

Self-esteem, Social Support and Coping Strategies of left-behind Children in Rural China, and the Intermediary Role of Subjective Support—a cross-sectional survey

Shu Cui

Anhui Medical University <https://orcid.org/0000-0003-0148-7319>

Fangshuo Cheng

Anhui Medical University

Ling Zhang

Anhui Medical University

Chao Zhang

Fuyang People's Hospital

Qiuyu Yuan

Anhui Medical University

Cui Huang

Anhui Medical University

Kai Zhang (✉ zhangkai@ahmu.edu.cn)

Anhui Medical University <https://orcid.org/0000-0001-8581-9063>

Xiaoqin Zhou

Anhui Medical University

Research article

Keywords: Left-behind children, coping strategies, self-esteem, social support

Posted Date: January 5th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-38660/v2>

License:   This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

Version of Record: A version of this preprint was published on March 17th, 2021. See the published version at <https://doi.org/10.1186/s12888-021-03160-y>.

Abstract

Background: Negative coping strategies and behavioral problems are common among Chinese left-behind children, which are related to a variety of negative consequences. At this stage of development, the relevant factors of coping strategies need to be further studied, in which social support and self-esteem are worthy of our attention. The aim of this study is to detect the current situation of self-esteem, social support, and coping styles of left-behind children (LBC) in rural China. **Methods:** 322 children from 3 schools in China enrolled in this study, including 236 LBC and 86 non-left-behind children (NLBC) to assess self-esteem, social support and coping strategies. **Results:** The LBC group had lower self-esteem score and lower total social support (subjective support, objective support and support-seeking behavior) than the NLBC group. In terms of coping strategies, the LBC group was lower than the NLBC group in problem-solving and rationalization. The self-esteem score in LBC was significantly positively associated with the subjective support score, objective support score, problem-solving and help-seeking score. In addition, self-esteem has a significant mediating effect between subjective support and problem-solving, subjective support and help-seeking, respectively. **Conclusions:** The findings indicate that Chinese LBC's self-esteem and social support need to be improved. Given the significant correlativity between self-esteem, subjective support and coping strategy, it is necessary to promote Chinese LBC's self-esteem and social support, especially subjective support.

1. Introduction

Since the 1980s, China has experienced rapid economic development. However, regions vary in terms of the rate of development, resulting in significant disparity in regional economies. An increasing number of adults from economically underdeveloped rural areas are moving to economically developed cities in search of better job opportunities. Due to the high cost of living and education in urban areas, most rural migrant residents cannot afford the education and daily living costs of their children, resulting in their children remaining in their rural hometowns. These children are known as left-behind children (LBC)(1-3). LBC are children under 18 who were left behind in their rural communities, while one or both of their parents migrated into cities for work, and who had not lived with parents for >6 months(4, 5). According to the report of the All-China Women's Federation in 2013, China had approximately 61.03 million LBC, which represented an increase of 2.42 million since 2005, accounting for 21.88% of the Chinese children population today (6). Most reside in the rural areas of the following provinces: Sichuan Province, Guangdong Province, Jiangxi Province, Anhui Province, Henan Province, and Hunan Province (7).

According to previous studies in China and abroad, children who are left behind encounter a range of problems. LBC tend to display more emotional, behavioral, and learning problems, such as depression, non-suicidal self-injury, and game addiction (8-10).

There are many kinds of coping strategies: problem-solving, rationalization, help-seeking, fantasy, avoidance, and self-accusation. Generally speaking, coping strategies can be sorted into two types: immature and mature, among which immature coping strategies include avoidance, fantasy, and self-accusation. Mature coping strategies include problem-solving, help-seeking, and rationalization. These

coping strategies can be used by all children, but when faced with difficulties, each child has their own unique set of coping strategies to which they are accustomed. In theory, the use of different coping strategies affects the final results of life events and then brings different psychological and emotional experiences to individuals(11, 12). Previous studies indicate that, compared with non-left behind children (NLBC), LBC are less likely to use positive coping styles such as problem-solving (13). If a child demonstrates social problem-solving deficits, or difficulties identifying problems and generating appropriate solutions, he will experience more hopelessness, depression, and suicide-related behaviors(14).

There are many definitions of social support. One definition is "a social network's provision of psychological and material resources intended to benefit an individual's capacity to cope with stress"(15) and another is "having or perceiving to have close others who can provide help or care, particularly during times of stress" (16). Social support seems to be related to a range of psychological and behavioral mechanisms, including increased self-esteem and the use of active coping strategies(17).

Although the prediction mechanism of social support on coping strategies is not very clear, we think that self-esteem may have an intermediary effect on social support and mature coping strategies. Self-esteem describes how people evaluate themselves and the extent to which they accept themselves, resulting in a basic sense of self-worth(18). Theoretically, a person's environment can affect self-esteem, support from others, and their positive evaluation can improve self-esteem(19) and may increase individuals' confidence in their abilities and efforts, and provide them with more resources to deal with difficulties in life. Previous studies have also revealed that social support can enhance a sense of self-worth, which in turn assists in maintaining or increasing reduced self-esteem in the face of adverse events(20). In addition, self-esteem can provide individuals with a good sense of self-efficacy and further provide confidence when dealing with difficulties and adversity(21), thus enabling them to employ more mature coping strategies to face challenges(22).

