

Externalizing behavior problems and influencing factors among hui nationality left-behind children in rural areas of China

Xue Yu (✉ yuxue200704@126.com)

Beijing First Hospital of Integrated Traditional Chinese and Western Medicine <https://orcid.org/0000-0002-1556-4904>

Qiuli Li

Ningxia Medical University

Lingling Wang

Luoyang Fifth people's Hospital

Miaomiao Liu

Yinchuan University of Energy

Xiuying Dai

Ningxia Medical University

Lingui Li

Ningxia Medical University

Research article

Keywords: hui nationality, left-behind children, externalizing behavior problems, rural areas

Posted Date: May 3rd, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-19515/v1>

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

Abstract

Background Externalizing behavior problems (EBP) is being increasingly viewed as a public health problem. Few studies have addressed EBP in Chinese hui nationality left-behind children (LBC). The aims of this current study to explore the prevalence of EBP and its influencing factors among hui nationality LBC in rural areas of China.

Methods A cross-sectional study was conducted among school students from the southern rural areas in Ningxia, China (2012–2013). The general self-made questionnaire, Egma Minnen av Bardndosnauppforstran (EMBU), Eysenck Personality Questionnaire (EPQ for Children), Piers-Harri Children's Self-concept Scale (PHCSS) and Achenbach's Child behavior Checklist (CBCL for parents) were used to investigate the related information. Descriptive analysis and logistic regressions were conducted.

Results The prevalence of EBP in hui nationality LBC and non-left-behind children(non-LBC) were 12.01% (46/383) and 8.57% (49/572), respectively, and there was no significant difference between them ($\chi^2 = 3.037$, $P = 0.081$). Multivariate logistic regression analysis showed that low self-concept of behavioral (OR = 13.709), introversion (OR = 11.188) and intermediate personality (OR = 9.349) were risk factors for EBP of hui nationality LBC, while the intermediate type of mother refusal and denial (OR = 0.430) was their protective factor.

Conclusions Our findings suggest that parental migration is a risk factor for EBP among hui nationality LBC in rural China. And measures should be taken from self-concept development, personality development, and family education for the prevention of EBP of hui nationality LBC in rural areas of China.

Background

Children's behavioral problems refer to the abnormal behaviors that affect children's social functions, including behavioral and emotional problems. An important distinction in the field of child psychology is the separation between 'externalizing' and 'internalizing' disorders[1]. Externalizing behavior problems (EBP) refer to a group of behavior problems that are evident in children's outward behaviour[2]. This study focuses on childhood's externalizing behavior, which is a major risk factor for later juvenile delinquency, adult crime, and violence[3].

Since the reform and opening up to the outside world, with the continuous development of China's industrialization and urbanization during the past several decades, a large number of spare labor force transferred from rural areas to cities for work, resulting in a special population of left-behind children (LBC). The term "LBC" refer to children less than 16 years old staying in their rural hometowns and villages for more than half a year because both or one of their parents migrate to an urban area for work ,and were taken care of by their grandparents, relatives, neighbors, single parent, siblings or themselves[4]. According to the research report released by china women's federation[5] in 2013, there were about 61.02 million LBC in China, who were concentrated in the underdeveloped rural areas in the central and western regions, accounting for 37.7 percent of the total number of rural children and 21.9 percent of the total number of children in China. LBC are in a critical period of psychological growth, and the long-term absence of the role of parents will cause lasting negative impacts on their psychological development[6, 7], which is prone to cognitive deviation and higher behavioral problems[8-10], among which delinquency , aggression and other externalizing behavior problems(EBP) are being increasingly viewed as a public health problem. If these problems of adolescent are not corrected, it will seriously affect the healthy development of adolescents and lead to social problems such as juvenile delinquency and adult violence[11]. Moreover, previous research also reported that the EBP could cause mental illness. For example, Mathyssek [12] et al. found that the social problems, thought problems and externalizing scales predicted adolescent panic attack onset. Roza[13] found that the EBP in children and adolescents were predictive of anxiety disorders in young adulthood.

Ningxia hui autonomous region is located in the northwest of China, with a population of 6.3014 million. According to the unified calculation of the national bureau of statistics, the initial calculation of Ningxia's GDP in 2019 is 374.848 billion yuan, ranking 29th among 31 provinces in China and relatively backward in economy. The main ethnic groups in Ningxia are hui and

han, among which the hui population accounts for about 1/3 of the total population of the autonomous region, accounting for 98.24% of the minority population of the autonomous region, and one fifth of the country's hui population. The hui population in the southern mountainous region of Ningxia accounted for more than 60 percent. Xiji and Haiyuan, two national-level poverty-stricken counties in the southern mountainous region, are the gathering places of hui nationality, with severe water shortage, barren land, closed transportation, backward economy and large labor export. In 1972, it was identified as one of the most unsuitable regions for human survival by the United Nations Food Development Agency. There were about 11.2 thousand left-behind children. However, few studies on hui nationality LBC were reported in China. Zhao Miaomiao et al. [14] showed that the mental health of LBC in rural areas was worse than that of non-LBC in Guyuan of China. Feng Yutao et al. [15] took Yongning County as the investigation site and found that the detection rate of behavioral problems of hui nationality LBC was 31.25%, which was far higher than 17.84% of Han nationality LBC. Previous studies have shown that children's psychological behavioral problems are related to a variety of factors, including children's personality characteristics [16], self-concept [17-19], parenting behaviors [20, 21], and family environment factors [19] and so on. Du Yasong et al. showed that family structure and environment were closely related to children's behavioral development [22], and LBC as special family structure will have more emotional [23] and social behavior problems [24]. Existing results showed a sizable adverse effect of exposure to parental migration on the health and education outcomes of children [25]. Numerous studies have shown that parental migration has a negative impact on EBP in children [23, 26-31]. Some research showed that changes in family structure in early childhood [32], poor family communication and decreased maternal positive reappraisal [33] were statistically associated with children's later elevated EBP. Another study found children exposed to maternal intimate partner violence (IPV) were more likely to have borderline to clinical level scores on EBP [34]. Similarly, Bair-Merritt MH documented that significant associations between maternal IPV and internalizing and externalizing [35]. However, the existing literature has not reported the research on EBP of hui nationality LBC, and there is still a lack of research with large sample sizes that could reveal the actual background of EBP in these children.

As we know, China is a multi-ethnic country, the party and government have always been concerned about the development of the western ethnic minority areas, and have fully implemented the strategy of developing the western region in order to promote the economic and cultural development of the ethnic minority areas and improve people's living standards and health. Therefore, this present study aims to answer three research questions. First, it examines the prevalence of EBP as well as the prevalence of each specific syndrome among hui nationality LBC. Second, given the potential impacts of individual characteristics, self-concept, family environmental factors on child psychological health, this study investigates the association between multi-level risk factors and children's EBP. Last but not least, this study is interested in the EBP of hui nationality LBC under the influence of Islamic cultural background. This study investigated 383 hui nationality LBC, trying to explore the factors related to the EBP of hui nationality LBC, which was of great significance for promoting their mental health, formulating relevant ethnic policies and maintaining social stability. These findings provide significant implications for future research and the development of interventions.

Methods

Subjects

The survey was a sub-project of the demonstration study on the integration and application of key technologies in the nutritional health of rural key populations. Data were obtained from a cross-sectional survey conducted in two counties Xiji, Haiyuan of Ningxia Hui Autonomous Region in southern rural mountains from December 2012 to September 2013. Using multi-stage stratified random cluster sampling methods, we selected six primary schools, 5 junior high schools in XinYing Township, HongYao township, XingLong town, Xi 'An town, ShuTai township from Xiji and Haiyuan counties. One class from grade 1 to grade 9 was randomly selected from each school. A total of 41 classes were selected for the survey. A total of 2000 questionnaires were distributed, and 1905 valid ones were recovered, with an effective rate of 95.25%, among which 955 (50.1%) hui nationality children were the subjects of this study. The 955 hui nationality students were divided into LBC group (n=383) and non-LBC group (n=572). Inclusion criteria for LBC: who stay in rural areas for more than half a year while their both parents or single parents working outside. They are taken care of by their grandparents, relatives, neighbors, single

parent, siblings or themselves. They are aged from 6 to 16 years old. Exclusion criteria: whose both parents or single parent has worked outside for less than 6 months; Having a serious physical or mental illness.

