



Original article

Emotional and Behavioral Problems of Left-Behind Children in Impoverished Rural China: A Comparative Cross-Sectional Study of Fourth-Grade Children



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A B S T R A C T

Purpose: Children who are left behind when their parents migrate for work have a high prevalence of emotional and behavioral problems, which affect social function and increase family burden. To date, no national survey has been conducted on the emotional and behavioral problems of left-behind children (LBC) in China. This study aimed to investigate the emotional and behavioral outcomes of primary school LBC in the fourth grade in impoverished rural China and the possible influences of family environment and parenting practices.

Methods: A cross-sectional study was carried out in 27 rural counties in the central and western parts of China from November 2016 to January 2017. The method of quota sampling was adopted to achieve a representative sample using postweighting adjustment. The survey sample was distributed proportionately across each county. LBC were defined as children aged <16 years who had two parents leave home to work or one parent leave home while the other lost the capacity to rear their children. The term “non-left-behind children” (NLBC) refers to children who have at least one parent who has not migrated for work. The Strengths and Difficulty Questionnaire (SDQ) was applied to measure children's emotional and behavioral problems.

Results: After the weighted calculations were performed, there were 1,147 LBC and 3,953 NLBC. The proportion of abnormal SDQ total scores (>17) was significantly higher in the LBC group than in the NLBC group (15.6% vs. 11.6%; $p < .01$). Binary regression analysis showed that high levels of insomnia

IMPLICATIONS AND
CONTRIBUTION

Many young people in rural China are left behind when parents or guardians migrate for work. The results show that left-behind children suffer worse emotional and behavioral outcomes than their peers with non-migrating parents or guardians.

Authors' contributions: Z.Y.-M. collected data, conducted statistical analysis, drafted the article, and edited and submitted the article. C.-X.Z. organized the program, collected data, reviewed and revised the article, and approved the final manuscript. Q.Y.-J. collected data, reviewed and revised the article, and approved the final manuscript. H.F. collected data, reviewed and revised the manuscript, and approved the final manuscript as submitted. S.J. designed the study, conducted statistical analysis; critically reviewed, edited, and revised the article; and approved the final manuscript as submitted. X.-N.H. reviewed and revised the article and approved the final manuscript as submitted. X.-B.T. reviewed and revised the article and approved the final article as submitted. Z.Y. conceptualized and designed the study, collected data, and approved the final article as submitted. Z.Y.-M. is the first author of the paper. S.J. and Z.Y. are co-corresponding authors.

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(odds ratio [OR] 1.54, 95% confidence interval [CI] 1.04–2.27), loneliness (OR 1.65, 95% CI 1.13–2.43), and self-harm (OR 1.92, 95% CI 1.17–3.16) may increase the risk of abnormal SDQ total scores in LBC.

Conclusions: LBC showed a higher prevalence of abnormal SDQ total scores than NLBC. Insomnia, loneliness, and self-harm behavior were associated with abnormal SDQ total scores in LBC.

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The term “left-behind children” (LBC) refers to children aged <16 years living in rural areas whose parents both leave the area for work or one of the parents leaves the area for work while the other loses guardianship. According to the definition of rural LBC issued by the Government of China in 2016 [1], there are a total of 9.02 million rural LBC in China. Most of these children are cared for by grandparents or other relatives and are impoverished. A number of previous studies have found that compared with non-left-behind children (NLBC), the long-term lack of parental care has long-lasting adverse effects on mental health outcomes in LBC [2], such as low levels of self-awareness [3], a strong sense of loneliness [4], and high levels of social anxiety [5].

Emotional and behavioral problems in childhood have frequently been identified as critical risk factors for mental health outcomes in later life [6]. The National Child Health Surveys [7] conducted in the early 2000s by the National Institutes of Health and the National Institute of Mental Health in the U.S. suggested that the prevalence of emotional behavior problems among children 8–10 years old was 5.5%, with 80% of these children experiencing poor social functioning. A German study [8] used the Child Behavior Checklist and found that the prevalence of emotional behavioral problems among children and adolescents 4–18 years old was 10%–18%. A Chinese survey using the Child Behavior Checklist scale in students aged 12–17 years in Yantai City found that the prevalence of emotional and behavioral problems was 10.5% [9].

