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# Self-esteem mediated relations between loneliness and social anxiety in Chinese adolescents with left-behind experience

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Although research examining loneliness and social anxiety has been conducted, few studies have explored pathways from loneliness at home to social anxiety at school in Chinese left-behind children. The study attempts to explore associations between loneliness at home and social anxiety at school and to examine roles of self-esteem in those relationships among a sample of Chinese left-behind children. Data were collected from 303 left-behind children, aged 10–14 years, and the Chinese versions of Children's Loneliness Scale, Social Anxiety Scale, and Rosenberg Self-esteem Scale were used to measure loneliness at home, social anxiety at school, and self-esteem, respectively. Results showed that loneliness at home was positively associated with social anxiety at school; self-esteem played a partial mediation role in associations between loneliness at home and social anxiety at school. Findings suggest that high levels of self-esteem may influence pathways from loneliness at home to social anxiety at school in Chinese left-behind children, and increasing levels of self-esteem may be used in preventions for loneliness of Chinese left-behind children.

## KEYWORDS

loneliness, social anxiety, self-esteem, left-behind children, mediating effect

## Introduction

With the acceleration of urbanization in China, more and more young adults leave the land to find work in towns and cities which leads to some social problems. Typically, left-behind children whose mother or father or both parents leave the countryside to work in towns and cities for more than 6 months are a special group of children that needs much more attention (Fan et al., 2018). Millions of children have been left behind in countryside each year (Fan et al., 2017), and left-behind experiences is related to many aspects of child development in short-and long-terms (Qi and Yang, 2020; Shao and Zhang, 2020), such as, behavior problems (e.g., Yang and Huang, 2022), peer relationships (e.g., Xie et al., 2020), and attention bias (e.g., Yang and Chen, 2017).

In light of both the basic and applied value of a clearer account of how left-behind experiences is related to child development, studies which explore pathways from family

life to school life of left-behind children need further exploration. Notably, extensive research has suggested that left-behind children felt much more loneliness (e.g., Ren et al., 2020) and social anxiety (Li M. et al., 2020) than children without left-behind experiences, and loneliness was associated with social anxiety (Alyson and Cheryl, 2015; Baytemirand and Yildiz, 2017; Chen et al., 2021). Moreover, a growing body of studies have indicated that self-esteem was related to loneliness (e.g., Yildiz and Karadaş, 2017) and social anxiety (e.g., Abdollahi and Talib, 2016). However, few studies have explored relationships between loneliness at home, social anxiety at school, and self-esteem in left-behind children.

The attachment theory posits that patterns of relationships between parent (s) and child may be generalized to other relationships or situations (Crittenden, 1985), which may provide a framework for exploring studies in left-behind children. Specifically, lack interactions between parents and left-behind children may contribute to high levels of loneliness at home (Zhao et al., 2021), which may influence the levels of self-esteem (Feng et al., 2019), and in turn, lead to high levels of social anxiety at school (Chen et al., 2021). Therefore, we attempt to explore pathways from loneliness at home to social anxiety at school and to examine roles of self-esteem in those pathways in Chinese left-behind children.

## The relationships between loneliness and social anxiety

Loneliness is an enduring condition of emotional distress, which influenced by lacking interactions and supports with/from parents or others (Zhang, 2011; Alkan, 2014; Stickley et al., 2015). Left-behind children may have less interactions with parents (Fan et al., 2016), and other family members (e.g., grandparents) may not provide psychological supports for children (Li et al., 2013), which may contribute to high levels of loneliness (Li J. et al., 2021). Social anxiety, as a developmental maladaptation, contains emotional and behavior problems, such as over anxious about communicating with strange others, which typically occurs in early-to mid-adolescence (Fehm et al., 2005). Left-behind children may suffer high levels of social anxiety during childhood (Li et al., 2019).

Meanwhile, associations between loneliness and social anxiety in left-behind children have been explored by a growing body of studies. For example, Duan (2014) found that loneliness was positively associated with social anxiety in 187 Chinese left-behind children. Wang and Yao (2020) confirmed these results in 442 Chinese left-behind children. Children with left-behind experiences have less interactions with parent (s), which may contribute to loneliness at home (Fan and Wu, 2020), and loneliness in family life may spread to school life, which may increase the levels of social anxiety at school (Yuan et al., 2014; Li and Ran, 2018). However, few

studies have explored relationships between loneliness at home and social anxiety at school in left-behind children. Therefore, the current study attempts to explore relationships between loneliness at home and social anxiety at school in a sample of Chinese left-behind children. We hypothesize that loneliness at home is positively associated with social anxiety at school in a sample of Chinese left-behind children.