Measuring tool

Sociodemographic characteristics: Participants reported their gender, age, nationality, grade, class, family situation, academic performance, caregiver and their education level, parents' education level and occupation, frequency contact with parents, frequency contact with parents, etc.

Achenbach's Child behavior Checklist (CBCL): Achenbach's Child behavior Checklist was developed by Achenbach, Ph.D, American psychology. Published in 1976[1], revised for the first time in 1983 [36], and revised again by Achenbach et al in 1991[3]. There are three versions including parent report version, teacher report version and self-assessment of older children, among which the parent version has the most experience and is the basis of the scale. This scale is applicable to children aged 4 to 16 years and has been widely used in the world. China has also introduced and standardized the scale and formulated the national and hunan norm[37, 38]. In this study, the school-age version checklists included 113 items to identify the children's behavioral problems[4], it was mainly used to assess children's various types of behavior for nearly six months by instructing parents or caregivers who were familiar with the children to report the children's behavioral problems on a 3-point Likert scale (0=not true, 1=somewhat or sometimes true, 2=very true or often true). Male and female students each had eight to nine specific syndromes, including schizoid, depressed, uncommunicative, obsessive-compulsive, somatic complaints, social withdrawal, hyperactivity, aggression and delinquent behavior. Through principal component analysis of the above factors, two dimensions, namely internalizing behavior problem and externalizing behavior problems (EBP), were obtained. We calculated raw scores of specific syndromes, which were used to compare with scores of the norm sample. The higher the score, the more obvious the behavior problem was. In this survey, boys' EBP included hyperactivity, delinquent and aggression; Girls' EBP include hyperactivity, sexual problems, delinquent, aggression and cruel. In this study, Children whose raw scores were above the upper threshold of the norm sample in at least one syndrome were considered to have behavioral disorders[38]. The score of EBP was calculated by adding the the corresponding syndrome scores, in which repeated items were not scored accumulatively.

Egna Minnen av Barndoms Uppfostran (EMBU) This scale was developed by C. Perris et al., department of psychiatry, Umea university, Sweden, in 1980 to evaluate parenting attitudes and behaviors. This study adopted the Chinese version revised by Dongmei Yue [39]in1993. Cultural differences between Chinese individuals and Western individuals are considered in the revised version, which consists of 66 items and 11 syndromes. Among them, there are 58 items of paternal rearing style, with a total of 6 syndroms, including emotional warmth and understanding, punishment and strictness, over-interference, favoring subjects, refusal and denial and over-protection, There were 57 items of maternal rearing style, with a total of 5 syndroms, including emotional warmth and understanding, over-interference and over-protection, refusal and denial, punishment and strictness and favoring subjects. The test-retest reliability is between 0.58 and 0.82. The split-half reliability is between 0.50 and 0.91, and the internal consistency reliability is between 0.59 and 0.88. Each item is scored according to never =1, occasionally =2, often =3, always =4, and unsuitable =0. The score was determined according to the norm mean score \pm standard deviation. Factors $<$ mean score - standard deviation was low score, $>$ mean score + standard deviation was high score, and the rest was medium score.

Eysenck Personality Questionnaire (EPQ) : Personality was assessed using eysenck personality questionnaire for Chinese children which revised by Yao-xian Gong,et al[40]. This version has 88 true-false items and includes four subscales: evaluating neuroticism (N), extroversion-introversion (E), psychoticism (P), and Lie (L) dimensions. Part of the scale is the reverse scoring title. We calculated raw scores of each subscale, and converted into standard T points, standard T $<$ 38.5 for typical low score, 38.5 to 43.3 for tended to low score, 43.3 to 56.7 for the medium type, 56.7 to 61.5 as the tendency to high score, $>$ 61.5 for the typical high score. The Cronbach's alpha was 0.70 for the total scale, 0.76, 0.76, 0.88, and 0.77 for E, P, N, and L, respectively.

Piers Harris Child's self-concept Scale (PHCSS): Children's self-concept Scale (PHCSS) is a self-rating Scale for Children compiled by American psychologists Piers and Harris in 1969 and revised in 1974. It is mainly used to evaluate Children's self-concept. It is composed of 80 items, including 6 subscales of behavioral, intelligence and school status, physical appearance and attributes, anxiety, popularity, happiness and satisfaction. The answer is 1, no 0, part of the question is the reverse score. In 2002, Su linyan et al. introduced, revised and formulated Chinese city norm [39, 41], with good reliability and validity. The factor score was determined according to the norm mean score \pm standard deviation, the factors $<$ mean score - standard deviation was low score, the $>$ mean score + standard deviation was high score, and the rest was medium score. The higher the total score or the score of a factor was, the stronger the self-awareness or self-awareness in a certain aspect was. For example, a high "behavior" score indicates that the child is behaving appropriately, and a high "anxiety" score indicates that the child is in good mood and not anxious. The half-reliability of PHCSS scale $r = 0.8176$ and the Cronhach 'a coefficient was 0.858, which was suitable for the measurement of children's self-concept in China.

Measures

We have obtained the approval and support from the local education bureau and the leaders of the investigated schools. The head teacher issue the informed consent for investigation to the WeChat group of parents, and explain the purpose and significance of the investigation in detail to the students and parents/guardians, as well as the way of filling in the questionnaire and the confidential method. Written informed consent signed by the participants and their parents/guardians is brought back to the school. The head teacher then handed over written informed consent from the participants to the researchers. After distributing the questionnaire uniformly in the class, we asked participants to complete the questionnaire within the prescribed time (60 ~ 80 min), and checked and withdrew the questionnaire on the spot. For grade 1 to grade 3 students, the investigator read each item to the subjects in neutral, non-suggestive language, and asked them to understand and then answer. Achenbach's Child Behavior Checklist (CBCL) should be taken home by the student and submitted to the caregiver for filling out after communication between the head teacher and their parents and shall be taken back within 3 days. For missing students or incomplete answers to the students, we took household supplementary survey. All investigators received training in advance.

Statistical analyses

Epidata3.0 software was used to establish the database, double input data, and the software SPSS 19.0 for Windows was used for all statistical analyses. A Chi-square test was used for categorical variables and a t test was used for continuous variables. Binary logistic regression was employed to analysis the risk factors of EBP of hui nationality LBC. The value of p takes the probability of two sides, and α takes 0.05 as a test standard.

Results

Sample Description

As can be seen in Table 1, a total of 955 hui nationality children were investigated. Among them, 383 children were hui nationality LBC, 50.7% of hui LBC were male. In terms of the age distribution, 29.8% of hui LBC were aged 6 to 11 years, and the average age was (12.86 ± 2.77) years. There were 572 hui nationality non-LBC, among whom 263 were male (46.0%). 181 (31.6%) were aged 6 to 11, and the average age was (12.62 ± 2.49) years. There was no significant difference between the two groups in age and gender ($P > .05$), however, there was a significant difference between the two groups in Father's occupation ($P = 0.00$), Mother's occupation ($P = 0.003$) and Parents' divorced ($P = 0.039$). (See Table 1 for details)

Table 1
The demographic characteristics between hui nationality LBC and non-LBC.