Groups vary in coping styles and social support, and these differences are affected by individual characteristics and external environmental factors(23). Previous literature indicates that LBC are characterized by an unwillingness to express their troubles to their guardians; their social support mainly comes from peers, incomplete parent-child relations, and limited and autonomous social interaction(24, 25). However, our understanding of the subtle, indirect and complex relationship between individual characteristics and external environmental factors and coping styles is still incomplete.

In view of this background, we hypothesized that the self-esteem, social support, and coping styles of LBC would vary from those of NLBC and that self-esteem may be an important mediating variable between social support and coping strategies. This study aimed to address the questions: what is the current situation of self-esteem, social support, and coping styles of LBC, and what is the relationship between the three? This study assessed Chinese LBC as research participants to explore the relationship between self-esteem, social support, and coping styles, and to identify and describe the influence of social support and self-esteem on coping strategies. The conclusions of this study can be used to formulate and propose behavioral intervention strategies for LBC.

2. Methods

2.1. Participants

We conducted a cross-sectional survey in Anhui Province from January to March 2019. We selected schools and participants through cluster sampling. In the first step, we randomly selected three cities (Maanshan City, Bozhou City, and Chaohu City) from all cities in Anhui Province. In the second step, we randomly selected a rural middle school from each city. In the third step, we randomly selected two classes from each middle school and investigated all the students in these classes. A total of 350 students were recruited from six classes.

A total of 350 questionnaires were distributed, and questionnaires with missing values more than 5% were eliminated, or containing obviously false responses, 28 (8%) participants were excluded from analyses. As a result, data from 322 participants were analyzed. We used the most widely accepted definition of LBC in China: children or adolescents under 18 years old who remained in their home region while one or both of the parents migrated to other cities for work, and the separation exceeded six consecutive months in the past year. It has been suggested that a child cannot fully understand the questionnaire until the age of 14, so we included only LBC who were aged between 14 and 17 years. LBC who met any of the following conditions were further excluded: 1) physical illness, or inability to complete the survey; 2) auditory dysfunction or language disorder; 3) unconscious or delirious, and unable to clearly express oneself.

Prior to the survey, written consent was obtained from either the participant's parent, legal guardian, or teacher, according to whichever was appropriate to the specific situation. In addition, verbal consent was obtained from the participant.

2.2. Measures

All the interviewers were pre-trained graduate students majoring in clinical medicine. A self-designed questionnaire was used to collect demographic data of all participants, such as age, gender, number of siblings, parental marital status, parental education, and attachment type.

2.2.1. Self-esteem

In this study, the Chinese version of the Rosenberg Self-esteem Scale (18)(SES) was used to evaluate the participants' self-esteem. The scale consists of 10 items on a 4-point scale, ranging from 1 to 4. The total score was between 10 and 40. A higher score on the self-esteem scale indicates higher self-esteem. Those with scores ≤ 25 , 26–32, and ≥ 33 were considered to have low self-esteem, moderate self-esteem, and high self-esteem, respectively. The Chinese version of the Rosenberg Self-esteem Scale has shown good reliability and validity for measuring self-esteem(26) and Cronbach's α coefficient in this study was 0.87.

2.2.2. Social support

The Chinese version of the Social Support Rating Scale (SSRS) was used to evaluate participants' social support (27). The scale includes 10 items in three following dimensions: objective support, subjective

support, and support-seeking behavior. The total score for social support is the sum of the 10 items. A higher score indicates a higher level of social support. The application of SSRS for Chinese children and adolescents has been confirmed in terms of its reliability and validity(12, 28) and in this study, the Cronbach's α coefficient was 0.82.

2.2.3. Coping strategy

The Chinese version of the Coping Style Questionnaire (CSQ) was compiled by Xiao et al. (29) and accords with the behavior habits of the Chinese people. The scale consists of 62 items, germane to Chinese characteristics and Chinese coping habits. Items are rated as 1 (agree) or 0 (disagree). The questionnaire comprises six subscales, including both immature and mature coping strategies. Each subscale examines two dimensions, tendency, and effectiveness, and the score of each coping strategy is the sum of the score of tendency and effectiveness. Immature coping strategies include avoidance, fantasy, and self-accusation. Mature coping strategies include problem-solving, help-seeking, and rationalization. The CSQ is a scale widely used among Chinese adolescents and demonstrates good reliability and validity(30) and in this study Cronbach's α coefficient was 0.81.

