							
Boy	620	49.8			48.1, 51.3		0.254
Girl	626	50.2			51.9, 48.7		
Age			10.96	0.565		10.98, 10.94	0.147
Family structure							
Children with two parents	1010	81.5			81.2, 81.6		0.853
Other family type	230	18.5			18.8, 18.4		
Number of siblings			1.23	0.739		1.26, 1.21	0.252
Parental migration status							
Children of parents at home	286	23.1			20.7, 25.3		0.057
Children of work-away parent	951	76.9			79.3, 74.7		
Self-reported health status							0.072
Very good	409	32.9			36.3, 29.7		
Good	429	34.4			32.3, 36.5		
Fair	346	27.8			26.6, 28.9		
Poor	59	4.7			4.5, 4.9		
Very poor	2	0.2			0.3, 0.0		
Self-reported family SES							0.539
Very good	76	6.1			6.2, 6.0		
Good	272	21.8			23.2, 20.5		
Fair	811	65.0			63.6, 66.4		
Poor	81	6.5			6.2, 6.8		
Very poor	7	0.6			0.8, 0.3		

Table 3
Descriptive of social emotional competencies at pre and post by group.

		Intervention (N = 648)		Control (N = 599)		Total (N = 1247)	
Variable	α	M	SD	M	SD	M	SD
Social emotional competencies total							
Pre	0.93	2.89	0.37	2.93	0.38	2.91	0.37
Post	0.92	2.96	0.43	2.92	0.38	2.94	0.41
Self-awareness							
Pre	0.71	2.90	0.36	2.93	0.40	2.92	0.38
Post	0.75	3.02	0.45	2.92	0.41	2.97	0.43
Social awareness							
Pre	0.63	2.88	0.48	2.96	0.48	2.92	0.48
Post	0.60	3.00	0.50	2.96	0.47	2.98	0.49
Self-management							
Pre	0.86	2.85	0.44	2.87	0.43	2.86	0.44
Post	0.85	2.89	0.50	2.88	0.43	2.89	0.47
Relationship skills							
Pre	0.69	2.97	0.49	3.03	0.48	3.00	0.48
Post	0.69	2.99	0.57	2.96	0.48	2.98	0.53
Responsive decision-making							
Pre	0.69	2.91	0.50	2.95	0.50	2.93	0.50
Post	0.72	2.95	0.58	2.96	0.53	2.96	0.56

