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Parental migration patterns and risk of depression and anxiety disorder among rural children aged 10–18 years in China: a cross-sectional study

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ABSTRACT

Objectives: This study aims to explore the prevalence of depression and anxiety in left-behind children, and to identify patterns of parents' migration and relative factors associated with depression and anxiety risk in this population.

Setting: A cross-sectional survey using a school-based sample was conducted in Puyang, Hebei, North China in December 2012.

Participants: 2283 students aged 10–18 years.

Main outcome measures: Parental migration status, depression and anxiety disorder.

Results: 61.2% of participants were left-behind children. The prevalence rate of depression among left-behind children with both parents migrating (14.2%) was higher than that of children with one parent migrating (11.7%) and no parent migrating (12.6%). The prevalence rate of anxiety disorder for children with no parent migrating (25.1%) was higher than that for children living with one or neither parent (22.2% and 22.0%). The risk factors for depression were low-level social support (OR=3.46, 95% CI 2.00 to 6.01), average academic performance (OR=2.37, 95% CI 1.7 to 3.3) and low academic performance (OR=3.01, 95% CI 1.92 to 4.72), staying up late (OR=1.67, 95% CI 1.17 to 2.39), having difficulty falling asleep (OR=2.04, 95% CI 1.48 to 2.82) and being an only child (OR=1.73, 95% CI 1.04 to 2.89). The factors associated with anxiety disorder were being female (OR=2.09, 95% CI 1.64 to 2.66), being in high school (OR=1.8, 95% CI 1.38 to 2.36), physical abuse (OR=1.5, 95% CI 1.04 to 2.15), having difficulty falling asleep (OR=1.67, 95% CI 1.33 to 2.10) and low-level social support (OR=2.17, 95% CI 1.44 to 3.28) and middle-level social support (OR=1.82, 95% CI 1.3 to 2.56).

Conclusions: Parents' migration was not associated with depression and anxiety in rural children aged 10–18 years, but academic performance at school, sleep problems and lack of social support were associated with depression and anxiety.

Strengths and limitations of this study

- This study found that children with both parents migrating had higher rates of depression than children living with one or two parents. Children living with both parents had a higher rate of anxiety than left-behind children.
- Academic performance at school, sleep problems and lack of social support were associated with higher prevalence rates of depression and anxiety disorder in rural children.
- This study showed that there was no significant association between parents' migration and psychological symptoms of depression and anxiety in children aged 10–18 years in rural North China. The main reason may be that most left-behind children lived with their mothers.
- The participants were a convenience sample from one rural county in North China, thereby limiting our ability to generalise the findings to left-behind children in other areas of the country.
- The sample was recruited from schools, which limited our ability to examine the impact of parental migration on school attendance.
- Owing to a small sample of mother-only-migration (1.8%), we could not assess differences in depression and anxiety disorder between mother-only-migration and father-only-migration.

families behind until spring festival days every year. An enormous number of rural residents, estimated at 269 million, moved to cities according to the China Women's Federation; most were aged 25–49 years. They return home and are reunited with the families for less than 1 month, and then leave again. Most of those left behind are children who cannot move to the city with their parents due to financial constraints and the school registration system, which requires that they stay at their rural home to study. This situation leaves over 60 million children in rural areas in China without one or both of their parents.[1]

INTRODUCTION

The migration of rural people for jobs and better income to cities has resulted in the separation of many families, leaving their

Left-behind children have drawn attention from researchers in psychology and sociology.[2–4] Recent studies showed that children separated from parents were disadvantaged in developmental and social emotional health; for example, left-behind children had a higher prevalence of depression, anxiety, substance abuse and suicide than non-left-behind children.[5][6] The absence of parental care and supervision and low family support were related to mental disorders in previous studies.[7] Senaratne et al also found that left-behind children with migrating mothers in Sri Lanka had a higher prevalence of mental health problems than non-left-behind children. A review found that left-behind children were more likely to have conflicts with peers and teachers, have more anxiety, lower self-esteem, higher suicidal behaviour and higher substance abuse than children living with their parents.[8]

The common view is that parental migration adversely impacts left-behind children.[9] However, some researchers have found that parental migration had a positive effect on early cognitive development, which offsets the potential negative early childhood development effects from temporary lack of parenting.[10] Other researchers have shown that parental migration had positive and negative impacts on left-behind children. Migration may enhance the well-being of left-behind children as well as of their families.[11] Childhood development is likely to depend on a combination of nutrition, stimulation, home inputs, health and parents' socioeconomic status. Given the traditional role of parents in providing nutrition and healthcare in rural China, the absence of parents might affect the quality of diet, food preparation and illness care. If these things could be done by one parent (mother) or by grandparents (in a Chinese traditional family structure, mother and grandmother are the main caregivers of children), the negative impact of single parent migration on children could be minimal.