Characteristics		LBC(n = 383)		non-LBC(n = 572)		χ^2	P-value
		N	%	N	%		
Gender	male	194	50.7	263	46.0	2.008	0.156
	female	189	49.3	309	54.0		
Age group	aged 6–11	114	29.8	181	31.6	0.379	0.538
	aged 12–16	269	70.2	391	68.4		
Average age(years)	Mean (SD)	12.86(2.768)		12.62(2.49)		1.402▲	0.161
Only child	yes	15	3.9	16	2.8	0.915	0.339
	no	368	96.1	556	97.2		
Mother alive	yes	375	97.9	567	99.1	2.521	0.112
	no	8	2.1	5	0.9		
Father's education level	junior high school or higher	77	20.1	123	21.5	0.271	0.603
	primary school or lower	306	79.9	449	78.5		
Maternal education level	junior high school or higher	29	7.6	49	8.6	0.303	0.582
	primary school or lower	354	92.4	523	91.4		
Caregiver's education level	junior high school or higher	76	19.8	123	21.5	0.383	0.536
	primary school or lower	307	80.2	449	78.5		
Academic performance	good	53	13.8	102	17.8	3.857	0.145
	moderate	262	68.4	358	62.6		
	poor	68	17.8	112	19.6		
Frequency of contact with teachers	at least once a week	26	6.8	38	6.6	5.518	0.138
	at least once a month	47	12.3	92	16.1		
	> once a month	222	58.0	291	50.9		
	never contact	88	23.0	151	26.4		
Father alive	yes	373	97.4	561	98.1	0.505	0.477
	no	10	2.6	11	1.9		
Father's occupation	farmers	233	60.8	440	76.9	28.531	0.000
	non- farmers	150	39.2	132	23.1		
Mother's occupation	farmers	287	74.9	474	82.9	8.917	0.003

Note: Data are number (percentage) or mean (SD). ▲ *t*-test. *P* values are from *t*-test (continuous variables). LBC: left-behind children; non-LBC: non- left-behind children.

Characteristics		LBC(n = 383)		non-LBC(n = 572)		χ^2	P-value
		N	%	N	%		
	Not farmers	96	25.1	98	17.1		
Parents' divorced	yes	16	4.2	11	1.9	4.244	0.039
	no	367	95.8	561	98.1		

Note: Data are number (percentage) or mean (SD). ▲ *t*-test. *P* values are from *t*-test (continuous variables). LBC: left-behind children; non-LBC: non- left-behind children.

The prevalence of EBP in hui nationality children

Table 2 showed that the overall prevalence of EBP of 955 hui nationality children was 9.95% (95/955), among whom 383 hui LBC had a prevalence of 12.01% (46/383) and 572 hui non-LBC was 8.57% (49/572). There was no significant statistical difference between the two group ($\chi^2 = 3.037, P = 0.081$). And there was no significant statistical difference in the prevalence of EBP among hui nationality LBC and non-LBC in gender.

Table 2
Prevalence of EBP among different categories of hui nationality children (%)

Variables		externalizing behavior problems				
		Sample size	Number	prevalence	χ^2	<i>P</i> -value
Age group	aged 6–11	295	31	10.5	0.150	0.699
	aged 12–16	660	64	9.7		
LBC	yes	383	46	12.01	3.037	0.081
	non	572	49	8.57		
Boys	LBC	194	22	11.3	2.826	0.093
	non-LBC	263	18	6.8		
Girls	LBC	189	24	12.7	0.848	0.357
	non-LBC	309	31	10.0		
LBC	boys	194	22	11.3	0.167	0.683
	girls	189	24	12.7		
non-LBC	boys	263	18	6.8	1.844	0.175
	girls	309	31	10.0		

Prevalence of specific syndromes and EBP in hui nationality children aged 6 ~ 11 When examining the prevalence of specific syndromes and EBP in hui nationality children, we found that there was no significant difference in the prevalence of specific syndromes and EBP between hui nationality LBC and non-LBC aged 6 ~ 11 years (all $P > 0.05$). (See Table 3 for details)

Table 3
Prevalence specific syndromes and EBP in hui nationality children aged 6–11 years (%)

syndromes	Boys aged 6–11				Girls aged 6–11				
	LBC(n = 56)	non-LBC (n = 88)	χ^2	P-value	LBC (n = 58)	non-LBC (n = 93)	χ^2	P-value	
Schizoid	5(8.9)	7(8.0)	0.043	0.837	–	–	–	–	
Depressed	8(14.3)	7(8.0)	1.470	0.225	2(3.4)	6(6.5)	0.183	0.669	
uncommunicative	4(7.1)	10(11.4)	0.695	0.405	–	–	–	–	
Obsessive-Compulsive	4 (7.1)	9 (10.2)	0.396	0.529	–	–	–	–	
Somatic Complaints	1(1.8)	7(8.0)	1.446	0.229	5(8.6)	11(11.8)	0.388	0.533	
Social-Withdrawal	2(3.6)	5(5.7)	0.031	0.860	2 (3.4)	7 (7.5)	0.457	0.499	
Hyperactive	0(0)	0(0)	–	–	2(3.4)	5(5.4)	0.023	0.881	
Aggressive	2(3.6)	1(1.1)	0.159	0.690	1(1.7)	3(3.2)	0.001	0.970	
Delinquent	3(5.4)	4(4.5)	0.000	1.000	3 (5.2)	5 (5.4)	0.000	1.000	
Sex problems	–	–	–	–	2(3.4)	6 (6.5)	0.183	0.669	
Cruel	–	–	–	–	6(10.3)	6(6.5)	0.304	0.582	
Schizoid-Obsessive	–	–	–	–	7 (12.1)	9(9.7)	0.216	0.642	
Externalizing behavior	4(7.1)	5(5.7)	0.000	1.000	8(13.8)	14(15.1)	0.046	0.831	

Prevalence of specific syndromes and EBP in hui nationality children aged 12–16.

Table 4 showed that there were significant statistical differences in physical complaints, uncommunicative, obsessive-compulsive, hostility and delinquent (all $P < 0.05$) between hui nationality LBC and non-LBC in boys group aged 12–16 years. And there was no significant difference in the prevalence of specific syndromes between hui nationality LBC and non-LBC in girls group aged 12 to 16 years (all $P = > 0.05$), but the prevalence of EBP in hui nationality LBC (12.6%) was higher than that in non-LBC(7.7%) ($P = 0.034$).

Table 4
Prevalence specific syndromes and EBP in hui nationality children aged 12–16 years (%)

syndromes	Boys aged 12–16				Girls aged 12–16			
	LBC (n = 138)	non-LBC (n = 175)	χ^2	P- value	LBC (n = 131)	non-LBC (n = 216)	χ^2	P- value
Somatic Complaints	19(13.8)	10(5.7)	5.953	0.015	7(5.3)	6(2.8)	0.862	0.353
Schizoid	13(9.4)	7(4.0)	3.790	0.052	24(18.3)	34(15.7)	0.390	0.532
uncommunicative	14(10.1)	6(3.4)	5.819	0.016	–	–	–	–
Immature	6(4.3)	4(2.3)	1.061	0.303	10(7.6)	7(3.2)	3.377	0.066
Obsessive-Compulsive	20(14.5)	12(6.9)	4.901	0.027	–	–	–	–
Hostile	16(11.6)	5(2.9)	9.410	0.002	–	–	–	–
Delinquent	13(9.4)	3(1.7)	9.446	0.002	8 (6.1)	7 (3.2)	1.620	0.203
Aggressive	8(5.8)	7(4.0)	0.546	0.460	8 (6.1)	5 (2.3)	2.285	0.131
Hyperactive	9 (6.5)	5(2.9)	2.425	0.119	–	–	–	–
Anxious-Obsessive	–	–	–	–	7 (5.3)	9(4.2)	0.257	0.612
Depressed-Withdrawal	–	–	–	–	10(7.6)	18(8.3)	0.054	0.817
Cruel	–	–	–	–	12(9.2)	11(5.1)	2.180	0.140
Externalizing behavior	18(13.0)	13(7.4)	2.726	0.099	34(12.6)	30(7.7)	4.489	0.034

The CBCL syndromes scores of hui nationality LBC and non-LBC aged 6–11 years

As shown in the Table 5, except that the hyperactivity factor score of hui boys LBC (2.20 ± 2.25) was significantly lower than that of hui boys non-LBC (3.39 ± 3.01) ($t = 2.705, P < 0.05$), the difference of other syndromes was not statistically significant ($P > 0.05$).