2.3. Statistical analysis

The data are expressed as mean \pm standard deviation. Group differences in demographic and other characteristics between the LBC and NLBC groups were compared using independent t-tests for continuous variables and chi-squared test for categorical variables. In addition, we used Spearman correlation coefficients to examine the correlation between self-esteem, social support, and coping strategy. The LBC were then divided into three groups based on the SES scores. One-way analysis of variance (ANOVA) was used for comparison of data among the three groups, followed by Fisher's Least Significant Difference post hoc tests. Then, numerical variables in the LBC group were normalized to Z scores, and PROCESS V3.3 was used for multiple mediation analysis(31). In order to test any explanation mechanism for significant relationships between self-esteem and problem-solving ability, we tested the role of subjective support and objective support as mediating variables in the LBC group. Multivariate intermediary analysis was used to test multiple variables and their indirect effects simultaneously. This analysis allows for an investigation of the joint effects of several intermediary variables at the same time, rather than in a series of single intermediary models(32). In the intermediary analysis, the bootstrap program was repeated 5000 times to verify the mediating effect of the above variables, and the confidence interval (CI) was 95%. When CI did not contain 0, the indirect effect was considered significant. All data were analyzed using SPSS 20.0. A two-tailed p-value of < 0.05 was considered statistically significant.

3. Results

3.1. Demographic data and characteristics of LBC and NLBC group

A total of 322 LBC cases were enrolled in our study, including 236 LBC and 86 NLBC cases. Table 1 shows the demographic data for all participants. No significant between-groups differences were observed for gender, age, and number of siblings (all p values > 0.05). However, there were significant differences in

parental marriage, parental education, and child attachment type (all p -values <0.01) (Table 1). Compared with NLBC, fewer LBC had a secure attachment type (Table 1). Parents of LBC had a higher rate of divorce and a lower level of education compared to parents of NLBC (Table 1).

Table 1 Demographic data and characteristics of left-behind children group and non-left-behind children group

Variable	LBC group (n=236)	NLBC group (n=86)	t or χ^2	p
Age (years)	14.41±0.65	14.47±0.68	-0.29	0.77
Gender	Male n (%)	43(50%)	0.22	0.64
	Female n (%)	43(50%)		
Number of siblings	No sibling n (%)	23(27%)	<0.001	0.95
	At least one n (%)	63(73%)		
Parental marital status	Divorce n (%)	3(3%)	7.39	0.01
	Not divorced n (%)	83(97%)		
Parental education	Both are less than 9 years education n (%)	54(63%)	7.53	0.01
	One of them is more than 9 years education n (%)	32(37%)		
Attachment type	Secure n (%)	27(31%)	21.30	<0.001
	Insecure n (%)	59(69%)		

LBC, left-behind children; NLBC, non-left-behind children.

3.2. Comparison of self-esteem, social support, and coping strategy between LBC and NLBC group

As shown in Table 2, the LBC group had lower self-esteem scores than the NLBC group ($p < 0.05$). The LBC group was lower than the NLBC group in total social support, subjective support, objective support, and support-seeking behavior scores (all p -values < 0.05). In terms of coping strategies, the LBC group was lower than the NLBC group in problem-solving, help-seeking, and rationalization, and the difference was significant. There was no significant difference between the two groups in other aspects of coping strategies, such as avoidance, self-accusation, and fantasy (all p -values > 0.05). However, after adjusting for the variables in Table 1 (age, gender, and attachment type of children, child number, marriage, and education of parents), only subjective support, objective support, and rationalization remained significantly different between groups.

Table 2 Comparison of self-esteem, social support, and coping strategy between the LBC and NLBC groups

Variables	NLBC group (n = 86)	LBC group (n = 236)	Before adjustment		After adjustment*	
			F	P	F	P
Self-esteem	30.19 ± 0.47	28.8 ± 0.28	6.35	0.012	1.63	0.294
Low self-esteem (%)	12	50				
Moderate self-esteem(n)	49	141				
High self-esteem (n)	25	45				
Social support	36.55 ± 0.59	33.52 ± 0.36	19.52	<0.001	9.43	0.002
Subjective support	20.79 ± 3.23	19.29 ± 3.65	11.26	0.001	6.17	0.013
Objective support	7.64 ± 1.77	6.93 ± 1.70	10.66	0.001	5.77	0.017
Support-seeking behavior	8.12 ± 1.98	7.36 ± 2.01	8.99	0.003	2.48	0.116
Coping strategy						
Problem-solving	2.14 ± 0.28	2.02 ± 0.39	6.65	0.01	2.43	0.120
Help-seeking	1.94 ± 0.43	1.85 ± 0.52	2.01	0.157	0.34	0.562
Rationalization	1.73 ± 0.40	1.61 ± 0.48	4.39	0.037	4.06	0.045
Avoidance	1.64 ± 0.42	1.59 ± 0.55	0.44	0.509	0.04	0.834
Self-accusation	1.42 ± 0.60	1.43 ± 0.60	0.04	0.84	0.01	0.987
Fantasy	1.56 ± 0.49	1.58 ± 0.52	0.04	0.839	1.63	0.202

LBC, left-behind children; NLBC, non-left-behind children.

*Adjusted for age, gender, and attachment type of children, child number, marriage, and education of parents

3.3. Correlation between self-esteem, social support, and coping strategy in LBC

The Spearman correlation analysis in Table 3 revealed that self-esteem was significantly positively correlated with subjective support, objective support, problem-solving, and help-seeking. In addition, subjective support was positively correlated with self-esteem and problem-solving.