## Self-esteem as a mediator

The relationships between loneliness and self-esteem have been explored by a growing body of studies. For example, Li L. et al. (2021) found that loneliness was negatively associated with self-esteem in a sample of Chinese children. Song et al. (2017) also found loneliness was negatively associated with self-esteem in a sample of Chinese left-behind children, and Chen and Yu (2022) confirmed these relationships in a sample of overseas Chinese left-behind children.

Moreover, some studies have found relationships between self-esteem and social anxiety. For example, Wu et al. (2020) found that self-esteem was negatively associated with social anxiety with a sample of Chinese high school students. You et al. (2019) confirmed these relationships based on a sample of Chinese college students. Meanwhile, Wang et al. (2008) reported self-esteem was negatively associated with social anxiety in Chinese left-behind children.

Although the associations between loneliness, self-esteem, and social anxiety have been explored by previous studies, few studies have explored roles of self-esteem in the relationships between loneliness and social anxiety, particularly in a sample of Chinese left-behind children. Left-behind children may have less interactions with parents that may contribute to high levels of loneliness at home, which may contribute to low levels of self-esteem, and these low levels of self-esteem may spill over to school life which contribute to high levels of social anxiety at school. We hypothesize, thus, that self-esteem mediates the relationships between loneliness at home and social anxiety at school in Chinese left-behind children.

## The current study

Although the associations among loneliness, social anxiety, and self-esteem have been explored by extensive studies, pathways from loneliness at home to social anxiety at school in Chinese left-behind children need further exploration. Moreover, left-behind children is an important issue for social development in China, which may raise the importance for exploring Chinese left-behind children. Therefore, the current study attempts to explore relationships between loneliness at home and social anxiety at school and to examine roles of self-esteem in those relationships in a sample of Chinese left-behind children, which may confirm the spillover effects of family life. We hypothesize that loneliness at home is positively associated with social anxiety at school, and self-esteem mediates relationships between loneliness at home and social anxiety at school among Chinese left-behind children.

## Materials and methods

### Participants

A total of 303 left-behind children whose father or mother or both parents were not live with them for over 6 months were recruited from two primary schools in Jiangsu Province, China, with a convenience sampling. Of those participants, 49.8% of them were girls ( $n=151$ ). The mean age was 11.68 years ( $SD=0.83$ ), with a range of 10–14 years. The detailed demographic information of participants is presented in Table 1.

### Measures

Children's Loneliness Scale (CLS). The CLS, developed by Asher et al. (1984), is a 16-item self-reported scale used to access loneliness for children (e.g., *It is hard for me to make friends*). The way of scoring each response is a 5-point scale (from 1 = *never* to 5 = *always*). Individuals who get high score of this scale may have high levels of loneliness. The Chinese version of CLS was administered in the current study to access loneliness at home (Wang et al., 1999), and the Cronbach's Alpha of this scale was.82 in the present study. According to the item parching (Bian

et al., 2007) which is used to make better fit for the models, the scale of loneliness was to broken into 4 parts based on factor analysis, loneliness 1 (LO1), loneliness 2 (LO2), loneliness 3 (LO3) and loneliness 4 (LO4).

Social Anxiety Scale for Children (SASC; La Greca et al., 1988). The SASC is a 10-item self-reported tool to access social anxiety for children, including subscales of fear of negative evaluation (FNE; e.g., *I am afraid of been teased*) and social avoidance and distress (SAD; e.g., *I feel nervous when taking to strange children*). The way of scoring each response is a 3-point scale (from 0 = *never* to 2 = *always*). Individuals who get higher scores may suffer higher levels of social anxiety. The Chinese version of SASC was administered in the current study to access social anxiety at school (Ma, 1993), and the Cronbach Alpha of this scale was.73 in the present study.

Rosenberg Self-Esteem Scale (SES). The SES, developed by Rosenberg (1965), is a 10-item self-reported questionnaire used to access self-esteem in this study (e.g., *I have lots of good qualities*). Participants were asked to rate each item on a 4-point scale (from 1 = *very conformity* to 4 = *very inconformity*). Ratings were averaged to form a total score on this measure and individuals who get higher scores have higher self-esteem (SE). The Chinese adaption of the SES was administered in the current study (Ji and Yu, 1999), and the Cronbach's Alpha of this scale was.73 in the present study.