Table 5
CBCL syndromes scores between hui nationality LBC and non-LBC aged 6–11 years(± s)

syndromes	Boys		<i>t</i>	<i>P</i>	Girls		<i>t</i>	<i>P</i>
	LBC(n = 56)	non-LBC(n = 88)			LBC (n = 58)	non-LBC (n = 93)		
Schizoid	2.13 ± 2.45	2.67 ± 2.53	-1.276	0.204	—	—	—	—
Depressed	3.11 ± 4.79	3.35 ± 4.43	-0.314	0.754	4.72 ± 4.44	4.91 ± 5.38	-0.225	0.822
uncommunicative	2.11 ± 2.52	2.39 ± 3.00	-0.578	0.564	—	—	—	—
Obsessive-Compulsive	2.80 ± 3.71	3.58 ± 4.11	-1.146	0.254	—	—	—	—
Somatic Complaints	1.34 ± 2.12	1.93 ± 2.92	-1.317	0.190	3.24 ± 3.75	3.55 ± 4.16	-0.458	0.648
Social-Withdrawal	1.34 ± 2.08	2.01 ± 2.40	-1.720	0.088	3.03 ± 3.05	3.08 ± 3.71	-0.070	0.944
Hyperactive	2.20 ± 2.25	3.39 ± 3.01	-2.705	0.008	3.05 ± 3.19	3.53 ± 3.74	-0.802	0.424
Aggressive	4.98 ± 6.19	5.45 ± 5.86	-0.029	0.997	4.62 ± 4.37	4.80 ± 5.80	-0.197	0.844
Delinquent	1.52 ± 2.69	2.16 ± 2.55	-1.438	0.378	0.74 ± 1.60	0.61 ± 1.24	0.553	0.581
Schizoid-Obsessive	—	—	—	—	1.74 ± 2.69	1.68 ± 2.90	0.136	0.892
Sex problems	—	—	—	—	0.93 ± 1.55	1.23 ± 1.76	-1.047	0.297
Cruel	—	—	—	—	0.98 ± 1.90	1.06 ± 1.78	-0.268	0.789
Externalizing behavior	8.07 ± 9.19	9.48 ± 8.75	-0.922	0.358	9.33 ± 9.20	10.23 ± 11.09	-0.516	0.607

The CBCL syndromes scores of hui nationality LBC and non-LBC aged 12–16 years

As shown in the Table 6, the hui nationality LBC of boy students had higher scores in schizoid, somatic complaints, uncommunicative, obsessive-compulsive, hostile, delinquent, aggression, hyperactivity and EBP than that of non-LBC ($P < 0.05$). The hui nationality LBC of girl students got higher scores in aggressive, cruel and EBP than that of non-LBC ($P < 0.05$).

Table 6
CBCL syndromes scores between hui nationality LBC and non-LBC aged 12–16 years(\pm s)

syndromes	Boys		<i>t</i>	<i>P</i>	Girls		<i>t</i>	<i>P</i>
	LBC (<i>n</i> = 138)	non-LBC (<i>n</i> = 175)			LBC (<i>n</i> = 131)	non-LBC (<i>n</i> = 216)		
Schizoid	3.66 \pm 3.18	2.74 \pm 2.58	2.746	0.006	2.69 \pm 2.83	2.39 \pm 2.56	1.020	0.308
Somatic Complaints	5.16 \pm 5.30	3.65 \pm 4.19	2.734	0.007	2.70 \pm 3.04	2.43 \pm 2.78	0.865	0.388
Uncommunicative	6.44 \pm 6.04	4.22 \pm 4.67	3.565	0.000	–	–	–	–
Immature	1.72 \pm 2.10	1.36 \pm 1.84	1.636	0.103	5.11 \pm 4.38	4.25 \pm 3.86	1.911	0.057
Obsessive-Compulsive	3.16 \pm 3.17	2.28 \pm 2.45	2.685	0.008	–	–	–	–
Hostile	4.62 \pm 4.81	3.33 \pm 3.33	2.683	0.008	–	–	–	–
Delinquent	3.08 \pm 3.78	2.29 \pm 2.71	2.081	0.038	4.63 \pm 4.32	3.76 \pm 3.56	1.921	0.056
Aggression	7.04 \pm 6.47	5.62 \pm 5.61	2.086	0.038	6.71 \pm 6.13	5.37 \pm 5.09	2.109	0.036
Hyperactive	3.96 \pm 3.49	2.98 \pm 3.04	2.637	0.009	–	–	–	–
Anxious-Obsessive	–	–	–	–	7.27 \pm 6.13	6.40 \pm 6.02	1.306	0.192
Depressed-Withdrawal	–	–	–	–	5.73 \pm 4.95	5.19 \pm 4.73	0.996	0.320
Cruel	–	–	–	–	2.19 \pm 3.49	1.36 \pm 1.96	2.504	0.013
Externalizing behavior	12.04 \pm 10.96	9.41 \pm 8.94	2.284	0.023	12.31 \pm 10.98	9.78 \pm 8.45	2.259	0.025

Univariate analysis results

First, chi-square test was conducted on the counting data that affected the incidence of EBP of hui nationality LBC, it was found that the frequency of contact with teachers, academic performance and parents' working out conditions were related to EBP of hui nationality LBC (all $P < 0.05$) (see Table 7 for details).

Table 7
Univariate analysis of the influence of general demographic data on EBP of hui nationality LBC (n = 383)

Characteristics		externalizing behavior problems			
		total number	positive number	χ^2	<i>P</i> -value
Gender	male	194	22	0.167	0.683
	female	189	24		
Caregiver's education level	junior high school or higher	76	10	0.118	0.731
	primary school or lower	307	36		
Age group	aged 6–11	114	12	0.338	0.561
	aged 12–16	269	34		
Father's education level	junior high school or higher	77	5	2.776	0.096
	primary school or lower	306	41		
Maternal education level	junior high school or higher	29	5	0.365	0.546
	primary school or lower	354	41		
Frequency of contact with teachers	at least once a week	26	2	10.01	0.018
	at least once a month	47	4		
	> once a month	222	21		
	never contact	88	19		
Academic performance	good	53	2	14.98	0.001
	moderate	262	27		
	poor	68	17		
Only child	yes	15	3	0.320	0.571
	no	368	43		
Parents' divorced	yes	16	1	0.110	0.740
	no	367	45		
Working out conditions	Single parents go out	252	24	4.311	0.038
	Both parents go out	131	22		
Father's occupation	farmers	233	28	0.000	0.996
	Not farmers	150	18		
Mother's occupation	farmers	287	30	2.628	0.105
	Not farmers	96	16		
Father alive	yes	373	46	0.428	0.236
	no	10	0		
Mother alive	yes	375	45	0.000	0.966
	no	8	1		

Second, t- test was conducted on the measurement data, the results showed that behavior, anxiety, popularity, happiness and satisfaction, total score of self-concept, father punishment and strictness, father favoring subjects, father refusal and denial, father over-protection, mother over-interference and over-protection, mother refusal and denial, mother punishment and strictness, extroversion-introversion (E), psychoticism (P),neuroticism(N), and Lie (L)were related to EBP of hui nationality LBC(see Table 8 for details)..