Table 3. Correlations among self-esteem, social support, and coping strategy in LBC

		1. Self-esteem	2. Subjective support	3. Objective support	4. Problem-solving	5. Rationalization	6. Self-accusation	7. Help-seeking	8. Fantasy	9. Avoidance
1	r	1.000	0.319**	0.198**	0.347**	-0.047	-0.115	0.194**	-0.006	-0.086
	P	<0.001	0.002	<0.001	0.471	0.077	0.003	0.930	0.189	
2	r	1.000	0.163*	0.382**	0.036	-0.010	0.159*	0.073	0.108	
	P	0.012	<0.001	0.579	0.874	0.014	0.265	0.099		
3	r	1.000	0.142*	0.021	-0.071	0.106	0.022	-0.077		
	P	0.030	0.743	0.276	0.105	0.741	0.236			
4	r	1.000	0.357**	0.225**	0.421**	0.145*	0.245**			
	P	<0.001	<0.001	<0.001	0.026	<0.001				
5	r	1.000	0.513**	0.108	0.348**	0.429**				
	P	<0.001	0.097	<0.001	<0.001					
6	r	1.000	-0.048	0.449**	0.501**					
	P	0.463	<0.001	<0.001						
7	r	1.000	-0.028	0.082						
	P	0.673	0.210							
8	r	1.000	0.500**							
	P									<0.001

3.4 The mediating role of self-esteem between subjective support and problem-solving tendency and effectiveness

Self-esteem can significantly mediate the relationship between subjective support and problem-solving. Evaluation of the overall and direct influence of subjective support on problem-solving ability indicated a significant effect of subjective support on problem-solving ability (all p -values < 0.001). Self-esteem was then introduced as an intermediary variable, and age, and gender as control variables into the regression equation, to calculate the indirect effect of the relationship between subjective support and problem-solving ability. The statistical significance in each path is shown in Table 4. Finally, Table 6 shows the bootstrap results of the mediating effect of self-esteem and its effect rate. The 95% CI value of the mediating effect of self-esteem did not include 0, indicating that there was a significant mediating effect, accounting for 27.1% of the total effect. Figure 1 shows an intermediary model in which self-esteem mediated subjective support and problem-solving.

Table 4. Regression Analysis of the relationship between variables in the Model

	Self-esteem			Problem-solving			Problem-solving		
	B	t	P	B	t	P	B	t	P
Subjective support	0.442	6.906	<0.001	0.025	4.513	<0.001	0.035	6.446	<0.001
Gender	0.082	0.178	0.859	0.066	1.738	0.083	0.068	1.729	0.085
Age	-0.515	-1.476	0.141	-0.037	-1.286	0.199	-0.048	-1.626	0.105
Self-esteem				0.022	4.690	0			
R ²		0.134			0.181			0.124	
F		16.410			17.485			14.992	

Table 5. Bootstrap results for the mediating effect of self-esteem between subjective support and problem-solving ability

Effect type	Effect	BootSE	Bootstrap 95% CI		Effect ratio	
			LLCI	ULCI		
Indirect effect	0.010	0.003		0.005	0.016	27.1%
Direct effect	0.025	0.006		0.015	0.036	72.6%
Total effect	0.035	0.005		0.025	0.045	

3.6 The mediating role of self-esteem between subjective support and help-seeking tendency and effectiveness

Self-esteem can significantly mediate the relationship between subjective support and help-seeking. Evaluation of the overall and direct influence of subjective support on help-seeking ability indicated a significant effect of subjective support on help-seeking ability (all p -values < 0.001). We then introduced self-esteem as an intermediary variable, age, and gender as control variables into the regression equation, and calculated the indirect effect of the relationship between subjective support and help-seeking ability. The statistical significance in each path is shown in Table 6. Finally, Table 7 shows the bootstrap results of the mediating effect of self-esteem and its effect rate. The 95%CI value of the mediating effect of self-esteem did not include 0, indicating that there was a significant mediating effect, accounting for 26.1% of the total effect. Figure 2 shows an intermediary model in which self-esteem mediates subjective support and help-seeking.

Table 6. Regression Analysis of the relationship between variables in the Model

	Self-esteem			Help-seeking			Help-seeking		
	B	t	P	B	t	P	B	t	P
Subjective support	0.442	6.906	<0.001	0.022	2.729	0.007	0.030	3.920	<0.001
Gender	0.082	0.178	0.859	-0.032	-0.590	0.556	-0.031	-0.558	0.577
Age	-0.515	-1.476	0.141	-0.041	-0.981	0.327	-0.050	-1.193	0.234
Self-esteem				0.018	2.660	0.008			
R ²		0.134			0.072			0.051	
F		16.410			6.134			5.710	

Table 7. Bootstrap results for the mediating effect of self-esteem between subjective support and help-seeking ability

Effect type	Effect	BootSE	Bootstrap 95% CI		Effect ratio	
			LLCI	ULCI		
Indirect effect	0.008	0.004		0.001	0.016	26.1%
Direct effect	0.022	0.009		0.005	0.039	73.9%
Total effect	0.030	0.008		0.013	0.046	

3.7 Gender differences in self-esteem, social support, and coping strategies of LBC

Table 8 summarizes the differences in self-esteem, social support, and coping strategies between male LBC (n = 125) and female LBC (n = 111). No significant difference was observed between the groups in

Terms of self-esteem, social support, problem-solving, help-seeking, rationalization, and self-accusation (all $p>0.05$). However, significant differences were observed between groups in avoidance and fantasy (all $p<0.05$).