Covariate variables. The demographic variables of participants were controlled using regression analysis during the data analysis, such as gender, grade, the number of children in the family, left-behind type, parents' education years, and family income.

TABLE 1 Demographic information of participants (N=303).

|                         |  | Adolescents with left-behind experience |      |
|-------------------------|--|---|------|
|                         |  | N                                       | %    |
| Gender                  | Male                                   | 152                                     | 50.2 |
|                         | Female                                 | 151                                     | 49.8 |
| Child number            | 1                                      | 95                                      | 31.4 |
|                         | >1                                     | 208                                     | 68.6 |
| Left-behind type        | Mother at home                         | 145                                     | 47.9 |
|                         | Father at home                         | 19                                      | 6.3  |
|                         | Live with grandparents without parents | 139                                     | 3.3  |
|                         |  |   |      |
| Family monthly income   | Less than 1,000                        | 18                                      | 5.9  |
|                         | 1,000 to 3,000                         | 94                                      | 31.0 |
|                         | 3,001 to 5,000                         | 115                                     | 38.0 |
|                         | More than 5,000                        | 76                                      | 25.1 |
| Father's education year | Less than 6 years                      | 53                                      | 17.5 |
|                         | 6 to 9 years                           | 131                                     | 43.2 |
|                         | 9 to 12 years                          | 87                                      | 28.7 |
|                         | More than 12 years                     | 32                                      | 10.6 |
| Mother's education year | Less than 6 years                      | 80                                      | 26.4 |
|                         | 6 to 9 years                           | 125                                     | 41.3 |
|                         | 9 to 12 years                          | 68                                      | 22.4 |
|                         | More than 12 years                     | 30                                      | 9.9  |

Mother at home: children live with mothers only at countryside; father at home: children live with fathers only at countryside; live with grandparents without parents: children live with grandparents without mothers or fathers at countryside.

### Procedure

There were several steps to conduct the current study. First, the first author chose two primary schools in Jiangsu Province with a convenience sampling, and then presented aims and processes of the current study to the headmasters, and received their permission to conduct the current study in their schools. Second, the first author randomly chose two classes for fourth, fifth, and sixth grade, respectively, in each primary school, and totally 12 classes were recruited in the current study. Third, a total of 303 left-behind children finished the questionnaires within 20 min, and all of left-behind children, caregivers, and teachers signed informed consent before data collecting process. All participants have a right to decline participation without any negative influences. Finally, participants received a small gift worth 5 RMB (\$0.75). The study was also approved by the ethics committee of the authors' institution (Code: 202102230004) and materials and process in the current study were safe for participants.

### Data analysis

Before data analysis, normality, missing values, and outliers were examined and the questionnaires with missing data (15%)

were excluded (Davey and Savla, 2010). Pearson correlation analysis and independent *t*-test were done to examine relations among all study variables. All tests were two-tailed for significance, and significance (*p* value) was set at 0.05. Structural equation modeling (SEM) and Bootstrapping Method were performed to examine relationships and mediating models among all variables. The goodness of model fit was accessed using chi-square statistics ( $\chi^2/df$ ), Root Mean Square Error of Approximation (RMSEA), and Standardized Root-Mean-Square Residual (SRMR). Fit indexes were the Comparative Fit Index (CFI), Goodness of Fit Index (GFI), the Relative Fit Index (RFI), Normed Fit Index (NFI), and Tucker Lewis Index (TLI). A  $\chi^2/df$  (degrees of freedom) less than 3 is considered a good fit; less than or equal to 5 indicates an acceptable fit. Moreover, CFI, TLI, GFI, NFI, and RFI values of .90 or higher indicate a good fit. RMSEA and SRMR values of less than 0.08 are considered a close fit and values less than .05 indicate a good fit (Kline, 2011).

## Results

### Descriptive analysis

Descriptive statistics and correlations are presented in Table 2. Loneliness at home was positively correlated with social anxiety at school ( $r=0.47$ ,  $p<0.01$ ); self-esteem was negatively correlated with loneliness at home and social anxiety at school ( $r=-0.43$ , and  $r=-0.34$ ,  $p<0.01$ ). Additionally, the common method variance did not influence the result in the current study ( $17.51\%<40\%$ ).