Table 8
Univariate analysis of the influence of measurement data on EBP of hui nationality LBC(n = 383) ($\pm s$)

Variables	externalizing behavior problems		t	P-value
	no(337)	yes(46)		
PHCSS				
Behavior	11.77 \pm 2.54	9.20 \pm 2.72	6.407	0.000
Intellectual and School Status	8.34 \pm 3.28	7.46 \pm 3.16	1.729	0.085
Physical Appearance and Attributes	5.60 \pm 2.76	5.52 \pm 2.69	0.179	0.858
Anxiety	8.21 \pm 2.52	6.93 \pm 2.59	3.210	0.001
Popularity	8.17 \pm 2.06	6.87 \pm 2.26	3.960	0.000
Happiness and Satisfaction	6.58 \pm 1.95	5.91 \pm 2.19	2.151	0.032
Total Score of self-concept	49.37 \pm 10.73	40.59 \pm 10.72	4.026	0.000
EMBU				
Emotional warmth and understanding(F)	44.31 \pm 9.59	43.04 \pm 10.25	0.835	0.405
Punishment and strictness(F)	19.28 \pm 5.81	23.67 \pm 8.12	-3.543	0.001
Over-interference(F)	18.64 \pm 4.61	20.41 \pm 6.23	-1.857	0.069
Favoring subjects(F)	8.71 \pm 3.10	10.00 \pm 3.67	-2.591	0.010
Refusal and denial(F)	9.16 \pm 3.12	11.20 \pm 4.29	-3.106	0.003
Over-protection(F)	10.28 \pm 2.58	11.20 \pm 2.78	-2.229	0.026
Emotional warmth and understanding(M)	47.46 \pm 9.35	44.72 \pm 8.80	1.881	0.061
Over- interference and over-protection(M)	34.07 \pm 6.62	36.48 \pm 6.89	-2.300	0.022
Refusal and denial(M)	13.01 \pm 4.03	16.13 \pm 4.82	-4.189	0.000
Punishment and strictness(M)	14.15 \pm 4.50	17.61 \pm 5.53	-4.062	0.000
Favoring subjects(M)	9.91 \pm 2.98	10.48 \pm 3.40	-1.201	0.232
EPQ				
Extroversion-introversion (E)	15.10 \pm 4.19	13.30 \pm 3.29	2.795	0.005
Psychoticism (P)	10.29 \pm 4.52	11.80 \pm 4.13	-2.154	0.032
Neuroticism (N)	4.53 \pm 2.76	6.43 \pm 2.96	-4.358	0.000
Lie (L)	13.44 \pm 4.25	11.59 \pm 3.72	2.815	0.005

Table 9
Assignment table of non-conditional Logistic regression analysis

Variables	The assignment
Externalizing behavioral problems(Y)	Negative = 0, Positive = 1
Behavior(X1)	Low score = 1,Medium score = 2 High score = 3
Anxiety(X2)	Low score = 1,Medium score = 2 High score = 3
Popularity(X3)	Low score = 1,Medium score = 2 High score = 3
Happiness and Satisfaction(X4)	Low score = 1,Medium score = 2 High score = 3
Total Score of self-concept(X5)	Low score = 1,Medium score = 2 High score = 3
Father punishment and strictness(X6)	Low score = 1,Medium score = 2 High score = 3
Father favoring subjects(X7)	Low score = 1,Medium score = 2 High score = 3
Father refusal and denial(X8)	Low score = 1,Medium score = 2 High score = 3
Father overprotection(X9)	Low score = 1,Medium score = 2 High score = 3
Mother over-interference and overprotection(X10)	Low score = 1,Medium score = 2 High score = 3
Mother refusal and denial(X11)	Low score = 1,Medium score = 2 High score = 3
Mother punishment and strictness(X12)	Low score = 1,Medium score = 2 High score = 3
Extroversion-introversion (X13)	Low score = 1,Medium score = 2 High score = 3
Psychoticism (X14)	Low score = 1,Medium score = 2 High score = 3
Neuroticism(X15)	Low score = 1,Medium score = 2 High score = 3
Lie(X16)	Low score = 1,Medium score = 2 High score = 3
Frequency of contact with teachers(X17)	at least once a week = 0;at least once a month = 1 > once a month = 2 never contact = 3
Academic performance(X18)	Good = 0, Moderate = 1 Poor = 2
Parents working out conditions(X19)	Father working out = 0;Mother working out = 1 Both parents working out = 2

Multivariate non-conditional logistic regression analysis results

As shown in the table 9 and Table 10, the total score of EBP of hui nationality LBC was taken as the dependent variable (negative = 0, positive = 1), and 19 factors with statistical significance in univariate analysis, including behavior, anxiety, popularity, happiness and satisfaction, total score of self-concept, father punishment and strictness, father favoring subjects, father refusal and denial, father overprotection, mother over-interference and overprotection, mother refusal and denial, mother punishment and strictness, extroversion-introversion, psychoticism, neuroticism, lie, frequency contact with teacher, academic performance and parents working out conditions were taken as the independent variables. Multivariate non-conditional logistic regression analysis, by using forward conditions, into the standard of $\alpha = 0.05$, exclusion criteria = 0.10, showed that low self-awareness of behavior, introversion and intermediate personality were the risk factors for the EBP of hui nationality LBC, while the intermediate type of mother refusal and denial was the protective factor for the EBP of hui nationality LBC.

Table 10
Results of multivariate logistic regression analysis predicting EBP of hui nationality LBC (n = 383)

variables	reference		B	S.E.	Wald	P-value	OR (95%CI)
behavior	High	Low	2.504	1.060	5.580	0.018	12.226(1.531 ~ 97.596)
		Medium	0.883	1.061	0.693	0.405	2.417(0.302 ~ 19.328)
mother refusal and denial	High	Low	-1.899	1.069	3.153	0.076	0.150(0.018 ~ 1.218)
		Medium	-0.967	0.372	6.771	0.009	0.380(0.184 ~ 0.788)
extroversion-introversion	High	Low	2.493	1.064	5.496	0.019	12.103(1.505 ~ 97.328)
		Medium	2.272	1.049	4.688	0.030	9.701(1.240 ~ 75.864)
frequency of contact with teachers	at least once a week	at least once a month	-0.005	0.949	0.000	0.996	0.995(0.155 ~ 6.395)
		> once a month	0.685	0.805	0.724	0.395	1.983(0.410 ~ 9.598)
		never contact	1.440	0.819	3.090	0.079	4.219(0.848 ~ 20.999)
constant			-5.827	1.596	13.327	0.000	0.003

Discussion

This study found that 95 out of 955 hui children had externalizing behavior problems, with a prevalence of 9.95%. Among the 383 hui LBC, 46 persons had EBP, with a prevalence of 12.01%. 49 out of 572 hui nationality non-LBC had EBP, with a prevalence of 8.57%. The prevalence of EBP was not statistically significant difference between hui nationality LBC and non-LBC. However, this study[42] found that the overall prevalence of behavioral problems of hui nationality LBC (25.1%) was significantly higher than that of hui nationality non-LBC (20.5%).The results was lower than the prevalence 41.3% reported by Wei-min Xu[8], But higher than 12.97% reported from China's 22 provinces to investigate children's behavior problems [43], and 17.6% of Xu Jing reported [44], also higher than 10.49% of shui LBC's behavior problem prevalence reported by Guo Guangwu[45] .In terms of the prevalence of EBP, the prevalence of hui nationality LBC was 12.01%, which was significantly higher than 4.03% of school-age children in rural areas of Harbin reported by Wu Lijie etc[46]. We analyzed that it could be related to ethnic cultural differences, different scales of use and differences in social development, but it was close to 13.2% of the prevalence of EBP in LBC reported by Hu H et al[47]. This study also found that there was no significant difference in the prevalence of EBP between boys and girls of hui LBC, which was consistent with the existing research results[46].

In this study, it was found that among LBC of hui nationality aged 6–11 years old, the top four prevalence of CBCL specific syndromes of male subjects were: depression(14.3%),schizoid(8.9%),obsessive-compulsive(7.1%),uncommunicative(7.1%)and EBP(7.1%). The top four prevalence of CBCL specific syndromes of female subjects were EBP (13.8%), schizoid-obsessive (12.1%), cruelty (10.3%) and somatic complaints (8.6%). There was no significant difference in prevalence of specific syndromes and EBP between hui nationality LBC and non-LBC aged 6 ~ 11 years, which was not consistent with that reported by liu shumiao et al[48].