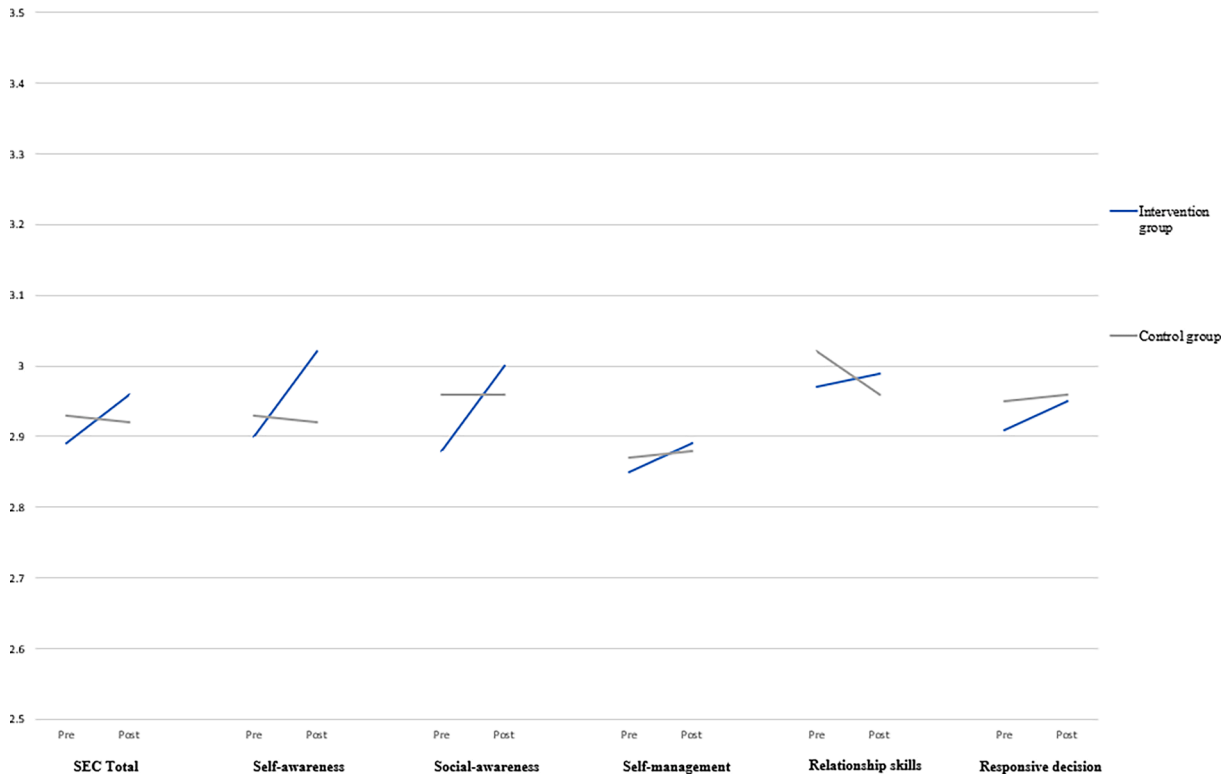

Fig. 2. Pre- and post-intervention scores of overall SECs

children in the intervention group at the post intervention time point achieved significantly higher scores than those in the comparison group. Specifically, controlling for all other variables, compared to children in the control group, children in the SEL experiment group reported 0.074 units higher on pre-post change score for social emotional competency ($p < .01$), 0.121 units higher on pre-post self-awareness scores ($p < .001$), 0.135 units higher on pre-post social awareness scores ($p < .001$), and 0.078 units higher on pre-post relationship skill scores ($p < .05$) (see Table 4). Cohen's d was employed as an effect size measure for the following SEC scores: SEC overall (ES = 0.213), self-awareness (ES = 0.342), social awareness (ES = 0.25), and relationship skills (ES = 0.185). Corrections for Cohen's d were made in accordance with the recommendations by Morris (2008). There were, however, no statistically significant intervention effects on the competencies of self-management and responsible decision-making.

The results from the subgroup analyses from Table 5 shed light on whether the intervention equally benefited participating children. We examined the estimated effect on the curriculum on children's overall social emotional competency score by children's gender and parental migration status. The Positive Growth curriculum had a significant impact on improving boys' overall social emotional competence (an increase of 0.109 units on change score for overall SEC scores, $p < 0.001$, 95 % CI = 0.046, 0.173), but not girls (no statistically significant change). In addition, the Positive Growth curriculum benefited children

Table 4
Estimated random-effect models of SEL intervention effects on SEC and subdomain.

Variables	Change Scores for Social and Emotional Competencies					
	SEC	Self-Awareness	Social awareness	Relationship Skills	Self-management	Responsive decision-making
Fixed effect model						
Direction of beneficial treatment effect	+	+	+	+	+	+
Treatment (Control)						
SEL Intervention (95 % CI)	**0.074** (0.019, 0.129)**	**0.121*** (0.063, 0.179)**	**0.135*** (0.054, 0.217)**	**0.078* (0.003, 0.153)**	**0.038 (-0.026, 0.102)**	**0.023 (-0.053, 0.098)**
Gender (female)						
Male	−0.002	0.039	−0.055	0.015	−0.005	−0.051
Age	−0.028	−0.023	−0.043	−0.031	−0.032	−0.015
Family structure (other type)						
Children with two parents	0.014	−0.024	0.004	0.029	0.033	0.046
Number of siblings	−0.009	−0.006	0.007	−0.025	−0.009	0.002
Parental migration status (both parents stayed in rural areas)						
Children of work-away parents	−0.005	−0.015	0.022	−0.046	0.001	−0.003
Self-reported health status (Very poor)						
Poor	−0.125	−0.678*	0.094	−0.008	−0.106	0.559
Fair	−0.094	−0.616*	0.076	0.019	−0.061	0.558
Good	−0.112	−0.619*	0.004	0.005	−0.071	0.529
Very good	−0.150	−0.657*	0.022	−0.045	−0.129	0.519
Self-reported family SES (Very poor)						
Poor	0.159	0.251	−0.072	0.071	0.180	0.234
Fair	0.126	0.170	−0.074	0.105	0.129	0.233
Good	0.137	0.179	−0.093	0.165	0.139	0.224
Very good	0.046	0.123	−0.191	0.081	0.023	0.126
Constant	0.292	0.728*	0.515	0.205	0.296	−0.588
Random intercept effect						
Classroom level (constant)	0.004	0.003	0.007	0.005	0.004	0.005
Classroom level (residual)	0.080	0.135	0.231	0.213	0.132	0.232
Model chi-square (df)	29.88**	40.86***	27.62*	19.61	24.22*	14.04
Number of study children	1211	1216	1216	1216	1217	1217
Number of classrooms	28	28	28	28	28	28
Estimate intraclass Correlation coefficient (ICC)	0.043	0.022	0.027	0.024	0.031	0.021
Effect size	0.213	0.342	0.250	0.185	0.069	0.060