### The relationships between loneliness at home and social anxiety at school

Average scores were used to determine structures of loneliness at home, social anxiety at school, and self-esteem, and all coefficients were standardized estimates. SEM was used to make

TABLE 2 Means, standard deviations, and correlations between study variables (N=303).

| Variables         | M    | SD   | 1       | 2       | 3 |
|-------------------|------|------|---------|---------|---|
| 1. Loneliness     | 2.04 | 0.54 |         |         | 1 |
| 2. Social anxiety | 1.54 | 0.36 | 0.47**  |         |   |
| 3. Self-esteem    | 2.89 | 0.42 | -0.43** | -0.34** |   |

\*\* $p<0.01$ .

TABLE 3 Model fit indexes.

|                 | $\chi^2/df$ | SRMR | RMSEA | GFI  | NFI  | RFI  | IFI  | TLI  | CFI  |
|-----------------|-------------|------|-------|------|------|------|------|------|------|
| Direct model    | 2.93        | 0.02 | 0.06  | 0.97 | 0.96 | 0.92 | 0.97 | 0.94 | 0.97 |
| Mediation model | 2.40        | 0.01 | 0.05  | 0.97 | 0.95 | 0.91 | 0.97 | 0.95 | 0.97 |

a direct model which to measure relationships between loneliness at home and social anxiety at school. The results indicated that loneliness at home was positively associated with social anxiety at school in left-behind children ( $\beta=0.65$ ,  $SE=0.07$ ,  $C.R.=7.13$ ,  $p<0.001$ ). All model fit indexes were acceptably (see Table 3).

### Mediating effect of self-esteem in relationships between loneliness at home and social anxiety at school

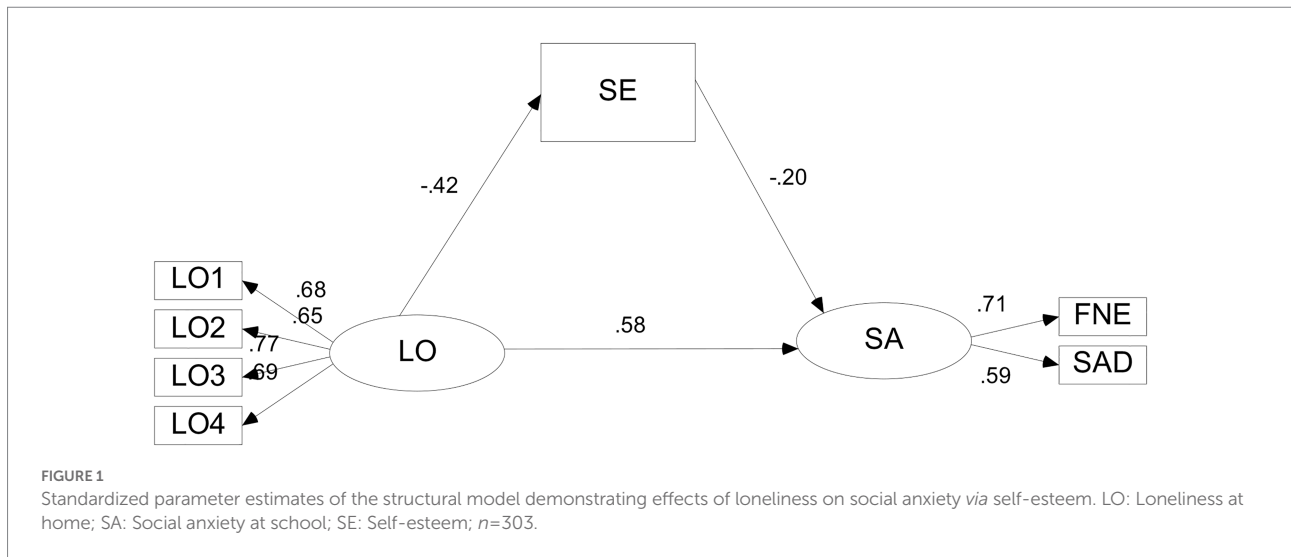
The mediation analysis has two steps according to Wen and his colleagues (Wen et al., 2005). One step is to develop a direct model; the second step is to develop a mediation model which input the mediator into the direct model. As we had noted above, the direct model between loneliness at home and social anxiety at school in left-behind children was verified. Then the mediation model was developed with Bootstrapping Method Bias-corrected percentile method. The SEM results showed that structural models provided acceptable good fit to the data (see Table 3) and the SEM results indicating relationships between variables are presented in Figure 1.

