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# Enhancing resilience in single-parent family adolescents in China: a randomized controlled trial based on home-school collaborative intervention

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## Abstract

**Background** It remains unknown whether home-school collaborative strategies can improve the resilience of adolescents and children from single-parent families in China.

**Objectives** This study addresses the gap in resilience interventions for single-parent family students by validating a 7-week home-school collaborative intervention strategy.

**Methods** The participants were 89 primary and secondary school children from China, randomly assigned to either the experimental group (20 single-parent and 27 non-single-parent students) or the control group (20 single-parent and 22 non-single-parent students). Both groups used the Adolescent Psychological Resilience Scale to report their resilience levels during the pre-test and post-test phases. Single-parent family parents also reported their collaborative participation using a behavior checklist.

**Results** The experimental group exhibited higher resilience gain scores compared to the control group. The intervention effects in the experimental group remained stable for one month after the intervention ended. Additionally, the intervention at the school level fostered greater collaborative involvement from single-parent families, particularly in terms of family support participation.

**Conclusions** The Home-school collaborative intervention strategy is a valuable measure for enhancing the resilience of students from single-parent families and has the potential for application within both family and school contexts.

**Keywords** Resilience interventions, Home-school collaboration, Single-parent family, Randomized controlled trial

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## Introduction

Children from single-parent families often face unique challenges that may negatively impact their development. Research has shown that these students are at a higher risk of experiencing emotional distress, such as anxiety and depression, due to the absence of one parental figure [1–2]. Additionally, they may encounter academic difficulties, including lower educational attainment and reduced motivation, stemming from economic hardships or limited parental support [3]. Socially, single-parent students may struggle with peer relationships and feelings of social isolation, further exacerbating their psychological vulnerability [4].

In response to these risks, resilience plays a crucial role in helping students from single-parent families adapt and thrive despite adversity. Resilience is commonly referred to as an individual's ability to utilize a range of protective factors to restore or maintain positive mental health after experiencing disadvantage or adversity [5]. It is viewed as a product of the interplay between individual and environmental factors [6]. Higher resilience in children correlates with enhanced adaptability, while lower resilience is associated with a propensity for aggressive behavior and psychological challenges [7].

Home-school collaboration offers a more comprehensive and integrated approach to supporting resilience among students from single-parent families. Home-School Collaboration refers to an active and cooperative process between parents (or guardians) and school personnel, including teachers and administrators. In this process, both parties engage in joint decision-making, identifying and addressing shared goals and concerns related to students' education and development. The primary objective of this collaboration is to ensure students' holistic development and overall well-being [8–9]. When families and schools work together, they create a consistent and reinforcing support network that fosters emotional stability, academic motivation, and adaptive coping strategies. Studies have shown that home-school collaboration strengthens children's problem-solving skills, emotional control, and sense of belonging, all of which contribute to greater resilience [10]. However, despite its theoretical and practical significance, there remains a gap in research on structured home-school collaborative interventions specifically targeting single-parent students. Given the critical developmental challenges faced by these students, it is essential to design interventions that systematically integrate home and school resources to provide holistic support. Therefore, this study aims to develop a structured home-school collaborative intervention strategy to enhance the resilience of single-parent adolescents and children in China and evaluate its practical effectiveness.

## Resilience of children from single-parent families

Children from single-parent families often face unique challenges that can impact their psychological well-being. In China, the number of single-parent households has been increasing due to rising divorce rates and shifting societal norms. However, traditional values continue to emphasize two-parent family structures, leading to social stigma. Studies suggest that children from single-parent families may experience discrimination and social exclusion [11], contributing to lower self-esteem and heightened emotional stress. Beyond social perceptions, they may also encounter economic difficulties [12], reduced parental supervision [13], and limited emotional support [1], all of which can increase their vulnerability to psychological distress.

Adolescence is a particularly critical period in this context, as it marks a stage of identity development and emotional maturation. According to Erikson's Psychosocial Development Theory [14], adolescents undergo a process of self-exploration, and a stable family environment plays a key role in shaping their self-perception and emotional stability. However, adolescents from single-parent families often face additional stressors, including economic instability, role strain, and societal bias, which may affect their emotional regulation and social adjustment. Given these risks, understanding and fostering resilience among adolescents from single-parent families is essential for their psychological well-being.

Resilience is often evaluated using the Adolescent Psychological Resilience Scale developed by Hu and Gan [15], a widely recognized assessment tool in China. This scale measures resilience across five key dimensions: goal focus, social support, family support, emotional regulation, and positive thinking. Each of these dimensions plays a crucial role in helping adolescents cope with stress, seek support, and maintain emotional stability. Research has demonstrated that resilience can significantly lower the risk of anxiety, depression, and behavioral issues, particularly among adolescents experiencing challenges related to family structure [16].

In summary, adolescents from single-parent families face various challenges, including social stigma, changes in family dynamics, and reduced parental support, which can affect their psychological well-being. Resilience serves as a key protective factor, enabling them to regulate emotions, seek support, and adapt to adversity, ultimately fostering greater confidence and stability in their development.

## Interventions for adolescent resilience

Resilience is a valuable capability that can be cultivated and enhanced through various means, including targeted interventions [17]. For children from single-parent families, the home and school environments are their primary

settings, making them particularly suitable for fostering resilience. Both approaches—home-based and school-based—have been proven effective in enhancing resilience among adolescents from single-parent families.