Note:
1. Reference groups for categorical variables are shown in parentheses.
2. * p <.05, ** p <.01, ***p <.001, +p <.05, two-tailed test for all variables.
3. Significant test for the random intercept effect is conducted by the likelihood ratio test comparing the random effect model with the linear model.

Table 5
Estimated effect of positive growth SEL curriculum on rural children's overall social emotional competencies by sex and parental migration status.

	Sex		Parental Residential Status	
	Female	Male	One or two parents working in urban areas	Both parents stayed in rural areas
Sample size	613	598	932	279
Number of clusters	28	28	28	28
Coefficient	0.048 (-0.013, 0.109)	0.109*** (0.046, 0.173)	0.071** (0.020, 0.122)	0.073 (-0.028, 0.175)

* 0.01 ≤ p <.05, ** 0.001 ≤ p <.01, and *** p <.001.
Note: All multilevel regressions controlled for the covariates reported in Table 4. The 95% confidence intervals are reported in parentheses.

of work-away parents (an increase of 0.071 units on change score for overall social emotional competence, p < 0.01, 95 % CI = 0.020, 0.122), more than it did their counterparts from non-migrating families (no statistically significant change).

4.3. Student reported intervention acceptability

Overall, among the 648 students in the intervention group, 617 (95.2 %) completed all eight sessions. Additionally, 12 students (1.9 %) missed one session, 9 students (1.4 %) missed two sessions, and 10 students (1.5 %) missed three or more sessions. Table 6 shows the responses obtained regarding student reported acceptability of the Positive Growth curriculum in this study. Participants in the intervention group reported high satisfaction scores about the current intervention (Mean = 9.1, SD = 1.6, based on a 1–10 scale). In addition, the intervention was considered interesting (Mean = 9.2, SD = 1.61), helpful (Mean = 8.6, SD = 2.15), and the skills taught were useful in their daily life (Mean = 8.07, SD = 2.65). Of the 648 participants, 97.65 % expressed their willingness to attend a similar intervention again. Furthermore, students evaluated each of the eight SEL sessions individually, with average scores ranging from 8.1 (for the 'establishing the class rule' session) to 9 (for the 'review and celebration' session). This

Table 6
Results from the acceptability survey completed by the intervention group.

Question	Range*	Mean	SD
1. How would you rate the overall satisfaction with this intervention?	1–10	9.1	1.6
2. How interesting would you rate this intervention?	1–10	9.2	1.61
3. How helpful was this curriculum for you?	1–10	8.6	2.15
4. How much did you apply this program to your daily life?	1–10	8.07	2.65
	n (%)		
5. Do you want to attend this kind of intervention again?	97.65 %		

Scoring range = 1 – 10; SD, standard deviation

range indicates a high level of acceptability among the children for each individual session of the SEL curriculum.

5. Discussion

To the best of our knowledge, the current study is the first to examine the preliminary impact of an elementary school-based SEL curriculum on rural children's social and emotional competencies in mainland China. This study is also notably good at its high retention rates; very few participants dropped out of the SEL program or had missing follow-up information. Through an equity lens, this study is distinct in terms of understanding the impact of a mental health prevention program targeted on a vulnerable group of children, rural children who have faced accumulated challenges and barriers in their lives. This study has joined other scholars' efforts toward shifting intervention research into supporting rural children, one of the most underserved population groups in China, through using rigorous research methods (Guo et al., 2020). The extant limited literature on SEL interventions in China either employs a convenience sample of children living in urban areas (An et al, 2021; Kam et al., 2011) or focuses more on academic outcomes such as school dropout and learning anxiety (Wang et al., 2016).