Emotional and behavioral problems have negative impacts on family life, friendship, learning, and entertainment activities and place a heavy burden on families and communities [7,10]. A Chinese study [11] showed the factors that increase the risk of emotional and behavioral problems include poor family relationships, negative life events, learning stress, and living in poor rural areas. Another survey from the U.S. confirmed that poor socioeconomic conditions and single-parent families (mainly cared for by mothers) increase the risk of having emotional and behavioral problems [7].

An ecological framework including social, environmental, and psychological factors suggests that emotional and behavioral development in children interacts with social and environmental factors. The children sampled in most previous studies were concentrated in only one city or in several cities in one province, such as Chongqing, Hunan, and Sichuan [12–15]. In addition, the standards and the results of previous research on depression, anxiety, and personality traits of LBC have been inconsistent [16,17]. To fill in the research gaps, it was proposed to conduct a national study using an international standardized measure to explore the emotional and behavioral problems and related risk factors for such problems among LBC.

This study investigated the areas in China where the majority of LBC live to understand the prevalence of emotional and behavioral problems among LBC and to explore related risk

factors for such problems. We analyzed various potential influencing factors, such as the time of parents leaving, reduced parent–child communication, risk behaviors, and negative emotions. We hypothesized that LBC have more serious emotional and behavioral problems than NLBC because of the long absence of their parents.

Methods

Study design and participants

The study used a cross-sectional research design and was conducted from November 2016 to January 2017. In contrast to previous studies, we adopted the stricter definition of LBC issued by the Government of China in 2016 [1]. Using this definition, 99.5% of LBC surveyed in this study had two parents working outside the home. The quota sampling methodology was used to recruit within poverty-stricken counties, namely, counties with more than 2% of the population living below the poverty line. The poverty line is defined as a per capita annual income of 2,300 Chinese yuan [18]. A total of 27 poverty-stricken counties in rural areas across 11 provinces and one municipality met the criteria and were included in the study. In each county, LBC and NLBC aged 8–11 years were recruited.

When calculating the sample size, the representativeness of the core indicators for each of the survey groups in all 27 counties and the minimum sample necessary for an analysis of each survey group in each province were ensured. According to the sample size calculation formula $N = \frac{D_{\text{def}} \times Z^2 P(1-P)}{d^2}$, the confidence level for each parameter was 95%, with a Z value of 1.96. Probability p demonstrated the low prevalence of emotional and behavioral problems for LBC over 15.0%, and the design effect D_{def} was 3 with a relative error of 15%; thus, $d = 15\% \times 15.0\%$. Given these calculations, the corresponding sample size needed for the survey group was estimated to be approximately 2,900. There were no fewer than 200 survey participants in each province. The ratio of the NLBC group to the LBC group was 1:2, and the NLBC group included no fewer than 1,450 people.

Procedures

In the survey sampling process, we selected 11 provinces (Shanxi, Hebei, Shaanxi, Hunan, Hubei, Henan, Anhui, Guangxi, Sichuan, Guizhou, and Jiangxi) and one municipality (Chongqing) with a relatively high concentration of LBC. In principle, we selected towns that were far away from the center, near the center, and a middle distance from the center of the county to recruit more LBC. Before the survey began, the local health administration department counted the number of LBC, the proportions of left-behind boys and girls, the total number of children locally, and the proportion of total boys and girls. When

the samples were recruited, they were grouped according to the number of LBC reported by each county. The sample size was determined by the number of LBC in the fourth to sixth grade of primary schools as follows: 240 LBC in counties where LBC exceeded 10,000; 200 LBC in counties with 6,000–10,000 LBC; 160 LBC in counties with 2,000–6,000 LBC; 120 LBC in counties with 1,000–2,000 LBC; 80 LBC in counties with 600–1,000 LBC; 40 LBC in counties with 200–600 LBC; and 20 LBC in counties with fewer than 200 LBC. Hebei, Henan, and Shanxi Provinces had fewer than 200 LBC after the allocation process; thus, the samples from these provinces were adjusted to meet the minimum sample size of 200 people in each province. Surveys were collected from NLBC in the same locations where the LBC were surveyed.