In the mediation model, loneliness at home was positively associated with social anxiety at school ( $\beta=0.58$ ,  $p<0.001$ ) and negatively associated with self-esteem ( $\beta=-0.42$ ,  $p<0.001$ ). Self-esteem was negatively associated with social anxiety at school ( $\beta=-0.20$ ,  $p<0.001$ ). The results of Bias-corrected percentile method showed that the 95% confidence intervals (CI) of indirect effects was [0.02, 0.10], and the 95% CI of direct effects was [0.31, 0.49]. Self-esteem partial mediated relationships between loneliness at home and social anxiety at school among left-behind children.

## Discussion

The current study explored relationships between loneliness at home and social anxiety at school and examined roles of self-esteem in those relationships in a sample of Chinese left-behind children, which may broaden studies of left-behind children and provide suggestions for protecting left-behind children. The results showed that loneliness at home was positively associated with social anxiety at school and self-esteem partial mediated those relationships in Chinese left-behind children.

The results showed that loneliness at home was positively associated with social anxiety at school in Chinese left-behind children, which were consistent with previous studies (Yuan et al.,



2014). Left-behind children who have less interactions between parents may have high levels of loneliness at home and less communication skills (Zhan and Chen, 2013), which may estrange themselves from others at school, in turn, may increase the levels of social anxiety in school lives (Li and Ran, 2018). Meanwhile, according to attachment theory, left-behind children who have less interactions with parents may have biased attachment patterns (e.g., unsecure attachment; Zou et al., 2022), which may influence internal working models about self and others and resource control strategies (Chen and Chang, 2012), in turn, contribute to high levels of social anxiety at school. These findings suggest that experiences in family, such as left-behind experiences, may influence individuals' school life (e.g., social anxiety; Chang and Lu, 2018).

Moreover, the results showed that self-esteem partial mediated relationships between loneliness at home and social anxiety at school in Chinese left-behind children, which were in lined with our hypothesis. Less interactions with parents may contribute to high levels of loneliness in left-behind children and left-behind children with high levels of loneliness may feel high levels of personal discrimination (Miao et al., 2015), which may contribute to low levels of self-esteem (Li L. et al., 2020), and these levels of self-esteem may increase the levels of social anxiety at school life. Further, interactions with parents may influence development of self-esteem, which suggests that left-behind experiences may impair self-esteem, and the impaired self-esteem may contribute to high levels of social anxiety at school. These findings suggest that loneliness not only has direct effects on social anxiety, but also has indirect effects on it via self-esteem in Chinese left-behind children.

The implications of these findings are significant, underscoring the role self-esteem involved in adjustment of left-behind children and pointing to potentially modifiable mechanisms. Specifically, increasing the levels of self-esteem may reduce levels of social anxiety at school in left-behind children. For example, teachers may give more supports for left-behind children, which may raise

their skills for interpersonal communication. Moreover, strengthening relationships within peers may increase self-esteem of children with left-behind experiences (Xie et al., 2020). Additionally, we should pay attention to left-behind children, and call for parents giving children the high quality of companion.

Several limitations should be acknowledged in this study. First, self-reported scales were only used to measure all variables in the present study, which may contribute to the biased information from the participants; several approaches should be applied to collect data in future research to ensure the accuracy of the information, such as experiments, questionnaires or interviews. Second, cross-sectional design was used to examine relationships between loneliness at home and social anxiety at school, which may not verify the relations causally. Longitudinal studies should be conducted to confirm the relationships between loneliness at home, social anxiety at school, and self-esteem. Third, the current study did not compare outcomes of children based on kinds of left-behind (e.g., mother or father at home), which may ignore the differences in outcomes based on kinds of left-behind. Future studies should take left-behind types into consideration and provide efficient strategies for protecting left-behind children.