Table 8. Gender differences in self-esteem, social support, and coping strategies of LBC

Variables	Male(n=125)	Female(n=111)	t	P
Self-esteem	28.69±4.43	28.94±4.45	-0.43	0.668
Social support	33.55±5.57	33.48±5.37	0.10	0.917
Subjective support	19.21±3.68	19.39±3.64	-0.38	0.707
Objective support	7.10±1.95	6.74±1.36	1.69	0.093
Support-seeking behavior	7.39±2.00	7.32±2.03	0.26	0.797
Coping strategy				
Problem-solving	2.05±0.38	1.99±0.41	1.24	0.218
Help-seeking	1.82±0.57	1.88±0.46	-0.85	0.394
Rationalization	1.66±0.50	1.55±0.44	1.84	0.068
Avoidance	1.67±0.54	1.51±0.55	2.20	0.029
Self-accusation	1.49±0.62	1.37±0.58	1.58	0.116
Fantasy	1.65±0.54	1.49±0.48	2.47	0.014

4. Discussion

The first purpose of this study was to determine the differences between LBC and NLBC in self-esteem, social support, and coping strategies. We observed that compared with the NLBC group, the LBC group had lower self-esteem and social support. Few LBC used mature coping strategies, such as problem-solving, help-seeking, and rationalization. Compared with low and moderate self-esteem LBC, high self-esteem LBC had better social support, especially subjective support. Correspondingly, LBC with high self-esteem tended to adopt problem-solving and help-seeking coping strategies.

Family was indicated as the main source of social support and the way of raising the child had a large influence on children's personality (33). Gao and colleagues observed that the more contact there is between parents and child, the more social support and interpersonal relationships the left-behind children could achieve at school(28). However, because the parents of LBC migrate to large cities for improved

employment opportunities, they have little contact with their children. Therefore, in our study, we observed that the LBC group had lower social support than the NLBC group. Interestingly, our analyses revealed a positive correlation between self-esteem and subjective support among LBC. High self-esteem LBC had more subjective feelings of support in this study. Dai and colleagues reported that Western Chinese LBC display lower levels of happiness and self-esteem than NLBC(34). They examined self-esteem among LBC in Sichuan Province in China using the Modified Harter Self-esteem Scale. Although they used different assessment scales than the current study, the results were similar. Low self-esteem was associated with depression, anxiety, internet addiction, and psychological and behavioral problems (7, 30, 35). Few LBC in our study used mature coping strategies, such as problem-solving, help-seeking, and rationalization. LBC tended to adopt immature coping strategies such as avoidance and self-accusation when faced with negative events in everyday life(36, 37).

The second purpose of this study was to determine the relationship between self-esteem, social support, and coping strategies among the LBC group. Our results confirmed a positive relationship between self-esteem, social support, and mature coping strategies. Specifically, self-esteem was significantly positively correlated with subjective support, objective support, problem-solving, and help-seeking. These results indicate that self-esteem and social support are related to coping styles adopted by adolescents in that, lower self-esteem and lower social support during adolescence are associated with greater likelihood of adopting immature or negative coping styles. Our results are consistent with some previous literature in that positive problem orientation is significantly positively correlated with the two dimensions of self-esteem (self-competence and self-liking) among patients with anorexia (38). A total of 92% of teenagers reported that social stigma and embarrassment prevented them from seeking professional help for mental health issues(39).

Our findings also indicate that when controlling for age and gender as covariables, self-esteem is not only the intermediary variable between subjective support and problem-solving ability, but also the intermediary variable between subjective support and help-seeking ability. Increased subjective social support can assist children to develop higher self-esteem, be more willing to solve problems in the face of difficulties, and more likely to solve problems successfully. In the process of dealing with problems, they will also be more willing to turn to the people around them for help. On the contrary, a lack of subjective social support is related to LBC's negative attitude toward themselves. They have the psychological characteristics of low self-esteem. People with low self-esteem are reluctant to accept themselves and often demean themselves, as expressed by feelings such as "I can't do simple things", "I am worthless", lack of confidence in completing work, or solving problems. Additionally, they are often lonely and sensitive, ignore constructive criticism from their friends, are unwilling to open their hearts to others, and believe that asking for help is an acknowledgment of their inability, or fear that others will refuse to help. Therefore, the LBC who lack subjective support are unwilling to solve the problem and seek help when facing difficulties.

In summary, our study emphasizes the influence of subjective support on the use of problem-solving and help-seeking coping strategies among LBC. Future studies should focus on social work in terms of providing

more social support to LBC, including high-quality services among high-risk young people to improve parent-child communication, psychological counseling participation by teachers, engaging or educational extracurricular activities, and so on.