This study was part of the epidemiological survey on mental health status among children and adolescents in China. It was approved by the Ethics Committee of Beijing Anding Hospital affiliated with Capital Medical University under the ethical approval number of 2013 (06). The survey was approved by the local health administration bureaus and the participating schools. Participation was voluntary, and participants signed an informed consent form. Interviews followed the principles of privacy protection, and the survey was conducted in a separate or isolated room or at a distance from the surrounding population. During the research process, trained local health workers identified students who met the inclusion criteria at the schools and briefed their teachers on the survey. The teachers described the questionnaires to the class and asked the students to complete the questionnaires. The teacher sent a set of survey forms to the students, which included the informed consent form, the survey questionnaire, a family information questionnaire, and so on. Students completed the survey questionnaire at school. The informed consent form and the family information questionnaire were brought to the family by the student; the caregiver completed the questionnaire, and both the students and parents or the caregivers signed the informed consent form.

Measures

This study used the Strengths and Difficulty Questionnaire (SDQ) to assess children's emotional and behavioral problems. The SDQ was designed and compiled by British psychiatrist Robert Goodman in 1997 in accordance with the DSM-IV and the 10th revision of the International Statistical Classification of Diseases and Related Health Problems [19]. Since it was modified in 2001, it has been applied in 40 countries [20,21]. In 2005, Du Yasong et al. [22] normalized these measures in children and adolescents in China and reported that it was a reliable and valid screening measure for emotional and behavioral problems. The SDQ (Student Edition) has 25 items, each of which has three response options: "not true," "somewhat true," and "certainly true," with 0, 1, and 2 points attributed to each response, respectively. Items 7, 11, 14, 21, and 25 are reverse scored. The SDQ consists of five subscales: (1) emotional symptoms; (2) conduct problem; (3) hyperactivity-inattention; (4) peer problems; and (5) prosocial behavior. The values obtained by adding the individual scores compiled from the items in subscales 1–4 comprise the total difficulties score. The higher the obtained total difficulties score is, the more severe the emotional and behavioral problems of the child are. Higher scores on subscale 5 indicate the child has a better ability to interact with society. Taking into account identified Chinese norms, we defined a score

of over 17 points on subscales 1–4 as abnormal emotional behavior and a score below 5 points on subscale 5 as abnormal social behavior. If a child's emotional symptoms score was greater than 5 points, the conduct problems score was greater than 4 points, the peer problems score was greater than 5 points, and the hyperactivity-inattention issues score was greater than 6 points, then the quantitative scores comprising the child's total difficulties score would be considered abnormal [22].

Social and economic factors

A self-assessment questionnaire on sociodemographic characteristics was conducted to collect basic information on the participants, such as age, gender, ethnicity, parental education level, boarding, frequency of outdoor activities, and family economic status. Family economic status was assessed according to annual household income divided by the number of people in the household. According to the China Statistical Yearbook compiled by the Statistics Bureau of China [23], an annual per capita annual income below 4,000 yuan indicates a low-income family, 4,000–10,000 yuan indicates a middle-income family, and 10,000 yuan or more is defined as a high-income family.

Caregiving and parenting environment

The survey also collected information about the parenting environment of the child after one or both parents went away for work, particularly related to the identity of the current primary caregivers. For example, response options to the question "Who is the caregiver?" included grandparents, other relatives, and underage siblings. The survey also collected information on age and the level of education of the current main caregiver for the child and the duration of the biological parent's absence, including how long it had been since the child last saw his or her father and mother. The survey collected information about parent–child communication, including how often and how long the parents communicated with their child through various means, including videos, phone calls, and letters.