This pilot study provides initial evidence of the promise of the Positive Growth SEL curriculum for improving students' self-reported social-emotional competence. In addition, this quasi-experimental SEL intervention study makes the very first efforts in terms of contributing to the existing resilience literature through shedding light on the potential of universal school-based SEL program in strengthening Chinese rural children's social and emotional competencies, a crucial resilience construct. These significant findings of SEL intervention effects concord with the impacts of SEL intervention in western literature (Sklad et al., 2012). The curriculum showed the greatest effects for improving rural children's social awareness (ES = 0.342), and then on self-awareness (ES = 0.25), and on relationship skills (ES = 0.185). These findings align with a systematic review revealing that the largest summary intervention effects of universal school-based SEL programs were found in the domain of self-awareness and social awareness (Van de Sande et al., 2019). The results shed light on the strengths and weaknesses of the Positive Growth curriculum. It may be better at helping rural children build empathy with others, identifying their own strengths and emotions as well as building and maintaining good relationships with others including peers, teachers, and their parents. However, the curriculum fails to significantly improve rural children's emotional regulation and responsive decision-making.

There are potential explanations underlying these two insignificant findings. The competency of responsive decision-making was not originally included in the SEL intervention development process considering the content might be already embedded in a class on moral education required in Chinese elementary schools. Among existing evidence-based SEL programs, the responsive decision-making domain has been less emphasized (Van de Sande et al., 2019). However, it is a different case for the self-management domain. Self-management, particularly referring to children's ability to regulate their emotions, was purposefully emphasized and addressed in the course design. The intervention may not create adequate space for rural children to practice their emotional regulation skills in their daily lives. One crucial criterion of SEL program design is to provide opportunities for students to practice their social and emotional skills both in class and after class (CASEL, 2020; Dusenbury et al., 2015). The current session for emotional regulation may need to be revised or strengthened to help children practice emotional regulation or coping strategies outside the class. In addition, emotional regulation is complicated, involving multiple skills (e.g., self-soothing, attention shifting, cognitive re-appraisal, acceptance) that may not be learned quickly within an eight-week intervention (Cole et al., 2019). Future work may need to consider adding more sessions for emotion regulation with more engaging activities that can help children practice learned skills in their daily academic and social lives.

In addition to examining the intervention effects on rural children in general, we expanded on extant literature by identifying subgroups that may obtain more growth in social emotional learning while receiving the same school-based intervention. Boys and children of work-away parents improved more compared to their counterparts. These differences might partially be due to the baseline difference of SEC scores. For instance, at the baseline, girls' overall scores were significantly higher than boys' SEC scores, leaving girls relatively smaller room to improve. This gender difference is consistent with research on children's social and informational processing skills (e.g., Terzian et al., 2015) and with studies implying that Chinese girls have higher social and emotional competencies than boys (Liu et al., 2022). Similarly, in this study, children of work-away parents have lower baseline competency scores than their counterparts, implying that they have more space to growth from this intervention. One other recent study also found children of work-away parents have lower social and emotional development (Shi et al., 2020). The intervention effects by gender and parental migration status indicate that the intervention may help rural children who need it most. Although intervention effect sizes in this study were small, as a low-cost universal intervention, it has potential to improve outcomes for the most vulnerable children in resource constrained areas, such as the most remote village schools in China. In addition, future SEL program design should also consider how to continue improving the curricula to better strengthen girls' social and emotional competencies by incorporating girls' unique needs into the intervention.

Furthermore, this pilot study also found that the school-based SEL curriculum is strongly acceptable, interesting, and perceived as helpful by rural students. On the one hand, this evidence of acceptability seems to coincide with a systematic review that illuminates that mental health interventions implemented in institutional settings like schools are likely to be acceptable by the recipients (Osborn et al., 2021). On the other hand, echoing the implication from an urban school SEL study in China (An et al., 2021), this extremely positive feedback on the SEL curriculum provides crucial implications for Chinese educational systems. In traditional classrooms, even more typical in rural schools, teachers are viewed as the authority figure, deliver lecture-based content, and students are expected to be obedient and sit quietly in class. In contrast, the SEL curriculum we piloted centers more on group-based activities that are intended to be engaging and interactive with teachers serving more as facilitators rather than instructors. The high acceptability of this non-traditional teaching style in rural school settings echoes a growing demand for more flexible, interactive and engaging classroom environments to support rural children's growth (An et al., 2021). In addition, the findings uphold the call for a broader education agenda that ensures the incorporation of social and emotional competencies as the basic skills to learn in schools (Greenberg et al., 2003).