Family intervention strategies can serve as a crucial cornerstone for the resilience development of adolescents from single-parent families. Through family interventions, single parents can create a loving and supportive environment, helping their children establish a stable emotional foundation, which, in turn, enables them to exhibit greater adaptability and resilience when facing life's challenges [18]. Daily interactions within the family, such as completing tasks together and sharing emotional experiences, not only strengthen the parent-child relationship but also foster the development of children's emotional regulation and problem-solving skills [19]. Specifically, regular family activities like outdoor adventures and parent-child games have been shown to effectively enhance children's self-efficacy and social skills [20], both of which are key components of building resilience.

School intervention strategies play a vital role in fostering resilience among adolescents from single-parent families [21]. Schools provide a safe and diverse learning and growth environment through the implementation of personalized support plans, psychological counseling services, resilience education programs, and group therapy sessions. These interventions aim to guide children in identifying and leveraging their personal strengths, as well as teaching them practical strategies to cope with stress and challenges [22]. Additionally, schools promote peer support and collaboration by organizing group activities and team-building exercises, which enhance the social-emotional skills of children from single-parent families, thereby strengthening their sense of belonging and psychological resilience.

Home-School Collaboration Strategies refer to systematically designed and implemented interventions within the framework of home-school collaboration. These strategies involve coordinated efforts between schools and families to enhance students' academic, psychological, and socio-emotional development [23]. Home-school collaboration strategies effectively combine the strengths of both families and schools to foster resilience in adolescents from single-parent families, showing more significant results [24]. This collaboration goes beyond merely sharing information and establishing feedback mechanisms; it involves a deep integration of educational philosophies and methods from both sides. Through regular home-school communication meetings, parent workshops, and school open days, families and schools can jointly develop intervention plans tailored to the individual needs of the children, ensuring consistency and continuity in the interventions. Additionally, home-school

collaboration encourages parents to participate in school activities, such as parent-child reading programs and homework assistance, which not only strengthen parent-child relationships but also promote children's overall development in academics and social-emotional areas. Therefore, resilience-focused home-school interventions, by integrating the strengths of both family and school education, can significantly enhance the resilience levels of adolescents from single-parent families, helping them better cope with various life challenges.

Existing research underscores the importance of family support and school education in the development of resilience among students from single-parent families [25]. However, few studies systematically explore specific strategies that integrate family and school resources to jointly promote resilience in these children. Many studies rely on cross-sectional surveys, lacking the design of intervention measures and in-depth, longitudinal analysis of intervention effects [26–27]. Therefore, there is an urgent need for a resilience intervention study specifically targeting adolescents and children from single-parent families.

### **Connecting home and school collaboration with resilience**

The synergistic effect of combining home and school collaborative interventions stems from their complementary influences on the developmental domains of students from single-parent families. Families primarily enhance children's basic sense of trust and self-worth by providing emotional support and a sense of security. In contrast, schools contribute to cognitive development and social skills by offering new perspectives and problem-solving scenarios through education and social opportunities [24]. This dual engagement optimizes the development of resilience by providing a holistic approach that addresses multiple aspects of emotional and intellectual growth in students from single-parent families.

Combining home and school collaboration offers unique advantages by creating a rich, multidimensional support environment where children can engage in emotional learning and social understanding within the warmth of the family and the challenges of the school. This integrated approach amplifies the benefits observed from single interventions, enhancing the adaptive and stress-coping abilities of students from single-parent families through a broader range of cognitive and emotional skills. Theoretical perspectives, such as Bronfenbrenner's ecological systems theory, suggest that children's development is profoundly influenced by their interactions within various environments [28]. Interventions that combine home and school collaboration create a dynamic interactive context, significantly enriching these developmental experiences and, thereby, fostering resilience more effectively than single approaches.

## Current study

The resilience of adolescents from single-parent families is a critical area that requires targeted intervention. Despite the urgent need, this issue is often overlooked in contemporary research. Existing studies primarily focus on general student populations, resulting in a significant gap in our understanding of adolescents from single-parent families. Additionally, these studies tend to examine singular intervention strategies, such as family support or school activities, without exploring the combined effects of these approaches. This oversight limits the applicability of research findings to the multifaceted nature of fostering resilience in these children. Our work aims to address these gaps by introducing a comprehensive, home- and school-based collaborative intervention specifically designed for adolescents from single-parent families. By exploring the synergistic potential of combining family and school support, our research seeks to enhance resilience, a crucial skill for addressing the challenges faced by these adolescents. Due to changes in family structure, children from single-parent families may encounter higher rates of behavioral issues and are more susceptible to mental health problems [29]. A study on single-parent children highlighted that the vast majority lack resilience [30], further underscoring the urgency for tailored interventions for this demographic. Limited research has explored the potential positive impact of combined family and school support on the resilience of adolescents from single-parent families, marking a clear research gap our study intends to fill. By examining the efficacy of a program that combines family and school support, this study contributes significantly to the field, offering a comprehensive, scalable intervention model that could inform future educational policies and practices aimed at fostering resilience in adolescents from single-parent families.

The study addresses the following research questions:

RQ1: Does the home-school collaborative intervention effectively enhance the resilience of students from single-parent families?

RQ2: Does the home-school collaborative training program maintain its impact on the resilience of students from single-parent families over a 1-month follow-up period?

The hypotheses tested are as follows:

**Hypothesis 1** Students from single-parent families in the experimental group will exhibit significantly greater resilience growth compared to the control group post-intervention.