Psychological characteristics

We were interested in exploring whether the child developed risk behaviors after one or both of their parents went away for work. To assess this, we asked the following questions: "Over the past 7 days, what was the average amount of time you watched TV each day?" "On average, how much time have you spent online each day?" "On average, how much time have you spent playing on a mobile phone each day?" "Have you ever tried to smoke or drink alcohol?" We asked questions to explore whether children felt any academic pressure or negative emotions because of their parents' leaving, which included the following questions: "In the past 6 months, have you been in a bad mood because of exam grades or academic performance?" "Have you ever felt lonely and helpless?" "Have you ever not been able to move because of sadness and despair?" The information collected from these targeted questions identified variables that may significantly affect children's mental health outcomes.

Statistical analysis

All questionnaires were retrieved and uniformly coded, and data were entered using Epidata 3.1 (Odense, Denmark). All data

were double entered, and automated comparison checks were performed using test software. The demographic data of the LBC group and the NLBC group were compared. The categorical data were analyzed by the chi-squared test, and the nonnormally distributed measurement data were tested by the rank-sum test. The chi-squared test was used to assess the prevalence of an abnormal SDQ total score in the LBC group and the NLBC group, and the specific variables related to the demographic questionnaire, family parenting environment, bad habits, and negative emotions were analyzed by the chi-squared test. Statistically significant variables were used in

the binary regression analysis. An analysis of the risk factors that may affect abnormal behavior of LBC was conducted. The threshold of significance was defined as $p < .05$. All statistical analyses were performed using SPSS for Windows 22.0 (IBM, Chicago, IL).

Results

The sample of the entire study is composed of five age groups, but this article only shows the results of the fourth-grade primary school group (8–11 years old). A total of 5,099 fourth-grade students were surveyed, including 3,371 LBC and 1,728 NLBC. After the weighted calculations were performed, there were 1,147 LBC and 3,953 NLBC. The median age was 9 years, and the distribution was mainly concentrated among children who were 9–10 years old. The most common caregivers of LBC were grandparents (94.9%), and the median age of the caregivers was 61 (58–66). For the majority of the primary caregivers, the level of education was primary school or not attending school (76.7%). Among LBC, 99.5% reported that both parents went away for work. Table 1 shows there are no significant differences in the demographic variables between LBC and NLBC with regard to gender, ethnicity, boarding, number of siblings living together, father's education level, and mother's education level. Concerning the family economic status of LBC, the proportions of high-, middle-, and low-income levels were 16.0%, 47.0%, and 37.0%, respectively. For NLBC, the proportions of high-, middle- and low-income levels were 15.0%, 50.9%, and 34.1%, respectively. The chi-squared test between the two groups was not statistically significant ($\chi^2 = 5.29$, $p > .05$). The results suggest that NLBC engage in outdoor activities more frequently than LBC ($\chi^2 = 16.63$; $p < .01$). In the LBC group, approximately 25.5% of children had a father who had been away for work for more than 1 year, and 18.5% had a mother who had been away for work for more than 1 year. The frequency of parental contact with LBC was low, with 26.8% of the children reporting they had almost no contact with their parents or were uncertain of the contact and 47.7% reporting that each communication with their parent lasted <30 minutes.

The results in Table 2 show that the prevalence of emotional and behavioral problems in LBC was 15.6%, whereas the prevalence in NLBC was 11.6% ($\chi^2 = 12.78$; $p < .01$). In terms of SDQ factors, the prevalence of emotional symptoms in LBC was 11.7% higher than that in NLBC ($\chi^2 = 26.48$; $p < .01$). The prevalence of attention-deficit hyperactivity disorder in LBC was 7.4%, which was higher than the prevalence of 4.9% in NLBC ($\chi^2 = 10.77$; $p = .01$). The prevalence of a child feeling unhappy because of academic pressure or performance over the past 6 months for LBC was 56.2%, which was higher than the prevalence of 50.8% among NLBC ($\chi^2 = 10.33$; $p = .001$). A total of 28.4% of LBC had ever had insomnia, whereas 23.0% of NLBC had insomnia

Table 1

Differences between LBC and NLBC stratified by demographic characteristics, left-behind status, and parent–child communication