Our study has several limitations. First, is the cross-sectional survey design, thus we cannot interpret the cause-effect relationship among self-esteem, social support, and coping strategy. Second, the participants were selected from three cities in Anhui Province. Although our study adopted the method of cluster sampling, the results should be generalized to all LBC in China with caution. We chose teenagers over the age of 14 because it was assumed that younger children would be unable to accurately understand the meaning of the questions on the scales we used. The results among 14-to 17-year-olds may not be universal to the entire population of LBC.

5. Conclusions

Compared with NLBC, the LBC group had lower levels of self-esteem and social support, and lower tendency and effectiveness of using mature coping strategies, such as problem-solving and help-seeking. Among the LBC group, self-esteem was significantly positively correlated with subjective support, objective support, problem-solving, and help-seeking. Self-esteem played an intermediary role in the relationship between adolescents' subjective support and problem-solving or help-seeking tendencies and effectiveness. It is hoped that these findings will have some implications on how to improve LBC coping strategies (problem-solving and help-seeking ability).

Abbreviations

LBC: left-behind children

NLBC: non-left-behind children

SES: Rosenberg Self-esteem Scale

SSRS: Social Support Rating Scale

CSQ: Coping Style Questionnaire

Declarations

Ethics approval and consent to participate

The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures were approved by the ethical standards of the Ethics Committee of Chaohu Hospital, Anhui Medical University (No. 201901-kyxm-02) and followed the tenets of the Declaration of Helsinki. Written informed consent was obtained from all participants. Written informed consent for publication was obtained from all participants.

Consent for publication

Not applicable.

Availability of data and materials

All the data supporting our findings have been presented in the manuscript; the datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

We thank all of patients who volunteered to participate in the study. This study was supported by the National Nature Science Foundation of China (81801341), the Anhui Provincial Key R&D Programme (202004j07020030). These funds are only used to provide a small amount of financial compensation for each research participant participating in the research.

Authors' contributions

(I) Conception and design: X Zhou; (II) Administrative support: X Zhou, K Zhang; (III) Provision of study materials or patients: S Cui, F Cheng, L Zhang, Q Yuan, C Huang; (IV) Collection and assembly of data: S Cui, L Zhang, Q Yuan; (V) Data analysis and interpretation: S Cui, K Zhang, C Zhang; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Acknowledgements

We thank all of participants who volunteered to participate in the study. Thanks to Chaohu Hospital, Anhui Medical University and corresponding authors for their support.

References

1. Fan F, Su L, Gill MK, Birmaher B. Emotional and behavioral problems of Chinese left-behind children: a preliminary study. *Soc Psychiatry Psychiatr Epidemiol.* 2009;45(6):655-64.
2. Graham E, Jordan LP. Migrant Parents and the Psychological Well-Being of Left-Behind Children in Southeast Asia. *J Marriage Fam.* 2011;73(4):763-87.
3. Jingzhong Y, Lu P. Differentiated childhoods: impacts of rural labor migration on left-behind children in China. *Journal of Peasant Studies.* 2011;38(2):355-77.
4. Fellmeth G, Rose-Clarke K, Zhao C, Busert LK, Zheng Y, Massazza A, et al. Health impacts of parental migration on left-behind children and adolescents: a systematic review and meta-analysis. *The Lancet.* 2018;392(10164):2567-82.

5. Zhou C, Sylvia S, Zhang L, Luo R, Yi H, Liu C, et al. China's Left-Behind Children: Impact Of Parental Migration On Health, Nutrition, And Educational Outcomes. *Health Aff (Millwood)*. 2015;34(11):1964-71.
6. Federation A-CWs. The research report of left-behind children and migrant children in rural China. 2013.
7. Tang D, Choi WI, Deng L, Bian Y, Hu H. Health status of children left behind in rural areas of Sichuan Province of China: a cross-sectional study. *BMC Int Health Hum Rights*. 2019;19(1):4.
8. Tang W, Wang G, Hu T, Dai Q, Xu J, Yang Y, et al. Mental health and psychosocial problems among Chinese left-behind children: A cross-sectional comparative study. *Journal of affective disorders*. 2018;241:133-41.
9. Wang F, Lu J, Lin L, Zhou X. Mental health and risk behaviors of children in rural China with different patterns of parental migration: a cross-sectional study. *Child Adolesc Psychiatry Ment Health*. 2019;13:39.
10. Tang W, Wang G, Hu T, Dai Q, Xu J, Yang Y, et al. Mental health and psychosocial problems among Chinese left-behind children: A cross-sectional comparative study. 2018;241:133-41.
11. Enns A, Eldridge GD, Montgomery C, Gonzalez VM. Perceived stress, coping strategies, and emotional intelligence: A cross-sectional study of university students in helping disciplines. *Nurse Educ Today*. 2018;68:226-31.
12. Yu H, Li M, Li Z, Xiang W, Yuan Y, Liu Y, et al. Coping style, social support and psychological distress in the general Chinese population in the early stages of the COVID-19 epidemic. *BMC Psychiatry*. 2020;20(1):426.
13. Hui W, Tao LJCJoHP. Life Events and Mental Health of Left-behind Children in Shanbei Region:The Intermediary Effect of Coping Style. 2018.
14. Song X, Wang S, Wang R, Xu H, Wan YJIJoER, Health P. Mediating Effects of Specific Types of Coping Styles on the Relationship between Childhood Maltreatment and Depressive Symptoms among Chinese Undergraduates: The Role of Sex. 2020;17(9):3120.
15. Cohen S. Social relationships and health. *Am Psychol*. 2004;59(8):676-84.
16. Eisenberger NI. An empirical review of the neural underpinnings of receiving and giving social support: implications for health. *Psychosom Med*. 2013;75(6):545-56.
17. Southwick SM, Sippel L, Krystal J, Charney D, Mayes L, Pietrzak R. Why are some individuals more resilient than others: the role of social support. *World Psychiatry*. 2016;15(1):77-9.
18. Rosenberg M. Self Esteem and the Adolescent. (Economics and the Social Sciences: Society and the Adolescent Self-Image). *The New England Quarterly*. 1965;148(2).
19. Yarcheski A, Mahon NE, Yarcheski TJ. Social support and well-being in early adolescents: the role of mediating variables. *Clin Nurs Res*. 2001;10(2):163-81.
20. Cohen S, Wills TA. Stress, social support, and the buffering hypothesis. *Psychol Bull*. 1985;98(2):310-57.
21. Carver CS, Scheier MF. On the self-regulation of behavior. Cambridge: Cambridge University Press; 1998.
22. R C Kessler, R H Price a, Wortman CB. Social Factors in Psychopathology: Stress, Social Support, and Coping Processes. 1985;36(1):531-72.