The impact of parents' migration on children's developmental and mental health needs detailed research. We were interested in diverse forms of parental migration, including families with a single parent, those with both parents living away from their children and those with no parent migrating. The purpose of this study was to compare the prevalence rates of depression and anxiety disorder among left-behind children and non-left-behind children, to explore the risk factors for mental disorders using multivariate logistic regression, and to determine the effects of parental migration status and related factors on children's mental health.

METHODS
Sample
A cross-sectional design was used to conduct the study. Structured interviews were performed among students from two high schools in December 2012 in Nanle county, Puyang city, Henan province. There are a total of 10 junior high schools and 1 senior high school in the county. Two middle schools were randomly selected from the 10 rural junior high schools and 12 classes were randomly selected from 54 classes in the senior high school, representing grades 7th–12th, yielding 2500 respondents. A total of 2315 returned questionnaires, of which 2283 were complete and these were included in data analysis.

Measures
Demographic information of participants included sex, age, grade, whether or not they were an only child, school performance, family-related factors (such as education and occupation of parents, family income, parents' migration status in the past 6 months, and number of siblings) and health status (eyesight, disability and chronic diseases, etc).

Left-behind children refer to rural registered children less than 18 years of age where one or both of their parents migrate to urban areas for work, and where the children are left at home for at least 6 months, those children whose parent(s) were deceased, divorced or unknown were not included in this study.

Depression: The Children's Depression Inventory (CDI, simple Chinese version) was used to measure depressive symptoms of students.[12] The CDI is a 27-item scale that is self-rated and symptom oriented. We used a simplified Chinese version of CDI due to the high validity and reliability (Cronbach's α=0.85–0.88).[13][14] Individuals can score 0–54 with each statement being identified with a rating from 0 to 2. The higher score indicates more severe depressive symptoms. Scoring 20 and higher indicated depression.

Anxiety disorder: The Screen for Child Anxiety Related Emotional Disorders (SCARED) was used to assess anxiety symptoms of children in this study. SCARED was established in 1997 by Birmaher et al[15] to measure anxiety among children aged 9–18 years. SCARED is a reliable and valid anxiety screening instrument in Chinese children aged 6–16 years, with high internal consistency (α=0.43–0.89) and test–retest reliability (intraclass correlation coefficients=0.46–0.77 over 2 weeks and 0.24–0.67 over 12 weeks), and good discriminant validity (between anxiety and non-anxiety disorders).[16] Total scores range from 0 to 83 with each statement having a rating from 0 to 2. Higher scores indicate more severe anxiety symptoms. Scoring 25 and higher indicates the presence of an anxiety disorder.

Social support: The Scale of Social Support for Adolescents (SSSA) scale was developed by Ye et al,[17] and is a Chinese version designed to measure children's resources and utilisation of social support. The scale includes 17 items. Perceived social support from family, friends and relatives is recorded on three subscales: subjective support, objective support and utilisation of social support. The α coefficients of the total and three subscales range from 0.81 to 0.91.

Procedure
The survey was conducted between 1 and 31 December 2012. Questionnaires were completed using a group

administration format in classrooms. Trained research assistants administered the survey. Students were recruited for the project with approval from school officials and their guardians. The aim of the survey was introduced to the students and informed consent was obtained before completing the questionnaire. No names were collected. During the survey administration, students were not allowed to talk to each other. To ensure quality responses and correct understanding of the questions, assistants walked around the classroom to help those who were having difficulty. Students were told that there were no right or wrong answers and that they could withdraw from the study at any time.