Variable	Left-behind (n = 1,147)	Controls (n = 3,953)	χ^2/Z	df	p value
Age	9.47 ± .74	9.44 ± .72	-.04	1	.965
Gender			.109	1	.741
Female	603 (52.6)	2,100 (53.1)			
Male	544 (47.4)	1,853 (46.9)			
Ethnicity			3.212	1	.073
Han	1,034 (90.1)	3,630 (91.8)			
Others	113 (9.9)	323 (8.2)			
Living in a dormitory			2.269	1	.132
Yes	148 (12.9)	446 (11.3)			
No	999 (87.1)	3,507 (88.7)			
Father's level of education			5.654	2	.059
No school	28 (2.5)	154 (4.0)			
Elementary school	275 (24.3)	912 (23.4)			
Junior high school and above	829 (73.2)	2,824 (72.6)			
Mother's level of education			2.036	2	.361
No school	58 (5.2)	179 (4.6)			
Elementary school	324 (28.9)	1,199 (30.9)			
Junior high school and above	739 (65.9)	2,498 (64.4)			
Number of brothers or sisters living with the child			4.94	2	.085
0	201 (17.5)	697 (17.6)			
1	429 (37.4)	1,610 (40.7)			
≥2	517 (45.1)	1,646 (41.6)			
Family economic level			5.29	2	.071
High	182 (16.0)	589 (15.0)			
Middle	536 (47.0)	1,993 (50.9)			
Low	422 (37.0)	1,336 (34.1)			
Outdoor activity frequency			16.63	3	<.01
Once a day	559 (48.7)	2,005 (50.7)			
Once a week	243 (21.2)	955 (24.2)			
Once a month	31 (2.7)	127 (3.2)			
Never	315 (27.4)	866 (21.9)			
How long has the father been away most recently?					
.5 y–1 y	850 (74.5)				
1 y–2 y	208 (18.2)				
≥2 y	83 (7.3)				
How long has the mother been away most recently?					
.5 y–1 y	923 (81.5)				
1 y–2 y	124 (11.0)				
≥2 y	85 (7.5)				
How often do the parents contact the children?					
Every day or week	653 (57.6)				
1 week to 1 month	176 (15.5)				
Uncertain or not	304 (26.8)				
How long does each communication last?					
> 30 minutes	156 (13.8)				
10–30 minutes	437 (38.5)				
< 10 minutes	541 (47.7)				

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

($\chi^2 = 14.41$; $p < .01$). With regard to loneliness, 37.1% of LBC experienced loneliness, whereas only 26.6% of NLBC experienced loneliness ($\chi^2 = 47.58$; $p < .01$). Concerning the prevalence of

stopping normal activity because of sadness and despair, 12.1% of LBC and 7.9% of NLBC reported experiencing this ($\chi^2 = 19.97$; $p < .001$). The prevalence of self-harm for LBC was 10.2%, which is higher than the prevalence of 6.9% among NLBC ($\chi^2 = 13.91$; $p < .001$). The percentage of LBC who were online or playing on mobile phones for more than 4 hours per day in the past week was higher than that of NLBC.

Table 3 shows the variables that were significantly different between LBC with abnormal SDQ scores ($n = 179$) and those with normal SDQ scores ($n = 968$). These variables included age, length of time father/mother had been away for work, tried smoking, tried drinking, Internet access and hours used, playing with a cell phone and hours used, insomnia, loneliness, self-harm, and sadness and despair. These statistically significant variables and some other important variables, such as age and gender, were included in the logistic regression analysis. Table 4 shows the risk factors and their relation to abnormal SDQ scores among LBC, including insomnia (odds ratio [OR] 1.54, 95% confidence interval [CI] 1.04–2.27), loneliness (OR 1.65, 95% CI 1.13–2.43), and self-harm (OR 1.92, 95% CI 1.17–3.16).