## Conclusion

The current study explored relationships between loneliness at home and social anxiety at school and examined roles of self-esteem in those relationships in a sample of Chinese left-behind children. The results showed that loneliness at home was positively associated with social anxiety at school and self-esteem partial mediated those relationships in Chinese left-behind children. Findings suggest that loneliness not only has direct effects on social anxiety, but also has indirect effects on it via self-esteem in Chinese left-behind children. For example, the government and schools may use strategies to increase levels of self-esteem in left-behind children, which may decrease levels of social anxiety at

school. Moreover, the current study may also broaden the studies of Chinese left-behind children that combination of family and school life, which may provide relative new perspectives for the field of study.

## Data availability statement

The original contributions presented in the study are included in the article/Supplementary materials; further inquiries can be directed to the corresponding author.

## Ethics statement

The studies involving human participants were reviewed and approved by Beijing Normal University. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

## Author contributions

CC designed the study, wrote and revised the introduction and discussion of the manuscript, and completed the data analysis. LH wrote and revised the method and results of the manuscript. All authors contributed to the article and approved the submitted version.

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## References

- Abdollahi, A., and Talib, M. A. (2016). Self-esteem, body-esteem, emotional intelligence, and social anxiety in a college sample: the moderating role of weight. *Psychol. Health Med.* 21, 221–225. doi: 10.1080/13548506.2015.1017825
- Alkan, N. (2014). Humor, loneliness and acceptance: predictors of university drop-out intentions. *Procedia Soc. Behav. Sci.* 152, 1079–1086. doi: 10.1016/j.sbspro.2014.09.278
- Alyson, M. C., and Cheryl, B. (2015). Adolescent loneliness and social anxiety: the role of multiple sources of support. *J. Soc. Pers. Relat.* 33, 149–170. doi: 10.1177/0265407514567837
- Asher, S. R., Hymel, S., and Renshaw, P. D. (1984). Loneliness in children. *Child Dev.* 55:1456. doi: 10.2307/1130015
- Baytemirand, K., and Yildiz, M. A. (2017). Multiple mediation of loneliness and negative effects in the relationship between adolescents' social anxiety and depressive symptoms. *anales de psicologia* 33, 612–620. doi: 10.6018/analesps.33.3.269211
- Bian, R., Che, H., and Yang, H. (2007). Item parceling strategies in structural equation modeling. *Adv. Psychol. Sci.* 15, 567–576. doi: 10.1016/j.conbuildmat.2005.08.001
- Chang, L., and Lu, H. (2018). Resource and extrinsic risk in defining fast life histories of rural Chinese left-behind children. *Evol. Hum. Behav.* 39, 59–66. doi: 10.1016/j.evolhumbehav.2017.10.003
- Chen, B., and Chang, L. (2012). Adaptive insecure attachment and its relationships with resource control strategies during middle childhood. *Int. J. Behav. Dev.* 36, 389–397. doi: 10.1177/0165025412445440
- Chen, X., Li, Z., and Wang, J. (2021). The mediating effect of loneliness and social anxiety in depression and self-esteem. *J. Psychol. Sci.* 44, 199–204. doi: 10.16719/j.cnki.1671-6981.20210128
- Chen, M., and Yu, H. (2022). The relationship between overseas Chinese left-behind children's loneliness, social support and self-esteem. *J. Zhejiang Normal University* 3, 101–110. doi: 1001-5035(2022)03-0100-11
- Crittenden, P. M. (1985). Social networks, quality of child rearing, and child development. *Child Dev.* 56, 1299–1313. doi: 10.2307/1130245
- Davey, A., and Savla, J. (2010). *Statistical power analysis with missing data: A structural equation modeling approach*. United Kingdom: Taylor and Francis Group.
- Duan, B. (2014). On the correlations between loneliness and social anxiety of 3 to 6 grade left-behind children. *J. Ningbo University* 36, 16–19. doi: 10.16165/j.cnki.22.1096/g4.2014.06.001
- Fan, X., Fang, X., Huang, Y., Chen, F., and Yu, S. (2018). The influence mechanism of parental care on depression among left-behind children in China: a longitudinal study. *Acta Psychol. Sin.* 50, 1029–1040. doi: 10.3724/SP.J.1041.2018.01029
- Fan, X., He, M., and Chen, F., Chen, F. (2016). Effect of hope one the relationship between parental care and loneliness in left-behind children in rural china. *Chinese J. Clin. Psychol.* 24, 702–706. doi: 10.16128/j.cnki.1005-3611.2016.04.028
- Fan, Z., and Wu, Y. (2020). Relationship between parent-child relationship, loneliness and depression among the left-behind rural children: gratitude as a