Statistical analysis

Differences in demographics (age, grade, sex, whether or not they were an only child), academic performance at school, eyesight, disabilities, unintentional injury and physical abuse and levels of social support between children stratified by parental migration status (no parent migrating, one parent migrating and both parents migrating) were determined using χ^2 test. An unconditional, multivariate logistic regression was performed to calculate the ORs and 95% CIs to explore the factors that were related to depression and anxiety risk. The dependent variables in this study were age; grade; sex; whether or not he/she is an only child; children with no, one or both parents migrating; sleep difficulty; staying up late; time spent watching TV and using the internet; social support; unintentional injury and physical abuse. All tests were two tailed and significance was determined using <0.05. SAS V.9.4 was used for statistical analysis.

RESULTS

The mean age of students was 14.22±1.71 years. Boys and girls accounted for 45% and 55%, respectively, of the sample. A total of 1397 (61.2%) children were left-behind children; among those, 1185 (84.5%) had one parent migrating and 212 (15.5%) had both parents migrating. For left-behind children, caregivers were mothers (1160, 83%), grandparents (131, 9.4%), fathers (25, 1.8%) and other relatives (81, 5.8%).

Table 1 shows the demographic information of left-behind children and non-left-behind children, and the proportion being left behind was similar between boys and girls. Most parents' education was middle and primary school among left-behind children.

The overall prevalence rates of anxiety and depression were 28.2% and 12.3%, respectively (table 2). Left-behind children had higher rates of depression than non-left-behind children, but children with no parent migrating had higher rates of anxiety disorder than left-behind children. Children with both parents migrating had a significantly higher prevalence rate of unintentional injury (12.3%) than those with no parent migrating (4.6%) and one parent migrating (6.0%)

(p<0.05). The pattern of physical abuse was similar with no significant differences across groups. There were significant differences among the proportion playing computer games, spending time on the internet and watching TV among children by parental migration status (p<0.01).

The average social support score was 69.66±11.33. According to this, we defined the total score below 58 as low-level social support, 59–80 as middle-level social support, and higher than 81 as high-level social support. Overall, children who had high-level social support had lower rates of physical abuse and mental disorder (p<0.01). Children with low-level social support had higher prevalence rates of anxiety and depression, and were exposed to more unintentional injury and physical abuse. When stratified by parents' migration status, children with both parents migrating and with one parent migrating who had low-level social support had higher rates of anxiety disorder (34.7% and 36.5%, respectively) compared with children who had no parents migrating (32.7%). Children with both parents migrating and low-level social support had a higher prevalence rate of depression (34.2%) than the other two groups of children (table 3).

Table 4 shows risk factors for depression and anxiety disorder based on multivariate logistic regression analysis. Parental migration status did not enter the final models of depression and anxiety disorders (table 4). Having difficulty sleeping and low-level social support were significantly associated with depression and anxiety disorders (p<0.01). Sleep-related problems increased the risk of mental disorders, having difficulty falling asleep, and staying up late elevated the risk of depression (OR=2.04, 95% CI 1.48 to 2.82, and OR=1.67, 95% CI 1.17 to 2.39, respectively). Difficulty falling asleep also increased the likelihood of anxiety disorder (OR=1.67, 95% CI 1.33 to 2.10).

Students with poor eyesight and poor academic performance at school had higher rates of depression compared with students with good or excellent academic performance. Being a girl and a high school student was significantly associated with higher anxiety. Unintentional injury and physical abuse increased the risk of anxiety disorder in this study.

DISCUSSION

In this cross-sectional study, 61.1% of children were left-behind children. Among those, left-behind children living with a mother or father accounted for 83% and 1.8% of the study population, respectively. The prevalence rates of depression and anxiety disorders among rural students were 12.3% and 23.2%, respectively. There were no significant differences in prevalence of depression and anxiety disorders among children based on parents' migration status. The prevalence rate of depression was similar to that of previous studies among middle school students in China.[18] [19] However, the

Table 1 Demographic characteristics of 2283 children in rural schools, North China