**Hypothesis 2** The resilience of the experimental group will show improvement during the follow-up survey.

## Method

### Participants

This study was conducted at an experimental school in Yancheng, Jiangsu Province. The researchers had prior communication with the school, thoroughly explaining the study's content and obtaining consent from school leaders, teachers, students, and parents. Written informed consent forms were signed by both students and parents, clearly informing them of their right to leave the activity room or withdraw from participation at any time.

Before the study began, a pre-test was conducted using the Adolescent Psychological Resilience Scale, targeting students from the fourth and fifth grades of elementary school and the first and second grades of middle school. The pre-test was administered by class, and 893 valid questionnaires were collected, including 110 from students from single-parent families. Students from single-parent families with resilience scores below the overall average (3.37 points) were selected as the study subjects. Ultimately, 89 children were randomly assigned to either the experimental or control group. Figure 1 illustrates the flow of study participants.

These 89 children were randomly divided into four groups. For single-parent students, there were 20 each in the experimental and control groups. For non-single-parent students, there were 27 in the experimental group and 22 in the control group. The children's ages ranged from 10 to 15 years old, with an average age of 13.02 (standard deviation of 1.47). In terms of gender distribution, there were 43 boys (48%) and 46 girls (52%).

### Intervention design

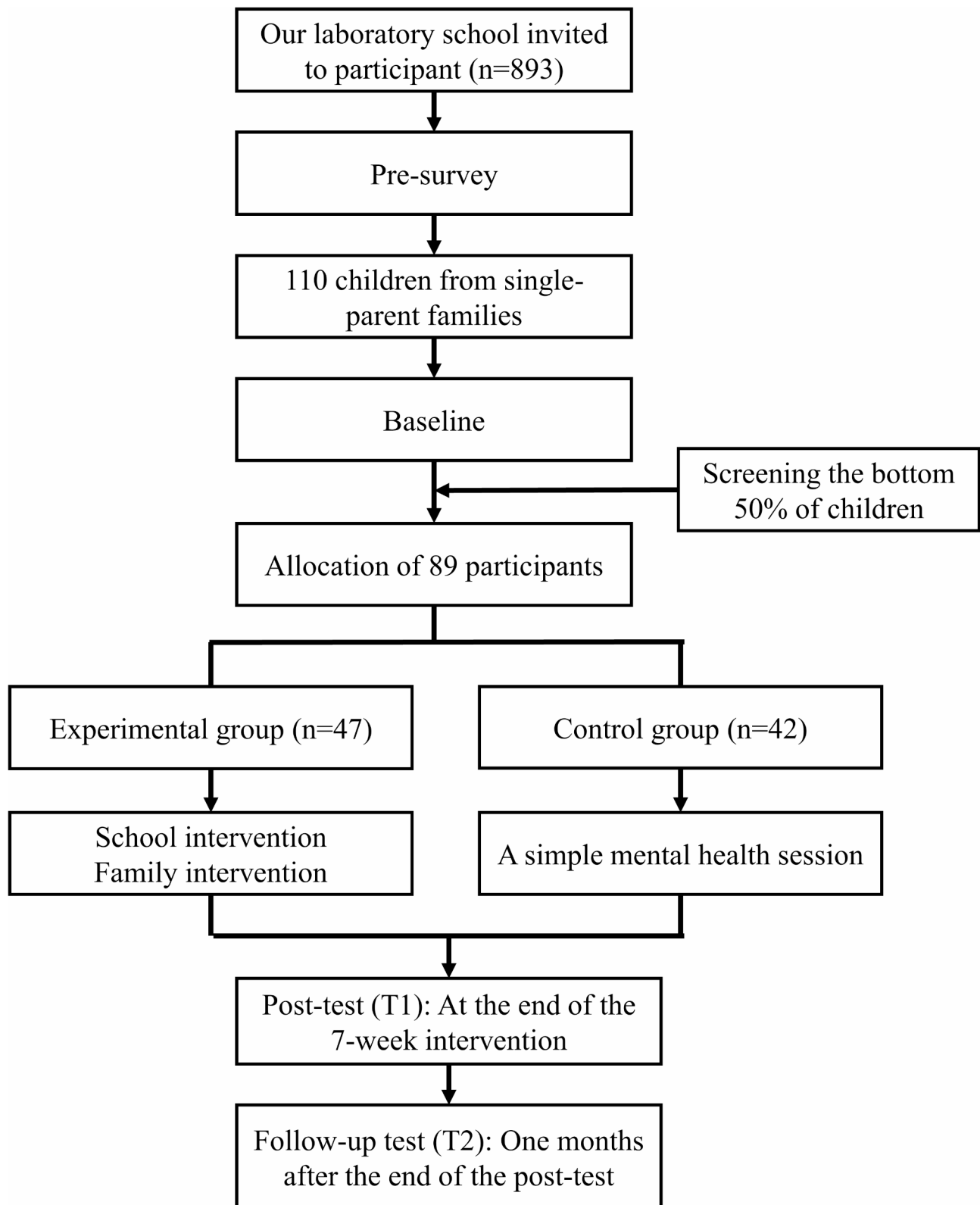
This study aims to enhance the psychological resilience of adolescents from single-parent families by providing comprehensive support through the collaborative efforts of both the family and the school, helping these children improve their ability to cope with stress and challenges.

The intervention content is divided into two main levels: the school level and the family level.

School level:

(1) Group counseling sessions: The intervention lasts for seven weeks, with one 45-minute group counseling session held each week. The activities focus on five dimensions of resilience: goal orientation, emotional control, positive cognition, family support, and interpersonal assistance.