Discussion

To the best of our knowledge, this is the first study to use a cross-sectional and comparative design to assess the prevalence

Table 2

Left-behind group and control group comparison of SDQ, negative emotions, and risk behaviors

Variables	Left-behind ($n = 1,147$)	Controls ($n = 3,953$)	χ^2	df	p value
Total difficulties score >17	179 (15.6)	460 (11.6)	12.78	1	<.01
Emotional symptoms >5	134 (11.7)	276 (7.0)	26.48	1	<.01
Conduct problems >4	123 (10.7)	358 (9.1)	2.89	1	.089
Hyperactivity-inattention issues >6	85 (7.4)	194 (4.9)	10.77	1	.010
Peer problems >5	157 (13.7)	569 (14.4)	.38	1	.540
Prosocial behaviors <5	115 (10.0)	350 (8.9)	1.45	1	.228
Feel academic pressure			10.33	1	.001
Yes	645 (56.2)	2,010 (50.8)			
No	502 (43.8)	1,943 (49.2)			
Insomnia			14.41	1	<.001
Yes	326 (28.4)	908 (23.0)			
No	821 (71.6)	3,045 (77.0)			
Loneliness			47.60	1	<.001
Yes	425 (37.1)	1,050 (26.6)			
No	722 (62.9)	2,903 (73.4)			
Self-harm			13.91		<.001
Yes	117 (10.2)	272 (6.9)			
No	1,030 (89.8)	3,681 (93.1)			
Online time			11.66	2	.003
No	1,015 (88.5)	3,367 (85.2)			
<4 hours	122 (10.6)	565 (14.3)			
≥4 hours	10 (.9)	21 (.5)			
Playing on mobile phones			24.44	2	<.001
No	834 (72.7)	2,586 (65.4)			
<4 hours	301 (26.2)	1,339 (33.9)			
≥4 hours	12 (1.0)	28 (.7)			
Smoking			.003	1	.959
Yes	107 (9.5)	375 (9.6)			
No	1,014 (90.4)	3,533 (90.4)			
Drinking			.25	1	.617
Yes	196 (17.4)	705 (18)			
No	933 (82.6)	3,210 (82)			

SDQ = Strengths and Difficulty Questionnaire.

of emotional and behavioral problems in LBC at a specific age (8–11 years) in a large number of rural areas. The LBC and NLBC groups were not significantly different with regard to general demographic variables, such as gender, ethnicity, living in a dormitory, living with several brothers and sisters, father's education level, and mother's education level.

The prevalence of emotional and behavioral problems was 15.6% for LBC and 11.6% for NLBC. Significant differences were found between the two groups, indicating that more emotional and behavioral problems occurred in the LBC group than in the NLBC group due to prolonged absences of parents working outside the home. The results of this survey were consistent with the results of a meta-analysis performed in 2018 [24]. This meta-analysis included a total of 111 studies encompassing 106,167 LBC and 158,800 NLBC. The results of this study showed that compared with NLBC, LBC were at a higher risk of experiencing depression (risk ratio [RR] 1.52, 95% confidence interval [CI] 1.27–1.82), anxiety (RR 1.85, 95% CI 1.36–2.53), and behavioral problems (RR 1.16, 95% CI .88–1.52).

LBC had significantly higher scores than NLBC on some of the subscales of the SDQ, including hyperactivity-inattention issues and emotional symptoms. Although these results are consistent with previous results from a study in Wuhan [25], our survey data from fourth graders across 11 provinces and one municipality of mainland China are quite unique and add much-needed context to this area of research.

Focusing on issues among LBC, previous studies have postulated that the longer parents (especially the mother) are away from their child for work, the greater the risk that the child will develop emotional and behavioral problems. However, this study suggests that the length of time that the parents have been away for work is not a risk factor for increased emotional and behavioral problems. Similarly, many may assume that the frequency of the parents' communication with their LBC (by letter, telephone, and video) and duration of each communication are important factors; however, no relevant results have been obtained from this study supporting those claims. Although our results did not find statistically significant associations between these issues, it is possible that the questions asked in this study did not sufficiently explore these specific factors, especially because no questions were asked about the exact content of the communication.