Demographic characteristics	Total	Left-behind children (%)	Children with no parents migrating (%)
Gender			
Boys	1027	632 (45.2)	395 (44.6)
Girls	1256	765 (54.8)	491 (55.4)
Age group, years*			
10–12	400	234 (16.8)	166 (18.7)
13–15	1398	885 (63.4)	513 (57.9)
16–18	485	278 (19.9)	207 (23.4)
Grade**			
Junior (7th–9th)	1830	1182 (84.6)	648 (73.1)
Senior (10th–12th)	453	215 (15.4)	238 (26.9)
Academic performance at school			
Excellent/good	1093	667 (47.7)	426 (48.1)
Middle	945	592 (42.4)	353 (39.8)
Low	245	138 (9.9)	107 (12.1)
Eyesight*			
Normal	1335	844 (60.4)	491 (55.4)
Poor	948	553 (39.6)	395 (44.6)
Only child			
Yes	164	98 (7.0)	66 (7.4)
No	2119	1299 (93.0)	820 (92.6)
Father's education**			
Primary school or below	499	354 (25.3)	145 (16.4)
Junior high school	1382	860 (61.6)	522 (58.9)
Senior high school or above	402	183 (13.1)	219 (24.7)
Father's occupation**			
Farmer	1266	700 (50.1)	566 (63.9)
Non-farmer	1017	697 (49.9)	320 (36.1)
Mother's education**			
Primary school or below	1323	862 (61.7)	461 (52.0)
Junior high school	723	432 (30.9)	291 (32.8)
Senior high school or above	237	103 (7.4)	134 (15.1)
Mother's occupation**			
Farmer	1403	891 (63.8)	512 (57.8)
Non-farmer	880	506 (36.2)	374 (42.2)
Total	2283	1397 (100.0)	886 (100.0)

*p<0.05, **p<0.01.

finding of no difference in mental disorders between left-behind children and non-left-behind children differed from other studies, which have reported higher mental disorder among left-behind children than non-left-behind children.[5 19–23]

Our findings suggested that children with both parents migrating were more likely to smoke/drink, which was consistent with previous research.[21] However, children with no parent migrating were more likely to stay up late, play computer games and have high internet use compared with left-behind children. Children with both parents migrating tended to have more conflict with classmates, higher incidence of fighting and argument with peers, were exposed to unintentional injury and physical abuse, and developed depression, which might be related to poor interpersonal and communication skills for children with both parents away.[5] Liu et al reported that left-behind children had a higher

negative social adjustment than non-left-behind children.[24 25] Even though our findings did not show that mental disorders were related to parent migration statuses, we cannot further conclude that parent migration had no other adverse impacts on their children.

Children with one parent migrating had a similar prevalence rate of mental disorders compared with children living with both parents. Most children with one parent migrating lived with mothers in this study. All children live in school during the week and go back home on weekends, which may result in parental absence having less impact on their daily life. When they come home, caregivers provide them food, clothes and other support. Left-behind children usually had better living conditions than children with no parent migrating. With access to cheap and readily available communication, especially cellular telephones, communication is more frequent and more instantaneous, a development

Table 2 Proportions of health-related behaviours and mental disorders by parenting migration status in North China (N=2283)

Behaviours and mental disorders	No parents migrating (n=886)	One parent migrating (n=1185)	Both parents migrating (n=212)	Total (n=2283)
Smoking/drinking	36 (4.1)	47 (4.0)	14 (6.6)	97 (4.2)
Staying up late	157 (17.7)	173 (14.6)	29 (13.7)	359 (15.7)
Having difficulty falling asleep	430 (48.5)	604 (51.0)	111 (52.4)	1145 (50.2)
Playing computer game**	117 (13.2)	88 (7.4)	24 (11.3)	229 (10.0)
Conflicts with classmates	339 (38.3)	452 (38.1)	87 (41.0)	878 (38.5)
Time of internet use (h)**				
Never	300 (33.9)	571 (48.2)	99 (46.7)	970 (42.5)
<2	324 (36.6)	392 (33.1)	74 (34.9)	790 (34.6)
≥2	262 (29.6)	222 (18.7)	39 (18.4)	523 (22.9)
Time of watching TV (h)**				
<2	581 (65.6)	690 (58.2)	123 (58.0)	1394 (61.1)
≥2	305 (34.4)	495 (41.8)	89 (42.0)	889 (38.9)
Unintentional injury*	41 (4.6)	71 (6.0)	26 (12.3)	138 (6.0)
Physical abuse	79 (8.9)	110 (9.3)	26 (12.3)	215 (9.4)
Anxiety disorder	222 (25.1)	261 (22.0)	47 (22.2)	530 (23.2)
Depression	112 (12.6)	139 (11.7)	30 (14.2)	281 (12.3)

*$p<0.05$; **$p<0.01$.

that opens up new possibilities for maintaining family ties despite separation by migration. Therefore, although migrant parents may be physically absent, they may continue parenting from afar.