(2) Online platform: Resilience-related articles and videos are shared through a WeChat group platform, promoting interaction between parents and the school and sharing tips and experiences on resilience development. When selecting materials, we focused on the psychological developmental stages and learning characteristics of adolescents. All intervention materials were reviewed by

**Fig. 1** Research flowchart

psychological experts and educators to ensure they were appropriate for the cognitive level and emotional needs of the target population.

Family level:

(1) Parent behavior checklist: After each group counseling session, parents will receive printed materials related to the corresponding unit to help them understand the content of the school activities. They will also complete a behavior checklist to ensure family members' support and involvement with the adolescents.

(2) Parent-school communication: Regular check-ins and feedback are used to enhance communication between parents and the school, ensuring active parental participation and support.

### Implementation of the intervention program

#### *Experimental group*

This group involves activities on two levels: family and school. The school intervention includes two aspects: group counseling sessions conducted by the researchers and knowledge dissemination through an online platform. The family intervention includes completing a parent behavior checklist in cooperation with the school's group counseling activities and strengthening communication with the school.

Firstly, the school group counseling activities are divided into 7 units. Unit 1: Getting to know each other, understanding resilience. Unit 2: Becoming friends with setbacks (positive cognition). Unit 3: I am the manager of my emotions (emotional control). Unit 4: Unity is strength (interpersonal assistance). Unit 5: Being grateful (family support). Unit 6: Being a ship with direction (goal focus). Unit 7: A better tomorrow (conclusion).

Secondly, knowledge dissemination through an online platform. A WeChat group is established to facilitate communication, discussion, and problem-solving between parents and teachers. The school will post articles and videos in the group weekly, covering topics such as the relationship between resilience and mental health, what resilience is, how to cultivate and enhance children's resilience, effective communication with children, issues in single-parent families, relaxation training techniques, and the development of resilience in children from single-parent families. To avoid potential issues, materials will be sent to the homeroom teacher first, who will then distribute them to the WeChat group, targeting all student families.

Thirdly, family cooperation with school group counseling activities is also divided into 7 units. After each group counseling session, the parents of the participants will receive printed materials related to that unit. These materials will introduce the content covered in the session. Parents are expected to carefully read through these

materials, understand the content, and complete a parent behavior checklist accordingly.

Fourthly, parents are encouraged to enhance communication with the school. It is essential for parents to regularly review and study the resilience-related articles and videos shared by teachers in the group. When facing issues with their child's learning or mental health, parents should seek assistance from teachers and the school through home consultations. Regularly update the school on the child's performance at home and provide feedback on their behavior at home. By establishing effective communication channels with the school and teachers, parents can stay informed about their child's mental health issues, enabling collaborative intervention between the school and home to foster better development of the child's resilience. Detailed information on the school group counseling activity materials and the parental behavior checklist can be found in the supplementary materials. Figure 2 provides detailed information about the intervention design.

To ensure the internal validity of this study, a pre-test and post-test design with a control group was implemented, and all interventions were standardized under the supervision of trained psychologists. Additionally, the credibility of the parental behavior checklist was tested, and its reliability was assessed using Cronbach's  $\alpha$  coefficient, confirming the internal consistency of the scale. To enhance external validity, participants were recruited from diverse backgrounds, interventions were conducted in real-world school settings, and follow-up assessments were included to examine the sustainability of the effects.

#### *Control group*

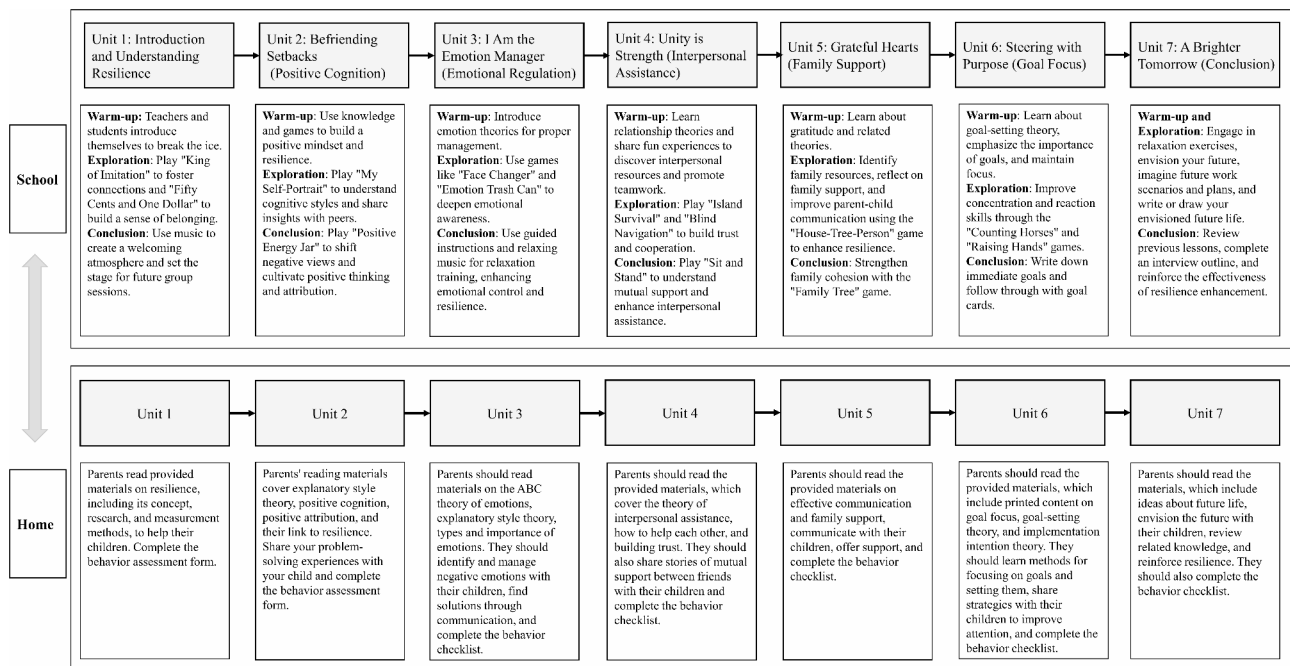
The students in the control group did not receive any intervention and continued their studies and daily life according to the usual school and family arrangements. Based on ethical considerations and as a gesture of gratitude, after the completion of all interventions for the experimental group, the control group received a single mental health lesson covering theoretical knowledge related to psychological resilience, including the concept of resilience and methods for enhancing it.