In this study, the prevalence of risk behaviors among the LBC group, such as trying smoking and trying drinking, did not significantly differ from the NLBC group. However, in the LBC group, the prevalence of risk behaviors, such as smoking, drinking, playing on mobile phones more than 4 hours per day, and surfing the Internet for more than 4 hours per day, was significantly higher in children with abnormal SDQ scores (total score > 17 points) than in children with normal SDQ scores. Furthermore, this study found the drinking rate of LBC to be 17.4%, which is higher than the previously documented drinking rate of 14.0% for LBC in Shandong Province with two parents away for work [26]. The study found that Internet use and spending time on a cell phone differed significantly between LBC and NLBC; however, the analysis showed that these differences were not statistically significant risk factors for emotional and behavioral problems among LBC.

Previously, one study [27] of adolescents using the criteria of the DSM-5 reported that the prevalence of nonsuicidal self-harm among rural youth in China was 12.2%. In our study, the prevalence of self-harm was 10.2% among LBC and 6.9% among NLBC. For the LBC with an abnormal SDQ total score, the prevalence of self-harm behavior was 21.8%, indicating that self-harm is not rare.

Table 3

Risk factors related to emotional behavior abnormalities in LBC (n = 1,147)

Variable	Abnormal (n = 179), n (%)	Normal (n = 968), n (%)	χ^2/Z	p value
Gender			1.66	.198
Female	102 (57.0)	501 (51.8)		
Male	77 (43.0)	467 (58.2)		
Age	9.59 ± .75	9.44 ± .74	−2.90	.017
Race			2.15	.143
Han	156 (87.2)	878 (90.7)		
Others	23 (12.8)	90 (9.3)		
Living in a dormitory			2.05	.152
Yes	29 (16.2)	119 (12.3)		
No	150 (83.8)	849 (87.7)		
Main caregiver			.82	.664
Grandparents	169 (94.9)	919 (95.5)		
Other relatives	6 (3.4)	34 (3.5)		
Siblings	3 (1.7)	9 (.9)		
Caregiver's level of education			1.49	.474
No school	41 (23.2)	204 (21.4)		
Elementary school	92 (52.0)	543 (56.9)		
Junior high school and above	44 (24.9)	208 (21.8)		
Father's level of education			3.98	.136
No school	7 (4.0)	22 (2.3)		
Elementary school	50 (28.4)	225 (23.5)		
Junior high school and above	119 (67.6)	710 (74.2)		
Mother's level of education			2.48	.289
No school	11 (6.2)	47 (5.0)		
Elementary school	58 (33.0)	266 (28.1)		
Junior high school and above	107 (60.8)	632 (66.9)		
Number of brothers and/or sisters living with the child			.54	.762
0	30 (16.9)	170 (17.6)		
1	71 (39.9)	358 (37.0)		
≥2	77 (43.3)	440 (45.5)		
Family economic level			.64	.725
High	25 (14.0)	157 (16.3)		
Middle	87 (48.9)	449 (46.7)		
Low	66 (37.1)	356 (37.0)		
Outdoor activity frequency			.78	.377
No		261 (27.0)		
Yes	129 (69.8)	707 (73.0)		
Most recent length of time father has been away			6.78	.032
.5 y–1 y	119 (66.9)	732 (76.0)		
1 y–2 y	41 (23.0)	167 (17.3)		
≥2 y	18 (10.1)	64 (6.6)		
Most recent length of time mother has been away			2.09	.352
.5 y–1 y	137 (77.8)	786 (82.2)		
1 y–2 y	22 (12.5)	102 (10.7)		
≥2 y	17 (9.7)	68 (7.1)		
How long has it been since the child has seen his/her parent(s)			4.25	.120
<6 mo	64 (35.8)	286 (29.5)		
6 mo to 1 y	94 (52.5)	588 (60.1)		
≥1 y	21 (11.7)	94 (9.7)		
How often does the parent contact the child?			5.05	.080
Every day or week	92 (52.3)	560 (58.6)		
1 week to 1 month	37 (21.0)	139 (14.5)		

(continued on next page)