Among the LBC of hui nationality aged 12–16 years old, the top four prevalence of CBCL specific syndromes of male students was: obsessive-compulsive (14.5%), somatic complaints (13.8%), EBP (13.0%) and hostility (11.6%). The top four

prevalence of CBCL specific syndromes for girls was schizoid (18.3%), EBP (12.6%), cruelty (9.2%), depression (7.6%) and immaturity (7.6%). This study found that with the growth of age, the prevalence of EBP of male hui nationality LBC showed an increasing trend, while the prevalence of female hui nationality LBC showed no increasing trend, but it was found that the female hui nationality LBC aged 12–16 had significantly higher EBP than non-LBC. This study suggest that children aged 12–16 with EBP not only may negatively affect their outside world, but also may be psychologically suffering internally. In other words, hui left-behind children aged 12–16 have the phenomenon of co-morbidity between externalizing and internalizing behavior problems[49], especially boys.

This study found that the score of hyperactivity factor of hui nationality LBC aged 6–11 years old was significantly lower than that of hui non-LBC, and there were no significant statistically difference in other factors of CBCL and EBP of hui nationality LBC compared with non-LBC. This was worthy of our attention, our study indicated that hui nationality LBC in low age groups might lead to their behavior convergence due to far away from parents and their inferiority complex. Another reason is that children at this age are in primary school. Because they are far away from their parents, they learn and master certain interpersonal skills. Compared with the psychological rebellion of middle school students when they entered adolescence, primary school students had simple and peaceful psychology and relatively few behavioral problems.

Our study showed that male hui nationality LBC aged 12–16 years old had higher scores on schizoid, somatic complaints, uncommunicative, obsessive-compulsive, hostility, delinquent, aggression, hyperactivity and externalizing behavior problems than those of non-LBC, indicating that older male hui LBC were more likely to have behavioral problems, which was consistent with that reported by Wei-min Xu[8]. The reason may be related to boy's different physiological characteristics, personality traits and family education environment. Our study also found that female hui nationality LBC aged 12–16 years old got higher scores in aggression, cruelty and EBP than those of non-LBC, suggesting that the behavior problems of the older female hui nationality LBC were mainly characterized by aggression and cruelty, and indicating that girls hui LBC were prone to externalizing behavior problems due to lack of family affection after entering adolescence. Thus, it can be seen that hui nationality LBC aged 12–16 are faced with a wider range of problems, including internalizing problems such as somatic complaints, depression and schizoid, as well as externalizing behavior problems such as delinquent, hyperactivity and aggression. After entering junior high school, because of parents and teachers pay too much attention to children's academic performance, children's learning pressure becomes larger, which may have an impact on their psychology. In addition, due to parents' migrant work, lack of parental care and discipline, the older they get, the greater their psychological needs will be. This was consistent with the increasing trend of emotional and behavioral problems in the process of children entering adolescence[50], suggesting that we should focus on senior hui nationality LBC, which was inconsistent with existing studies[46], and it was analyzed that our research objects were different from theirs.

The above results revealed that there were more behavioral problems among hui nationality LBC aged 12 ~ 16 years old, which were worthy of our attention.

Univariate analysis results of this study showed that children's gender, caregiver's education level, parents' education level, parents divorced and only child had no effect on EBP of hui nationality LBC, which was in line with the previous research results[51],but was inconsistent with the existing study reported that parents divorced may exacerbate the negative effects of parental migration[52]. However, the frequency of contact with teachers, academic performance, and parents' working out situation seemed to have an influence, but they were not independent influences in multivariate analysis, which was quite inconsistent with the existing studies at home and abroad[53–56]. The analysis suggests that they may play an indirect role through influencing children's personality development and self-concept development.

The results of multivariate analysis showed that low behavior score, introversion and intermediate personality were the risk factors for EBP of hui nationality LBC, while intermediate type of mother refusal and denial was the protective factor for EBP of hui nationality LBC. This result indicated that the low score of self-conscious behavior tended to cause hui nationality LBC to have higher EBP, which was consistent with the existing research[57]that pointed out a significant negative correlation between behavioral problems and self-consciousness. Our research also revealed that negative parenting styles, such as too

much or too little maternal refusal and denial, will increase the EBP of hui nationality LBC, which was consistent with the positive correlation between EBP and authoritarian parenting style reported by zhu wenfen et al[58]. Family is not only an important cultural carrier, but also is the first learning setting children are exposed to. Parental rearing style is considered a specific educational medium through which Chinese culture and social values are passed on to children. As a result of the impact that traditional Chinese culture and the education system have on parents, a hierarchy still exists between parents and children in most Chinese families. If a child's behavior goes against the will of the caregiver, rejection or punishment may occur. Previous studies[59, 60] suggested that corporal punishment by parents was strongly associated with later children externalizing behavior, such as aggression, criminality and antisocial behavior. Our study suggested that only moderate denial by mothers might have a protective effect on the development of EBP in hui nationality LBC, and that parent-based intervention had been proved to be effective in improving children's EBP[61]. Moreover, children learn moral values and social conventions through a process of socialization, much of which involves parenting styles[62], and it has been proved that moral education can promote the moral development of adolescents and hopefully reduce their EBP[63].

Our study had several limitations. Firstly, due to the limitations of the conditions, the selected sample population was single, involving only 5 township schools in 2 project demonstration counties, which limited the extensibility of the study results and affected the external validity of this study. Secondly, we collected information from caregivers or parents about children's behavioral problems, which might lead to bias. Thirdly, this study did not make an in-depth discussion on the influence of islamic culture on the externalizing behaviors of hui nationality LBC. Fourthly, the scores of the nationwide norm sample used in this study were collected through an epidemiology survey in 1992. It might lead to limitations when we used it to assess children's behavioral problems in current studies, as China has undergone dramatic development in the past decades. Finally, the research object of this paper is mainly left-behind children in school, not considering other children dropping out of school; At the same time, this survey is a cross-sectional study, and it is impossible to obtain detailed information about the complete development process and the overall trends of EBP over time in hui nationality LBC. Furthermore, the CBCL is adopted as a screening scale in this survey. Therefore, the prevalence of EBP and CBCL syndromes of hui nationality LBC cannot be used as the basis for the diagnosis of children's emotional and behavioral problems. So in order to provide more compelling evidence concerning influencing factors on EBP of hui nationality LBC, a longitudinal and prospective study is recommended to explore the mechanism of how these risk factors lead to EBP at individual and group levels.

Conclusion

This study showed a higher prevalence of EBP as well as specific syndromes of behavioral problems in hui nationality LBC. Our findings suggested that parental migration was a potential risk factor for EBP among hui nationality LBC in rural China. Introverted personality, intermediate personality, low self-conscious of behavior, and intermediate type of mother refusal are independent influencing factors for the occurrence of EBP of hui nationality LBC. And measures should be taken from self-concept development, personality development, and family education for the prevention of EBP of hui nationality LBC in rural areas of China.

Abbreviations

LBC: Left-behind children; non-LBC: non-left-behind children; EBP: externalizing behavior problems; CBCL: Achenbach's Child behavior Checklist; EMBU: Egma Minnen av Bardndosnauppforstran; EPQ : Eysenck Personality Questionnaire; PHCSS : Piers-Harri Children's Self-concept Scale.

Declarations

Ethics approval and consent to participate

Ethics approval was obtained from the Ethics Committees at Ningxia Medical University. Written informed consent was obtained from the students or caregiver in advance.

Consent for publication

Not applicable.

Availability of data and materials

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

Competing interests

The authors declare that they have no competing interests.