#### *Measure*

Adolescent Psychological Resilience Scale.

The Adolescent Psychological Resilience Scale, developed by Hu and Gan, is a widely recognized indigenous scale in China [15]. The scale consists of 27 items, encompassing five dimensions: goal focus, interpersonal assistance, family support, emotional control, and positive cognition. It employs a 5-point scoring system, where higher scores indicate greater psychological resilience in adolescents. The Cronbach's  $\alpha$  was 0.86 for this scale in the pre-test.





**Fig. 2** Detailed elaboration of Home-School Collaboration Strategies

### Parental Behavior Checklist.

The study utilized a self-developed Parental Behavior Checklist to evaluate the level of parental involvement in adolescents' growth, focusing on five areas: goal focus, interpersonal assistance, family support, emotional control, and positive cognition. The assessment scale comprises seven units, with Units 2 through 6 corresponding to the aforementioned five dimensions. Units 1 and 7 address daily involvement. The scale uses a 5-point scoring system, where higher scores indicate better parental involvement. The Cronbach's  $\alpha$  coefficients for the individual units range from 0.71 to 0.94, with an overall Cronbach's  $\alpha$  coefficient of 0.97 for the entire scale. Detailed information about the Parental Behavior Checklist can be found in the supplementary materials.

### Statistical analyses

The data analysis was performed using SPSS version 20.0 software. First, an independent samples t-test was used to analyze the resilience scores of the pre-test for both groups of students from single-parent families. Second, a t-test was conducted to examine the differences in resilience between the post-test of the experimental group and the post-test of the control group, as well as between the pre-test and post-test of the control group. Third, an analysis of variance (ANOVA) was employed to analyze the differences in resilience scores among the experimental group's pre-test, post-test (T1), and follow-up test (T2), followed by post-hoc tests (LSD).

**Table 1** Analysis of resilience differences between the experimental and control groups before the intervention in single-parent children

Variables	Pre-Test for the Control Group (n = 20)	Pre-Test for the Experimental Group (n = 20)	t	P
Goal focus	2.53 ± 1.01	2.39 ± 0.66	0.52	0.606
Emotional control	1.98 ± 0.64	2.03 ± 0.95	-0.20	0.846
Positive cognition	2.83 ± 0.92	2.59 ± 0.94	0.81	0.424
Family support	2.36 ± 0.98	2.54 ± 0.86	-0.63	0.534
Interpersonal assistance	2.42 ± 0.73	2.40 ± 0.84	0.07	0.947
Overall mean score of resilience	2.39 ± 0.35	2.37 ± 0.46	0.11	0.914

### Results

#### Homogeneity test prior to intervention

Table 1 provides the mean and standard deviation of resilience for single-parent families children in the intervention and control groups before the intervention.

The results of the independent samples t-test indicate that, prior to the intervention, there were no significant differences in overall mean score of resilience and their respective dimensions between students from single-parent families in the experimental group and those in the control group ( $p > 0.05$ ). This suggests that before the intervention, the resilience levels of students from single-parent families in both the experimental and control

groups were comparable and did not differ, which meets the requirements for an intervention experiment.

### Test of hypotheses

To test Hypothesis 1, which posits that students in the experimental group would exhibit significantly higher resilience gains compared to the control group after the intervention, we employed an independent samples t-test to examine the difference in gain scores between the experimental and control groups at the post-test (T1). The results indicated that at T1, the gain scores in the experimental group were consistently higher than those in the control group (see Table 2 for details). Consequently, Hypothesis 1 is supported.

The study further used a paired t-test to examine the difference in resilience scores for the control group between the pre-test and post-test (T1). Table 3 showed that there was no significant difference in the resilience scores of the control group between the pre-test and post-test (T1). Therefore, this finding further supports Hypothesis 1 from another perspective.

To test Hypothesis 2, which asserts that the resilience improvements in the experimental group are maintained throughout the follow-up survey period, we utilized repeated measures ANOVA to compare the resilience scores at the follow-up test (T2) of the experimental group with their scores at the pre-test and the post-test (T1).

Firstly, the scores of students from single-parent families showed significant differences ( $p < 0.05$ ) across the overall resilience mean scores and the five dimensions at the pre-test, post-test (T1), and follow-up test (T2).