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2022.1014794/full#supplementary-material>

- mediator and a moderator. *Psychol. Dev. Educ.* 36, 734–742. doi: 10.16187/j.cnki.issn1001-4918.2020.06.12
- Fan, X., Yu, S., Peng, J., and Fang, X. (2017). The relationship between perceived life stress, loneliness and general well-being among the left-behind rural children: psychological capital as a mediator and moderator. *J. Psychol. Sci.* 40, 388–394. doi: 10.16719/j.cnki.1671-6981.20170221
- Fehm, L., Pelissolo, A., Furmark, T., and Wittchen, H. U. (2005). Size and burden of social phobia in Europe. *European Neuropsychopharmacology* 15, 453–462. doi: 10.1016/j.euroneuro.2005.04.002
- Feng, D., Gao, W., Liu, X., and Yang, L. (2019). The effect of caregiver rearing style on loneliness of left-behind children: the mediating effect of self-esteem. *J. Suihua University* 39, 140–144. doi: 2095-0438(2019)04-0140-05
- Ji, Y., and Yu, X. (1999). The self-esteem scale. *Chin. Ment. Health J.* 5, 318–320.
- Kline, R. B. (2011). *Principles and practices of structural equation modeling*. United States: The Guilford Press.
- La Greca, A. M., Dandes, S. K., Wick, P., Shaw, K., and Stone, W. L. (1988). Development of the social anxiety scale for children: reliability and concurrent validity. *J. Clin. Child Psychol.* 17, 84–91. doi: 10.1207/s15374424jccp1701\_11
- Li, J., Ding, W., Sun, Z., Xie, R., and Zhang, J. (2021). Parental involvement and loneliness in children: mediating role of self-esteem and peer attachment. *Chin. J. Clin. Psych.* 29, 842–847. doi: 10.16128/j.cnki.1005-3611.2021.04.036
- Li, G., and Ran, Y. (2018). Investigation into the social anxiety of left-behind children under 14 living alone in Guizhou Province. *China J. School Health* 39, 1176–1178. doi: 1000-9817(2018)08-1176-03
- Li, M., Ren, Y., and Jiang, F. (2019). A meta-analysis of social anxiety in left-behind children in rural areas of China. *Chin. Ment. Health J.* 33, 839–345. doi: 10.3969/j.issn.1000-6729.2019.008
- Li, M., Ren, J., and Sun, H. (2020). Social anxiety and the relationship between social support and hope of left-behind children in rural area. *Chin. J. School Health* 41, 904–908. doi: 10.16835/j.cnki.1000-9817.2020.06.028
- Li, L., Wu, H., Zhao, J., Wang, W., Liu, Y., Liang, X., et al. (2020). Mediating role of left-behind children's individual discrimination perception in neglect and self-esteem. *J. North China University of Sci. Technol.* 22, 58–62. doi: 10.19539/j.cnki.2095-2694.2020.01.013
- Li, L., Zhang, F., Qi, Y., Zhang, S., Zhang, S., and Li, W. (2021). Emotional expression and loneliness of left-behind children: mediating effect of parent-child communication and moderating effect of gender. *Chin. J. Health Psychol.* 29, 1756–1781. doi: 10.13342/j.cnki.cjhp.2021.11.032
- Li, Z., Zou, X., and Zhu, P. (2013). The empirical research on competency of rural skip-generation guardian for left-behind children. *Chin. J. Health Psychol.* 21, 422–425. doi: 10.13342/j.cnki.cjhp.2013.03.018
- Ma, H. (1993). Social anxiety scale for children. *Chin. Ment. Health J.* 7, 216–217.
- Miao, L., Xu, X., and Sheng, S. (2015). Association of perception of personal discrimination with coping style among left-behind children. *Chin. J. Public Health* 31, 353–355. doi: 10.11847/zgggws2015-31-03-30
- Qi, Y., and Yang, N. (2020). Withdrawal behavior: mediating and moderating role of resilience. *Xue Qian Jiao Yu Yan Jiu* 2, 41–57. doi: 10.13861/j.cnki.sece.2020.02.004
- Ren, J., Li, M., and Sun, H. (2020). A meta-analysis of loneliness of left-behind children in rural China. *Chin. Ment. Health J.* 34, 841–847. doi: 10.3969/j.issn.1000-6729.2020.10.007
- Rosenberg, M. (1965). *Society and the adolescent self-image*. United States: Princeton University Press.