Table 3

Continued

Variable	Abnormal (n = 179), n (%)	Normal (n = 968), n (%)	χ^2/Z	p value
Uncertain or none	47 (26.7)	257 (26.9)		
Length of communication each time			.52	.771
≥30 minutes	27 (15.3)	129 (13.5)		
10–30 minutes	69 (39.0)	368 (38.5)		
<10 minutes	81 (45.8)	460 (48.1)		
Tried smoking			4.98	.026
No	145 (85.8)	868 (91.3)		
Yes	24 (14.2)	83 (8.7)		
Tried drinking alcohol			4.92	.027
No	132 (76.7)	801 (83.7)		
Yes	40 (23.3)	156 (16.3)		
Internet access			13.38	.001
No	145 (81.0)	871 (89.9)		
<4 hours	30 (16.8)	92 (9.5)		
≥4 hours	4 (2.2)	6 (.6)		
Play on the cell phone			12.34	.002
No	112 (62.6)	722 (74.6)		
<4 hours	63 (35.2)	238 (24.6)		
≥4 hours	4 (2.2)	8 (.8)		
Watch TV			1.55	.461
No				
<4 hours				
≥4 hours				
Academic pressure stress			23.05	<.001
No	49 (27.4)	453 (46.7)		
Yes	130 (72.6)	516 (53.3)		
Insomnia			29.53	<.001
No	98 (54.7)	723 (74.7)		
Yes	81 (45.3)	245 (25.3)		
Loneliness			32.18	<.001
No	79 (44.1)	643 (66.4)		
Yes	100 (55.9)	325 (33.6)		
Self-harm			31.09	<.001
No	140 (78.2)	890 (91.9)		
Yes	39 (21.8)	78 (8.1)		
Sadness and despair			18.17	<.001
No	39 (21.8)	101 (10.4)		
Yes	140 (78.2)	867 (89.6)		

LBC = left-behind children.

Among the limitations of this study was the method of sampling, which was slightly biased; therefore, the results may not be generalizable. The student questionnaire was a self-report assessment, and they may not have admitted some of their emotions and behaviors. Because of the constraints of the conditions, we were not able to obtain more emotional and behavioral information from the caregivers of LBC.

This study found that the prevalence of negative emotions, such as academic stress, loneliness, sadness, and despair, was significantly higher among LBC than among NLBC. The multiple regression analysis and findings featured in this study indicate that insomnia, loneliness, and self-harm behavior are issues that must be addressed among LBC across China. If the caregivers or teachers of LBC find that some of the children have these problems, they should pay more attention to these children and seek professional help. More public health policies should be formulated to improve the mental health of LBC.

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Table 4

Risk factors associated with SDQ score abnormalities in LBC

Variable	B	OR	95% CI	p value
Age	.245	1.28	1.01–1.60	.032
How long has the father been away most recently?				.176
.5 y–1 y		1		
1 y–2 y	.381	1.46	.92–2.33	.107
≥2 y	.476	1.61	.81–3.21	.175
How long has it been since the child has seen his/her parents?				.208
<6 mo		1		
6 mo to 1 y	–.347	.71	.42–1.05	.082
≥1 y	–.337	.71	.36–1.41	.334
How often does the parent contact the child?				.184
1 day to 1 week		1		
1 week to 1 mo	.413	1.51	.95–2.41	.084
Uncertain or none	–.019	.98	.64–1.50	.931
Length of communication each time				.823
>30 minutes		1		
10–30 minutes		1.06	.61–1.85	.843
<10 minutes		.93	.54–1.63	.810
Try smoking	.19	1.21	.68–2.14	.516
Try drinking	.152	1.16	.74–1.83	.511
Internet access				.420
No		1		
<4 hours	.302	1.35	.79–2.33	.275
≥4 hours	.744	2.10	.37–11.86	.399
Play on the cell phone				.449
No		1		
<4 hours	.251	1.29	.86–1.92	.223
≥4 hours	.417	1.52	.30–7.65	.613
Academic pressure	.366	1.44	.96–2.17	.080
Insomnia	.431	1.54	1.04–2.27	.030
Loneliness	.502	1.65	1.13–2.43	.011
Sadness and despair	–.553	.58	.36–.93	.023
Self-harm	.652	1.92	1.17–3.16	.010
Constant	–4.167	.016		.001

CI = confidence interval; LBC = left-behind children; OR = odds ratio; SDQ = Strengths and Difficulty Questionnaire.

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