Post hoc analysis revealed the following results (see Tables 4 and 5 for details):

(1) Between the pre-test and T1, significant differences ( $p < 0.05$ ) were observed among students from single-parent families in goal focus, emotional control, positive cognition, family support, interpersonal assistance, and overall resilience mean scores. Specifically, the scores for goal focus, emotional control, positive cognition, family support, interpersonal assistance, and overall resilience at T1 were significantly higher than the pre-test scores.

(2) Between the pre-test and T2, significant differences ( $p < 0.05$ ) were observed among students from single-parent families in goal focus, family support, and overall resilience mean scores. Specifically, the scores for goal focus, family support, interpersonal assistance, and overall resilience at T2 were significantly higher than the pre-test scores. However, no significant differences ( $p > 0.05$ ) were found between the pre-test and T2 in the dimensions of emotional control and positive cognition.

(3) Between T1 and T2, no significant differences ( $p > 0.05$ ) were observed among students from

**Table 2** Analysis of resilience differences between the experimental and control groups post-intervention in single-parent children

Variables	Post-test (T1) for the experi- mental group (n = 20)	Post-test (T1) for the control group (n = 20)	t	p
Goal focus	3.25 ± 0.68	2.63 ± 0.91	2.43	0.020
Emotional control	2.76 ± 1.16	2.18 ± 0.48	2.04	0.052
Positive cognition	3.39 ± 0.84	3.08 ± 0.80	1.21	0.234
Family support	3.10 ± 0.72	2.63 ± 0.91	1.83	0.075
Interpersonal assistance	2.88 ± 0.97	2.68 ± 0.74	0.73	0.469
Overall mean score of resilience	3.00 ± 0.54	2.61 ± 0.45	2.52	0.016

**Table 3** Analysis of resilience differences between the Pre-test and Post-test (T1) in the control group of single-parent children (n = 20)

Variables	Pre-test	Post-test (T1)	t	p
Goal focus	2.53 ± 1.01	2.63 ± 0.91	0.35	0.728
Emotional control	1.98 ± 0.64	2.18 ± 0.48	1.18	0.245
Positive cognition	2.83 ± 0.92	3.08 ± 0.80	0.94	0.352
Family support	2.36 ± 0.98	2.63 ± 0.91	0.94	0.352
Interpersonal assistance	2.42 ± 0.73	2.68 ± 0.74	1.14	0.261
Overall mean score of resilience	2.39 ± 0.35	2.61 ± 0.45	1.73	0.092

**Table 4** Analysis of resilience differences from pre-test to post-test (T1) to follow-up test (T2) in the experimental group of single-parent children (n = 20)

Variables	Pre-test	Post-test (T1)	Follow-up test (T2)	F	p
Goal focus	2.39 ± 0.66	3.25 ± 0.68	3.03 ± 0.87	7.287	0.002
Emotional control	2.03 ± 0.95	2.76 ± 1.16	2.51 ± 0.97	3.284	0.048
Positive cognition	2.59 ± 0.94	3.39 ± 0.84	3.09 ± 0.86	4.323	0.020
Family support	2.54 ± 0.86	3.10 ± 0.72	2.96 ± 0.63	5.603	0.007
Interpersonal assistance	2.40 ± 0.84	2.88 ± 0.97	2.91 ± 0.84	5.093	0.011
Overall mean score of resilience	2.37 ± 0.46	3.00 ± 0.54	2.88 ± 0.48	17.377	0.000

single-parent families in overall resilience mean scores or any of its dimensions.

These findings support Hypothesis 2.

### Data analysis of single-parent family parent behavior checklist

The Parent Behavior Checklist uses a 5-point scoring method, with higher scores indicating greater parental involvement in home-school collaboration interventions. Descriptive statistical analysis revealed an overall score of 2.77 ( $M < 3$ ). The scores for each unit were as follows:



**Table 5** Multiple comparison analysis of pre-test, post-test (T1), and follow-up test (T2) for the experimental group of single-parent children (n = 20)

Variables	Group	Group	p
Goal focus	Pre-test	T1	0.000
		T2	0.035
		T1	0.357
Emotional control	Pre-test	T1	0.033
		T2	0.153
		T1	0.267
Positive cognition	Pre-test	T1	0.001
		T2	0.137
		T1	0.292
Family support	Pre-test	T1	0.002
		T2	0.043
		T1	0.409
Interpersonal assistance	Pre-test	T1	0.021
		T2	0.025
		T1	0.845
Overall mean score of resilience	Pre-test	T1	0.000
		T2	0.001
		T1	0.195

**Table 6** Data analysis of Single-Parent family parent behavior checklist

Unit course	M	SD
Mean score for Unit 1	2.74	0.92
Mean score for Unit 2	2.84	1.23
Mean score for Unit 3	2.68	1.25
Mean score for Unit 4	2.57	1.11
Mean score for Unit 5	3.03	1.34
Mean score for Unit 6	2.94	1.24
Mean score for Unit 7	2.62	1.37
Overall mean score	2.77	1.03

Unit 1, Unit 2 (Positive Cognition), Unit 3 (Emotional Control), Unit 4 (Interpersonal Assistance), Unit 5 (Family Support), Unit 6 (Goal Focus), and Unit 7 scored 2.74, 2.84, 2.68, 2.57, 3.03, 2.94, and 2.62, respectively (see Table 6 for details).

Discussion

This study investigates the impact of home-school collaborative intervention strategies on the resilience of single-parent adolescents and children in China. The findings indicate that such interventions significantly enhance the resilience of these young individuals. The results support our initial hypothesis and have sparked discussions on the broader implications of these findings.