- Shao, M., and Zhang, Q. (2020). Influence of the parental migration modes on problem behaviors of rural left-behind children. *Chinese J. Child Health Care* 25, 1–6. doi: 10.11852/zgetbjzz2019-1933
- Song, J., Zuo, B., Tan, X., and Dai, Y. (2017). Mediating effect of self-esteem in relationship between parental cohesion, peer acceptance and loneliness in left-behind children. *Chin. Ment. Health J.* 31, 376–380. doi: 10.3969/j.issn.1000-6729.2017.05.008
- Stickley, A., Koyanagi, A., Leinsalu, M., Ferlander, S., Sabawoon, W., and McKee, M. (2015). Loneliness and health in Eastern Europe: findings from Moscow, Russia. *Public Health* 129, 403–410. doi: 10.1016/j.puhe.2014.12.021
- Wang, T., Wang, W., Liu, Z., and Gao, W. (2008). A study on social anxiety and its related factors in left-behind children. *Chinese J. Behavioral Medical Sci.* 17, 910–912.
- Wang, X., Wang, X., and Ma, H. (1999). Manual of assessment of mental health scale. *Chin. Ment. Health J.* 248
- Wang, L., and Yao, J. (2020). Life satisfaction and social anxiety among left-behind children in rural China: the mediating role of loneliness. *J. Community Psychol.* 48, 258–266. doi: 10.1002/jcop.22252
- Wen, Z., Hou, J., and Zhang, L. (2005). A comparison of moderator and mediator and their applications. *Acta Psychologica Sinica* 37, 268–274.
- Wu, X., Qi, J., and Zhen, R. (2020). Bullying victimization and adolescents' social anxiety: roles of shame and self-esteem. *Child Indic. Res.* 14, 769–781. doi: 10.1007/s12187-020-09777-x
- Xie, Q., Zheng, H., Fan, Y., He, F., Quan, X., and Jiang, G. (2020). Perceived discrimination and loneliness and problem behavior of left-behind junior middle school students: the roles of teacher-student relationship and classmates' relationship. *J. Psychol. Sci.* 43, 1355–1361. doi: 10.16719/j.cnki.1671-6981.20200611
- Yang, Y., and Chen, Q. (2017). The attentional bias towards socially rejecting information in left-at-home children. *Chin. J. Spec. Educ.* 8, 61–66.
- Yang, B., and Huang, J. (2022). Relative deprivation and externalizing problem among left-behind children: the mediating role of deviant peer affiliation and the moderating role of parental warmth. *Chin. J. Clin. Psych.* 30, 568–574. doi: 10.16128/j.cnki.1005-3611.2022.03.014
- Yıldız, M. A., and Karadaş, C. (2017). Multiple mediation of self-esteem and perceived social support in the relationship between loneliness and life satisfaction. *J. Educ. Pract.* 8, 130–139.
- You, Z., Zhang, Y., Zhang, L., Xu, Y., and Chen, X. (2019). How does self-esteem affect mobile phone addiction? The mediating role of social anxiety and interpersonal sensitivity. *Psychiatry Res.* 271, 526–531. doi: 10.1016/j.psychres.2018.12.040
- Yuan, Y. B., Jin, C., and Yang, S. (2014). Loneliness and social anxiety of different types rural left - behind children. *Chin. J. Health Psychol.* 22, 1564–1566. doi: 10.13342/j.cnki.cjhp.2014.10.051
- Zhan, H., and Chen, S. (2013). A child discipline study of left-behind children in ethnic areas of Sichuan province. *Educ. Rev.* 16, 114–116.
- Zhang, L. (2011). The influencing factors on loneliness of rural left-behind children. *J. Shangqiu Teachers' Education College* 1, 113–116.
- Zhao, Y., Xing, Q., Long, Y., Sun, W., Liu, Z., and Zhang, X. (2021). Relationship between left-behind children in China loneliness and negative life events. *Maternal and Child Health Care of China* 36, 864–866. doi: 10.19829/j.zgfybj.issn.1001-4411.2021.04.042
- Zou, W., Xie, L., and Wang, H. (2022). Relationship between parent-child attachment and aggressive behavior of left-behind children: an application of latent profile analysis. *China J. Health Psychol.* 30, 703–710. doi: 10.13342/j.cnki.cjhp.2022.05.014