This study highlights the adaptation of program development across diverse cultural contexts. By employing a Western-based SEL guiding framework, we have tailored the SEL curriculum to suit Chinese rural environments, potentially explaining its high acceptability and preliminary positive outcomes. The curriculum incorporates culturally relevant materials and examples, such as utilizing the dragon in setting rules and emotional regulation sessions, which might aid children in understanding and learning SEC more appropriately. The research team considers SEC as a universal skill set that children from various cultural backgrounds should acquire and practice. However, we recognize that the interpretation of each specific subdomain of SEC may vary across different contexts, influencing the practical design of SEL programs. Therefore, we join the call for developing SEL interventions that are culturally sensitive or specifically tailored to the needs of minoritized or vulnerable children (Castro-Olivo & Merrell, 2012) as well as exploring how these programs can work in diverse contexts.

6. Limitations

There are four major limitations to this study concerning study design, measurement issue, and outcomes that were measured. Due to limited funds and the difficulty of large-scale school collaboration in rural China, we were not able to use a cluster Randomized controlled trial (RCT), the gold standard in program evaluation, to understand the causal relationships between the SEL program and social emotional competencies. Given that this study does not employ a RCT design, it cannot account for all unobserved confounding variables. In addition, SEL is a life learning process and should ideally be learned in a sequenced way over time (CASEL, 2020). The current intervention is only an eight-session curriculum targeted on fifth graders. The intervention effects were understandably of a small magnitude, consistent with the results of a *meta*-analysis of SEL interventions (Durlak et al., 2011). The current study was not able to follow up with the students after the posttest. Future studies should consider using longitudinal study designs to understand the long term impact of multi-year school-based SEL intervention (Greenberg et al., 2003) on rural children's social emotional competencies.

Second, this study relied solely on children's self-reported socio-demographic information and their assessments on their social-emotional competence, primarily due to concerns about the administrative burden on rural teachers and the challenges of engaging with parents working remotely. Existent literature indicates that SEL program effects are more recognizable by teachers or caregivers compared to by students themselves (Coelho et al., 2015; Shapiro et al., 2002). Using multiple informants including teachers and caregivers to further triangulate the assessment data can strengthen future research.

Third, this study primarily focused on the impacts of SEL intervention on rural children's social emotional competencies. Future research can dive deeper into its effects on other mental health outcomes including reducing children's internalizing and externalizing mental health problems and school outcomes. Additionally, future research could explore the intervention mechanism, such as assessing the mediating effects of social-emotional competencies on mental and school outcomes.

Fourth, the current study was limited in its ability to conduct a comprehensive assessment of implementation fidelity, as it solely focused on the completion of each SEL session. Future research should consider developing a detailed checklist for teachers to monitor both their adherence to and the quality of implementation. Additionally, incorporating an implementation diary for teachers to document their feedback and reflections, as well as employing additional personnel for classroom visits with a pre-designed observation checklist, might also enhance the assessment of implementation fidelity.

7. Conclusion

The significant intervention effects of the school-based SEL program on rural children's overall social emotional competencies and three subdomains and its high acceptability among rural children demonstrate the potential of adoption and scaling up SEL programming in rural Chinese elementary schools. The positive effects on children of work-away parents were especially encouraging, considering these children are typically situated in more disadvantaged circumstances. This pilot study sheds light on preliminary evidence on SEL intervention and calls for more practice improvement and policy efforts in this field. Future research should consider random assignment, longer follow-ups, multiple informants, and the inclusion of diverse mental health outcomes.

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CRediT authorship contribution statement

Linyun Fu: Conceptualization, Methodology, Writing - original draft. **Zhen Zhang:** Funding Acquisition, Project administration, Writing - review & editing. **Yuanyuan Yang:** Data Curation. **J. Curtis McMillen:** Writing - review & editing, Supervision.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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