Funding

This research was financially supported by grants from "twelfth five-year" National science and technology for rural areas support program (2012BAJ18B07-2). The funder had no role in study design, data analysis and interpretation, or preparation of the manuscript.

Author Contributions

XY and QL conceptualized and designed the study. LW and ML contributed to the study design and the data collection. XY, LW and QL analyzed the data and drafted the manuscript. XD and LL obtained the funding of this survey and supervised the study. All authors reviewed the manuscript and approved the final manuscript.

Acknowledgments

The authors thank all participants in this study, as well as all the interviewers for data collection in this study.

Author details

¹Beijing First Hospital of Integrated Traditional Chinese and Western Medicine- First Affiliated Hospital of Institute of Basic Theory, China Academy of Chinese Medical Sciences, No.13 Jintai Road, Chaoyang District ,Beijing,100026,China. ²College of Clinic Medicine, Ningxia Medical University, No.1160 Shengli Street, Xingqing District, Yinchuan, 750004, Ningxia Hui Autonomous Region, China. ³Luoyang Fifth People's Hospital-Fifth Affiliated Hospital of Henan University of Science and Technology, No. 1, Lingkang Lane, Baimasi Temple Town, Luolong District, Luoyang, 471013, Henan province, China. ⁴Yinchuan University of Energy, Wangtaipu, Yongning County, 750100, Ningxia Hui Autonomous Region, China. ⁵School of

References

1. Achenbach TM. The Child Behavior Profile: I. Boys aged 6–11. *J Consult Clin Psychol*. 1978;46(3):478–88.
2. Eisenberg N, Cumberland A, Spinrad TL, Fabes RA, Shepard SA, Reiser M, Murphy BC, Losoya SH, Guthrie IK. The relations of regulation and emotionality to children's externalizing and internalizing problem behavior. *Child development*. 2001;72(4):1112–34.
3. Betz LC. Childhood Violence: A Nursing Concern. *Issues in Comprehensive Pediatric Nursing*. 1995;18(3):149–61.
4. Duan CR, Zhou FL. Studies on Children Left Behind. population research. 2005;29(1):29–36. (In Chinese).
5. China women's federation. **A research report on the status of rural left-behind children in China**. *Chin Women's Movement*;2013. (6): 30–34. (In Chinese).
6. Zheng TG, Wang SM, Zhou SH, Shu DL, J, Zheng NX, Zhang LS. Analysis of interversion effect on left-children students from different guardian. *Chin J School Health*. 2010;31(12):1459–60. (In Chinese).
7. Zhao C, Wang F, Li L, Zhou X, Hesketh T. Long-term impacts of parental migration on Chinese children's psychosocial well-being: mitigating and exacerbating factors. *Soc Psychiatry Psychiatr Epidemiol*. 2017;52(6):669–77.
8. Xu WM, Tang JL, Wu D, Xu XY, Yang L. Research on present situation of behavior disorders of left-behind children in the countryside of Anhui province. *J Appl Clin Pediatr*. 2007;22(11):852–3. (In Chinese).
9. Haight W, Black J, Sheridan K. A mental health intervention for rural, foster children from methamphetamine-involved families: Experimental assessment with qualitative elaboration. *Child Youth Serv Rev*. 2010;32(10):1446–57.
10. Chen SH, Liao ZG, Wang SH, Xi BR, Liu H, He SZ. Analysis of factors related to behavior problems of left-behind children in Jiangxi province. *Chin J Sch Health*. 2014;35(1):95–7. (In Chinese).
11. Wichers M, Gardner C, Maes HH, Lichtenstein P, Larsson H, Kendler KS. Genetic innovation and stability in externalizing problem behavior across development: a multi-informant twin study. *Behavior genetics*. 2013;43(3):191–201.
12. Mathyssek CM, Olinio TM, Verhulst FC, van Oort FVA, van Os J. **Childhood Internalizing and Externalizing Problems Predict the Onset of Clinical Panic Attacks over Adolescence: The TRAILS Study**. *PLoS ONE* 2012, 7(12).
13. Roza SJ, Hofstra MB, van der Ende J, Verhulst FC. Stable prediction of mood and anxiety disorders based on behavioral and emotional problems in childhood: a 14-year follow-up during childhood, adolescence, and young adulthood. *Am J Psychiatry*. 2003;160(12):2116–21.
14. Zhao MM, Li H, Li J, Li LG, Wang CL, Stephen, Nicholas, Meng QY. Studying on the influence of migrant parents on mental health of their left-behind children in rural China. *Chin Health Service Management*. 2012;29(1):60–3. (In Chinese).
15. Feng YT, Hu CZ, Li QL, Liu MM, Yu X, Dai XY: **Detectable rate and correlative factors of behavior problems among Hui nationality left-behind children in rural district of Ningxia**. *Chin J Behavioral Medicine and Brain Science* 2013,22(2):157–159. (In Chinese).
16. Van Heel M, Bijttebier P, Colpin H, Goossens L, Van Den Noortgate W, Verschueren K, Van Leeuwen K. Investigating the interplay between adolescent personality, parental control, and externalizing problem behavior across adolescence. *J Res Pers*. 2019;81:176–86.
17. Wang X, Ling L, Su H, Cheng J, Jin L, Sun YH. Self-concept of left-behind children in China: a systematic review of the literature. *Child Care Health Dev*. 2015;41(3):346–55.
18. Ybrandt H. The relation between self-concept and social functioning in adolescence. *J Adolesc*. 2008;31(1):1–16.
19. Shen JQ, Wu HJ, Chen HW. Research on correlations between aggressive behavior and rearing pattern, family environment and self-concept. *Chin J Behavioral Medicine Science*. 2006;15(8):744–5. (In Chinese).
20. Burlaka V. Externalizing behaviors of Ukrainian children: The role of parenting. *Child Abuse Negl*. 2016;54:23–32.