23. Wang P, Xiong Z, Yang H. Relationship of Mental Health, Social Support, and Coping Styles among Graduate Students: Evidence from Chinese Universities. *Iran J Public Health*. 2018;47(5):689-97.
24. Wang F, Lin L, Xu M, Li L, Lu J, Zhou X. Mental Health among Left-Behind Children in Rural China in Relation to Parent-Child Communication. *Int J Environ Res Public Health*. 2019;16(10).
25. Liu H, Liu L, Jin X. The Impact of Parental Remote Migration and Parent-Child Relation Types on the Psychological Resilience of Rural Left-Behind Children in China. *Int J Environ Res Public Health*. 2020;17(15).
26. Wang XD, Wang XL, Ma H. Rating scales for mental health: Chinese Mental Health Journal Publisher; 1999.
27. Tang KH, Zhang LYJMJoCPLA. Development of Chinese Military Personnel Social Support Scale and tests for its reliability and validity. 2013;38(1):69-72.
28. Gao L, Chan S, Mao Q. Depression, perceived stress, and social support among first-time Chinese mothers and fathers in the postpartum period. *Res Nurs Health*. 2009;32(1):50-8.
29. Xiao JH, XF X. Study on validity and reliability of coping style questionnaire. *Chin Ment Health J*. 1996;4:164-8.
30. Shi Y, Yu B, Shen Y, Kenny K, Rozelle SJC, Economy W. Effects of Parental Migration on Mental Health of Left-behind Children: Evidence from Northwestern China. 2016;024(003):105-22.
31. Hayes AF, Rockwood NJ. Regression-based statistical mediation and moderation analysis in clinical research: Observations, recommendations, and implementation. *Behav Res Ther*. 2017;98:39-57.
32. Preacher KJ, Hayes AF. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behav Res Methods*. 2008;40(3):879-91.
33. Jogdand SS, Naik J. Study of family factors in association with behavior problems amongst children of 6-18 years age group. *Int J Appl Basic Med Res*. 2014;4(2):86-9.
34. Dai Q, Chu R. Anxiety, happiness and self-esteem of western Chinese left-behind children. *Child Abuse Negl*. 2018;86:403-13.
35. Wang H, Liu TJCJoHP. Life Events and Mental Health of Left-behind Children in Shanbei Region:The Intermediary Effect of Coping Style. 2018.
36. Wang S, Xu H, Zhang S, Yang R, Li D, Sun Y, et al. Linking Childhood Maltreatment and Psychological Symptoms: The Role of Social Support, Coping Styles, and Self-Esteem in Adolescents. *J Interpers Violence*. 2020:886260520918571.
37. Wang S, Xu H, Zhang S, Yang R, Li D, Sun Y, et al. Linking Childhood Maltreatment and Psychological Symptoms: The Role of Social Support, Coping Styles, and Self-Esteem in Adolescents. *Journal of Interpersonal Violence*. 2020:886260520918571.
38. Paterson G, Power K, Yellowlees A, Park K, Taylor L. The relationship between two-dimensional self-esteem and problem solving style in an anorexic inpatient sample. *Eur Eat Disord Rev*. 2007;15(1):70-7.
39. Radez J, Reardon T, Creswell C, Lawrence PJ, Evdoka-Burton G, Waite P. Why do children and adolescents (not) seek and access professional help for their mental health problems? A systematic review of quantitative and qualitative studies. *Eur Child Adolesc Psychiatry*. 2020.