Experimental group shows greater resilience increase after intervention

The results show that the experimental group had significantly higher resilience gains post-intervention compared to the control group, providing strong support

for Hypothesis 1. Specifically, the experimental group exhibited significant improvements in dimensions such as goal focus, emotional control, and overall mean score of resilience, suggesting that the intervention was effective in enhancing resilience among children from single-parent families. It is worth noting that the pre- and post-test (T1) analysis of the control group revealed no significant changes in their resilience levels, indicating that, without any intervention, the students’ resilience remained relatively stable and did not undergo substantial changes. This further corroborates the effectiveness of the intervention—suggesting that the improvements in the experimental group were not the result of natural development, but rather the gain effects produced by the systematic intervention.

From a cultural perspective, Chinese families and schools play a significant role in children’s growth and education, especially the collaborative efforts between home and school, which cannot be overlooked in the educational process [31]. For children from single-parent families, the lack of support and emotional regulation from both parents may make them more vulnerable when facing adversity and stress [1]. Therefore, in this context, home-school collaboration interventions are particularly crucial. By fostering close cooperation between schools and families, students can receive more emotional support, social resources, and cognitive guidance, all of which contribute to enhancing their resilience [25]. For instance, the improvements in goal focus and emotional control in home-school collaborative interventions result from the combined efforts of professional support provided by schools and emotional support from families. These interventions play a positive role in boosting the self-confidence and coping abilities of children from single-parent families when facing life challenges.

Related research also indicates that home-school collaboration has a significant effect on enhancing children’s psychological resilience. Twum-Antwi et al. highlight that the interaction between schools and families effectively promotes students’ emotional control and social adaptability, which is crucial for children to demonstrate stronger resilience when facing challenges [32]. He further suggests that home-school collaboration interventions provide essential support for children from single-parent families, helping them develop effective coping strategies in adversity [25]. Moreover, research has shown that the cooperation between schools and families not only plays a role in emotional support but also helps guide children in forming a healthy mindset and positive behavioral patterns through shared educational goals and consistent behavioral norms [33]. These findings strongly support the conclusions of the current study.

In conclusion, the increase in resilience observed in the experimental group reflects the positive effects of

the home-school collaboration intervention, particularly in areas such as goal focus and emotional control. This indicates that systematic interventions can effectively enhance students' psychological resilience. This result is not only closely related to the cultural emphasis on education but also supported by previous research, further validating the unique role of home-school collaboration in enhancing children's resilience.

#### **Resilience improvement in experimental group students sustained in follow-up**

The research results indicate that the home-school collaboration intervention has a significant effect on enhancing the psychological resilience of students from single-parent families, and this improvement was maintained in subsequent assessments after the intervention. Specifically, compared to pre-intervention scores, the experimental group students showed significant improvements in goal focus, emotional control, positive cognition, family support, interpersonal assistance, and overall psychological resilience at the post-test (T1). In the follow-up test (T2), goal focus, family support, interpersonal assistance, and overall psychological resilience scores remained significantly higher than pre-intervention levels. However, emotional control and positive cognition scores did not continue to improve compared to T1. This suggests that the effects of the intervention can be maintained for a longer period in some areas, while improvements in emotional control and positive cognition may require more prolonged reinforcement or further intervention.

These findings validate Hypothesis 2, indicating that the psychological resilience improvements in the experimental group students were stable during the follow-up assessments. Specifically, there were no significant differences between the scores of the psychological resilience dimensions in T1 and T2, suggesting that the resilience improvements achieved after the intervention did not weaken over time. This phenomenon indicates that the positive impacts of home-school collaboration interventions have a certain degree of durability, forming relatively stable positive effects in the students' psychological development.

First, students from single-parent families have relatively weaker support systems and face greater psychological adaptation challenges [34]. Home-school collaboration interventions strengthen the connection between family and school, providing students with an additional social support network, which effectively promotes improvements in goal focus, interpersonal assistance, and overall psychological resilience. Secondly, the socio-cultural emphasis on group belonging and collectivism leads individuals to rely more on external support systems [35]. Research shows that when social support

is sufficient, psychological resilience is more likely to strengthen [36]. This study found that family support and interpersonal assistance remained significantly higher at T2 compared to pre-intervention, indicating that the home-school collaboration intervention created a stable support network, allowing students to continue benefiting from it. Moreover, Chinese families and schools generally emphasize goal orientation, with parents and teachers encouraging students to set clear goals and maintain focus. This study found that the improvement in goal focus remained significant at T2, which may be related to the long-term reinforcement from both family and school.

However, the phenomenon of reduced improvement in emotional control and positive cognition at T2 may be associated with the phased nature of the intervention. The home-school collaboration intervention initially enhanced these abilities quickly through group counseling and cognitive training, but long-term maintenance requires more continuous psychological support mechanisms. Research suggests that in a cultural context that emphasizes academic performance, students' daily application of emotional regulation skills may be affected by academic stress [37]. Furthermore, the sustained increase in overall mean score of resilience indicates that, even though some dimensions experienced fluctuations, systematic interventions can still effectively integrate protective factors, leading to a comprehensive enhancement of psychological resilience.

In summary, this study not only confirms the immediate impact of home-school collaboration interventions on enhancing the psychological resilience of students from single-parent families but also reveals the unique and lasting advantages of such interventions within the Chinese educational ecosystem.