21. Park S, Dotterer AM. Longitudinal associations of family stressors, fathers' warmth, and Korean children's externalizing behaviors. *J Fam Psychol.* 2018;32(8):1036.
22. Du YS, Tang HQ, Bao YJ, Wang YW, Zheng WZ. Behavior Problems of Children in Special Families. *Chin Ment Health J.* 2002;16(1):41–3. (In Chinese).
23. Wang Y-Y, Xiao L, Rao W-W, Chai J-X, Zhang S-F, Ng CH, Ungvari GS, Zhu H, Xiang Y-T. The prevalence of depressive symptoms in 'left-behind children' in China: a meta-analysis of comparative studies and epidemiological surveys. *J Affect Disord.* 2019;244:209–16.
24. Tang W, Wang G, Hu T, Dai Q, Xu J, Yang Y, Xu J. Mental health and psychosocial problems among Chinese left-behind children: A cross-sectional comparative study. *J Affect Disord.* 2018;241:133–41.
25. Meng X, Yamauchi C. Children of migrants: The cumulative impact of parental migration on children's education and health outcomes in China. *Demography.* 2017;54(5):1677–714.
26. Liu Z, Li X, Ge X. Left too early: the effects of age at separation from parents on Chinese rural children's symptoms of anxiety and depression. *Am J Public Health.* 2009;99(11):2049–54.
27. Huang Y, Zhong XN, Li QY, Xu D, Zhang XL, Feng C, Yang GX, Bo YY, Deng B. Health-related quality of life of the rural-China left-behind children or adolescents and influential factors: a cross-sectional study. *Health Qual Life Outcomes.* 2015;13:29.
28. Shen M, Gao J, Liang Z, Wang Y, Du Y, Stallones L. Parental migration patterns and risk of depression and anxiety disorder among rural children aged 10–18 years in China: a cross-sectional study. *BMJ Open.* 2015;5(12):e007802.
29. Fellmeth G, Rose-Clarke K, Zhao C, Busert LK, Zheng Y, Massazza A, Sonmez H, Eder B, Blewitt A, Lertgrai W, 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.
30. Ding L, Yuen LW, Buhs ES, Newman IM. Depression among Chinese Left-Behind Children: A systematic review and meta-analysis. *Child Care Health Dev.* 2019;45(2):189–97.
31. Zhao J, Li Q, Wang L, Lin L, Zhang W. Latent profile analysis of left-behind adolescents' psychosocial adaptation in rural china. *J Youth Adolesc.* 2019;48(6):1146–60.
32. Womack SR, Taraban L, Shaw DS, Wilson MN, Dishion TJ. Family Turbulence and Child Internalizing and Externalizing Behaviors: Moderation of Effects by Race. *Child Dev.* 2019;90(6):e729–44.
33. Burlaka V, Wu Q, Wu S, Churakova I. Internalizing and Externalizing Behaviors among Ukrainian Children: The Role of Family Communication and Maternal Coping. *J Child Fam stud.* 2019;28(5):1283–93.
34. Kernic MA, Wolf ME, Holt VL, McKnight B, Huebner CE, Rivara FP. Behavioral problems among children whose mothers are abused by an intimate partner. *Child Abuse Negl.* 2003;27(11):1231–46.
35. Bair-Merritt MH, Ghazarian SR, Burrell L, Crowne SS, McFarlane E, Duggan AK. Understanding How Intimate Partner Violence Impacts School Age Children's Internalizing and Externalizing Problem Behaviors: A Secondary Analysis of Hawaii Healthy Start Program Evaluation Data. *J Child Adolesc Trauma.* 2015;8(4):245–51.
36. Achenbach TM, Edelbrock CS: **Manual for the child behavior checklist and revised child behavior profile.** *Vermont: University of Vermont, Department of Psychiatry;* 1983.
37. Su LY, Li XR, Wan GB, Yang ZW, Luo XR. **Hunan norm of Achenbach child behavior checklist.** *Chin J Clinical Psychology* 1996,4(1):24–28. (In Chinese).
38. Xin RE, Zhang ZX: **Investigate on 24013 city children's behavioral problems in 26 units of 22 provinces.** *Shanghai Arch. Psychiatr,* 1992, 4(1):47–55. (In Chinese).
39. Wang XD, Wang XL, Ma H. **Handbook of mental health rating scale: revised edition [M].** Beijing: *Chin Ment Health J.* 1999;13(1):161–7. 306–307. (In Chinese).
40. Gong YX. **revised eysenck personality questionnaire handbook [M].** Changsha: *hunan medical college,* 1986, 2. (In Chinese).

41. Su LY, Li XR, Wan GB, Yang ZW, Luo XR. Hunan norm of Achenbach child behavior checklist. *Chin J Clinical Psychology*. 1996;4(1):24–8. (In Chinese).
42. Yu X, Dai XY, Li QL, Wang LL, Li LG, Liu MM, Zhang J. Psychological behavior problems and influencing factors in rural Muslim left-behind children. *Chin J Public Health*. 2014;30(7):857–60. (In Chinese).
43. Collaborative investigation unit of 22 cities in China. Children's behavior problems and their influential factors: A collaborative survey of 24,013 children and adolescents in 22 cities in China. *Chin Ment Health J*. 1993;7(1):13–5 + 46. (In Chinese).
44. Xu J, Chu KK, Xu B, Zhang JP, Wang CY, Liu QX, Gu L, Ke XY. Prevalence and related factors of behavioral problems among adolescents aged 12–16 years in Nanjing city. *Chin J Public Health*. 2018;34(4):489–92. (In Chinese).
45. Guo GW, Yang SW, Liu XY, Wu DX, Wei YL, Yu YS, Lu XB, Lin XY, Chen YK, Zhou XY. Epidemiological investigation of behavior problems of aquatic children in rural areas. *J Qiannan Medical College for Nationalities*. 2012;25(4):284–5. (In Chinese).
46. Wu LJ, Liu AS, Tao YC, Zhang LP, Wu K, Chen, Li. An Epidemiological Survey of Behavioral Problems among School-aged Children in Harbin. *Chin J School Health*. 2002;23(6):488–9. (In Chinese).
47. Hu H, Gao J, Jiang H, Jiang H, Guo S, Chen K, Jin K, Qi Y. **A Comparative Study of Behavior Problems among Left-Behind Children, Migrant Children and Local Children.** *Int J Environ Res Public Health* 2018, 15(4).
48. Liu SM, Wang RZ, Wang YH, et al. : An epidemiological investigation of behavioral problems and the relevant factors in children aged 6 ~ 11 years in Shandong province. *Journal of Psychiatry*. 2018;31(4):272–5. (In Chinese).
49. Hinshaw SP. On the distinction between attentional deficits/hyperactivity and conduct problems/aggression in child psychopathology. *Psychological bulletin*. 1987;101(3):443–63.
50. Wang XL, Li PF, Peng Y, Li K. Emotional and behavioral problems of children-adolescents aged 4–18 in Changsha. *Chin. Ment Health J*. 2012;26(10):775–9. (In Chinese).
51. Gao Z, Liu ZN, Lin JL, Li H, Li XT, Mei WH. Research and analysis on behavior problems of middle-school students in Zhuhai City and their related factors. *Chin J Behavioral Medicine Science*. 2004;13(5):93–4. (In Chinese).
52. Zhao C, Wang F, Zhou X, Jiang M, Hesketh T. Impact of parental migration on psychosocial well-being of children left behind: a qualitative study in rural China. *Int J Equity Health*. 2018;17(1):80.
53. Zhou JY, Luo XR, Wei Z, Guan BQ, Yuan XH, Ye HS, Ding J, Zhang YB. Characteristics of Behavioral and Emotional Problems of Left-Behind Children in Rural Area of Changsha. *J Appl Clin Pediatr*. 2009;24(24):1901–3. (In Chinese).
54. Cabrera N, Hofferth SL, Hancock G. Family structure, maternal employment, and change in children's externalizing problem behaviour: Differences by age and self-regulation. *Eur J Dev Psychol*. 2014;11(2):136–58.
55. Zhao XX, Chen JQ, Feng YN, Jin YC, Liu CF, Yu PY: **Investigation on behavioral problems and influencing factors among primary school students in rural areas of shandong province.** *Chin J child health care*, 2015, 23(5):522–525. (In Chinese)
56. Zhou YM, Qi YJ, Zhang ZX, He F, Zheng Y. Analysis of incidence and influencing factors of psychological behavior problems of left-behind children aged 4–6 in rural areas. *J Clin Psychiatry*. 2019;29(3):157–60. (In Chinese).
57. Lan YL, Zhang HY, Li P, Xu HB. Self-concept and Behaviour problems of Children. *Chin J Clin Psychol*. 2004;12(1):53–5. (In Chinese).
58. Zhu WF, Kong LN, Fu YX, Hu XM, Li T, Wang YC, Deng W. A twin study on externalizing problem behavior in adolescents in Chongqing City. *JOURNAL OF HYGIENE RESEARCH*. 2017;46(3):423–8. (In Chinese).
59. Gershoff ET. Corporal punishment by parents and associated child behaviors and experiences: a meta-analytic and theoretical review. *Psychological bulletin*. 2002;128(4):539–79.
60. Callender KA, Olson SL, Choe DE, Sameroff AJ. The effects of parental depressive symptoms, appraisals, and physical punishment on later child externalizing behavior. *J Abnorm Child Psychol*. 2012;40(3):471–83.
61. Mingebach T, Kamp-Becker I, Christiansen H, Weber L. Meta-meta-analysis on the effectiveness of parent-based interventions for the treatment of child externalizing behavior problems. *PLoS One*. 2018;13(9):e0202855.
62. Grusec JE. Socialization processes in the family: social and emotional development. *Ann Rev Psychol*. 2011;62:243–69.

63. Shek DTL, Zhu X. Reciprocal Relationships Between Moral Competence and Externalizing Behavior in Junior Secondary Students: A Longitudinal Study in Hong Kong. *Front Psychol.* 2019;10:528.