Figures

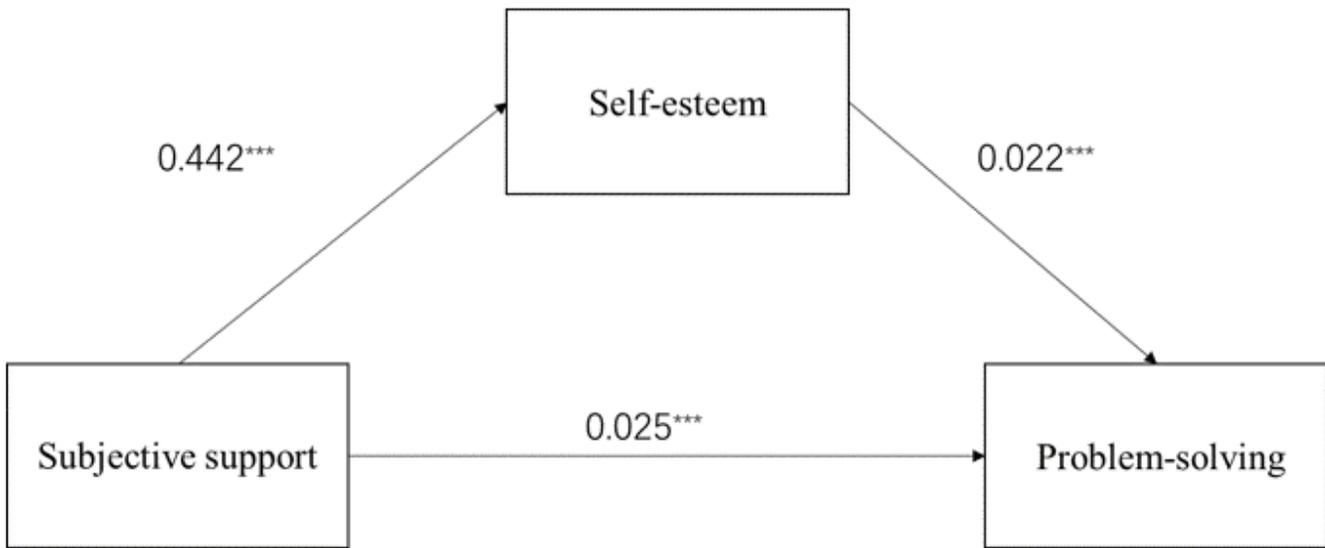


Figure 1

Model of Mediation Analyses. The arrow from Subjective support to Problem-solving represents the direct effect; the arrow from Subjective support to Problem-solving passing through Self-esteem, which is the mediator, represents the indirect effect. * $p < 0.05$; ** $p < 0.01$.

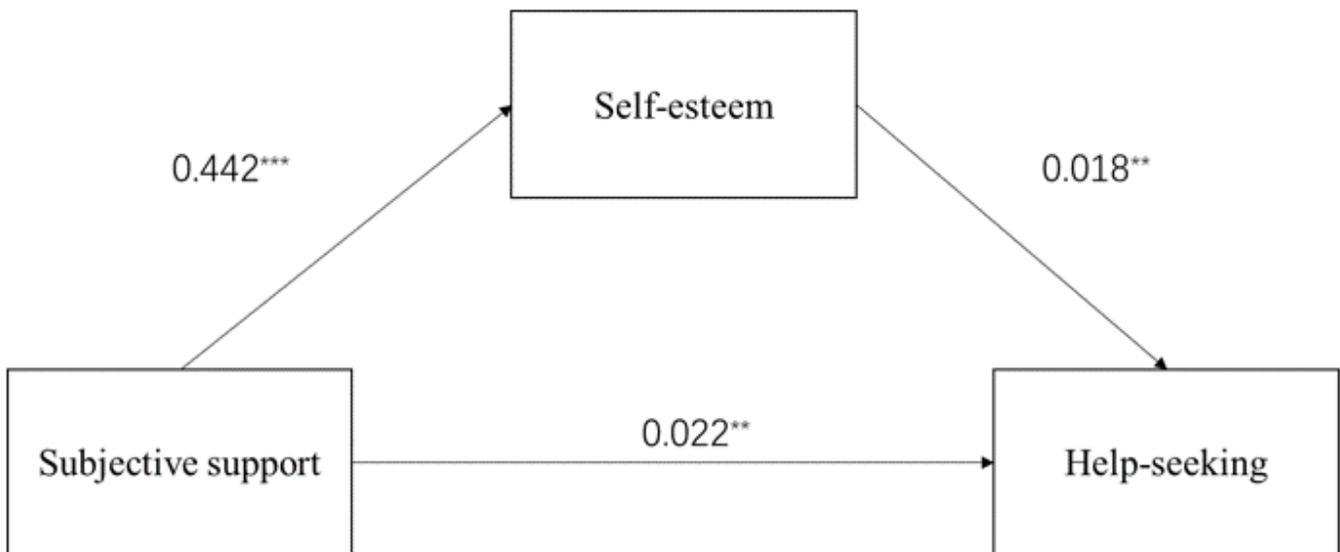


Figure 2

Model of Mediation Analyses. The arrow from Subjective support to Help-seeking represents the direct effect; the arrow from Subjective support to Help-seeking passing through Self-esteem, which is the

mediator, represents the indirect effect. * $p < 0.05$; ** $p < 0.01$.