#### **Parental involvement in home-school collaboration**

The evaluation of parental behavior in home-school collaboration interventions shows that single-parent families exhibit domain-specific differences when participating in home-school co-education activities. Specifically, parents are more involved in goal focus and family support, while their investment in promoting children's emotional control and interpersonal assistance is relatively lower. This suggests that parents tend to focus more on their children's academic development during the intervention, while there are still shortcomings in providing emotional support and fostering social skills.

This phenomenon is closely related to socio-cultural factors. In the context of family education beliefs, parents generally view academic achievement as the core of their children's development and, therefore, tend to provide more academic support [38], while placing relatively less emphasis on social skills and emotional management.

Additionally, the traditional division of family roles influences the way parents engage in their children's growth, leading them to focus more on providing basic support rather than deeply participating in the development of psychological and social skills.

In conclusion, the home-school collaboration intervention has been somewhat effective in promoting parents' focus on their children's academic goals, but there is still room for improvement in enhancing emotional management and social support. Future interventions should strengthen parental training to help parents recognize the importance of emotional support and social guidance for their children's overall development, thereby increasing their holistic involvement and helping children establish a more balanced developmental model.

### **Strengths and limitations**

This study has three key advantages. First, it used a randomized controlled design to ensure that differences in outcomes were primarily due to the intervention. Second, it considers both family and school factors, validating the crucial role of home-school collaboration in enhancing the resilience of single-parent adolescents and children. Third, the study focused on single-parent adolescents and children, recognizing their unique challenges. This intervention program is expected to enhance their resilience.

However, the study also has some limitations. Firstly, the sample size is relatively small, encompassing only one school, so caution is needed when generalizing the results. Future research should include larger and more diverse samples to ensure broader applicability. Secondly, in terms of family coordination in school-based interventions, this study focuses on the cooperative engagement of single-parent families. It lacks an investigation into the daily communication between single parents and teachers, and their collaborative efforts in fostering children's resilience prior to the intervention. Future research should thoroughly examine the changes in communication patterns of single-parent families before and after the implementation of intervention measures. Thirdly, the intervention group spent more time on structured activities compared to the control group, which may have contributed to the differences in resilience observed between the groups. Future studies should consider this factor and examine the role of time investment in intervention outcomes.

### **Educational implications**

This study not only reveals the effectiveness of home-school collaborative interventions in enhancing the resilience of students from single-parent families but also holds significant implications for educational policy, educational practice, and future research directions.

Firstly, at the school level, schools play a crucial role in facilitating home-school collaboration and should establish effective communication mechanisms to avoid superficial coordination. First and foremost, schools should improve home-school collaboration mechanisms, prioritizing the mental health and resilience development of students from single-parent families. Schools should create environments conducive to building resilience, such as organizing motivational storytelling sessions and stress-resistance activities, forming teams of professional educators, developing relevant curricula, and establishing resilience screening mechanisms to regularly assess students' conditions and devise personalized intervention plans. Secondly, schools should shift their educational philosophies to align with parents' educational goals and encourage parental participation in school activities by establishing feedback mechanisms to ensure that every student from a single-parent family receives attention and support. Furthermore, schools should recognize the diverse needs of single-parent students and provide necessary educational support, such as psychological counseling and academic assistance. By enhancing family education guidance, schools can help improve parents' educational philosophies and methods.

Secondly, at the family level, the family serves as a crucial external protective factor in the construction of a child's resilience. Parents should provide emotional support to lay the foundation for their child's resilience development. In daily life, parents should act consistently, support their children in expressing their emotions, and encourage them to take proactive actions when facing setbacks. Parents also need to give their children ample attention and companionship to strengthen family cohesion, influence their children with positive emotions, and guide them using scientific methods. Furthermore, parents should recognize that they are their child's first teachers and avoid over-relying on school education. They should actively participate in home-school activities and maintain cooperation with the school to jointly create an environment that enhances their child's resilience.

Thirdly, at the individual level, students from single-parent families should learn to manage their emotions and enhance self-awareness. They need to correctly understand their negative emotions and effective management techniques, actively participate in emotional management activities, and learn methods to regulate adverse emotions. Additionally, children from single-parent families should strengthen interpersonal collaboration to improve their resilience. They should proactively participate in school activities, such as group competitions and speech contests, to enhance their interpersonal and communication skills, overcome feelings of inferiority, build self-confidence, enrich their school life,

and experience the care and support of the community, thereby promoting the improvement of their resilience.

## Conclusion

This study implemented a 7-week home-school collaborative intervention strategy, effectively enhancing the resilience of adolescents from single-parent families. The positive effects of the intervention remained stable for a period after its conclusion. The preliminary results are encouraging, and future research will test the effectiveness of this intervention in larger randomized controlled trials.

## Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12889-025-22662-y>.

Supplementary Material 1

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## Author contributions

MP: Contributed to the detailed discussions of the experimental design, interpreted and discussed the experimental results, assisted in the initial drafting of the manuscript, and participated in the final review of the manuscript. BRD: Responsible for the overall conception of the experimental design and the initial drafting of the manuscript. YJH: In charge of data collection and analysis, conducted multiple revisions and improvements to the manuscript.

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## Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

## Declarations

### Ethics approval and consent to participate

This study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of Yancheng Teachers University. Written informed consent was obtained from the parents or legal guardians of all participants under the age of 16. Additionally, assent was obtained from the participants themselves, ensuring that they were adequately informed about the study and their participation.

### Consent for publication

Not applicable.

### Competing interests

The authors declare no competing interests.

### Submission declaration

The authors declare that the submitted article has not been published previously, that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere including electronically in the same form, in

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