The long-term impacts of traditional concepts lead parents to focus almost exclusively on their children's academic performance rather than on psychological well-being.[26] When children do not study hard, beating and scolding are common punishments used by parents. The results indicated that physical punishment increased the risk of anxiety disorder (OR=1.5, 95% CI 1.04 to 2.15), especially for children living with both parents and with mothers. However when both parents migrated to the city, grandparents took the role of caring for left-behind children. Grandparents often spoil the children and will not punish them if they fail examinations, but

Table 3 Social support and trauma exposure, mental health stratified by parents' migrating status among rural children in North China (N=2283)

| Injury or mental disorder | Social support | | | χ^2 | p Value |
	Low level	Middle level	High level		
Total					
Anxiety	132 (34.7)	341 (22.7)	57 (14.1)	47.10	<0.0001
Depression	110 (29.0)	148 (9.9)	23 (5.7)	122.03	<0.0001
Unintentional injury	33 (8.7)	80 (5.3)	25 (6.2)	6.02	0.0494
Physical abuse	61 (16.1)	139 (9.3)	15 (3.7)	34.98	<0.0001
No parents migrating					
Anxiety	49 (32.7)	143 (24.9)	30 (18.6)	8.17	0.0168
Depression	41 (27.3)	60 (10.4)	11 (6.8)	36.77	<0.0001
Unintentional injury	14 (9.3)	17 (3.0)	10 (6.2)	12.08	0.0024
Physical abuse	25 (16.7)	46 (8.0)	8 (5.0)	14.78	0.0006
One parent migrating					
Anxiety	69 (36.5)	170 (21.46)	22 (10.8)	38.23	<0.0001
Depression	55 (29.1)	74 (9.3)	10 (4.9)	68.62	<0.0001
Unintentional injury	14 (7.4)	46 (5.8)	11 (5.4)	0.85	0.6537
Physical abuse	31 (16.4)	75 (9.5)	4 (2.0)	24.40	<0.0001
Both parents migrating					
Anxiety	14 (34.2)	28 (21.1)	5 (13.2)	5.29	0.0709
Depression	14 (34.2)	14 (10.5)	2 (5.3)	17.40	0.0002
Unintentional injury	5 (12.2)	17 (12.8)	4 (10.5)	0.14	0.9324
Physical abuse	5 (12.2)	18 (13.5)	3 (7.9)	0.87	0.6461

Table 4 OR and 95% CIs of depression and anxiety disorder by multivariable logistic regression model among rural children, North China (N=2283)

Variables	Depression		Anxiety disorder	
	OR	95% CI	OR	95% CI
Gender (girl:boy)			2.09	(1.64 to 2.66)**
Grade (senior high school:junior high school)			1.80	(1.38 to 2.36)**
Only child (yes:no)	1.73	(1.04 to 2.89)*		
Having difficulty falling asleep (yes:no)	2.04	(1.48 to 2.82)**	1.67	(1.33 to 2.10)**
Staying up late (yes:no)	1.67	(1.17 to 2.39)**		
Eyesight (poor:good)	1.51	(1.12 to 2.03)**		
Anxiety disorder (yes:no)	4.18	(3.08 to 5.67)**		
Depression (yes:no)			4.09	(3.02 to 5.55)**
Physical abuse (yes:no)			1.50	(1.04 to 2.15)*
Social support				
High level (≥81)	1.00		1.00	
Middle level (59–80)	1.28	(0.76 to 2.14)	1.82	(1.30 to 2.56)**
Low level (≤59)	3.46	(2.00 to 6.01)**	2.17	(1.44 to 3.28)**
Academic performance at school				
Excellent/good	1.00			
Middle	2.37	(1.70 to 3.30)*		
Low	3.01	(1.92 to 4.72)*		
Time of internet use (h)				
Never	1.00		1.00	
<2	0.66	(0.46 to 0.94)*	1.43	(1.10 to 1.85)**
≥2	0.70	(0.48 to 1.03)	1.44	(1.17 to 2.39)*

*p<0.05; **p<0.01.

may ignore the mental health of their grandchildren.[22 27–29] In this study, there was no significant difference in the prevalence rates of physical abuse by parent migration statuses (p>0.05). Children with both parents migrating had higher rates of unintentional injury than did children with no parent migrating, which was consistent with previous studies in China.[30–32] Research demonstrated that left-behind children spent more time on farm work and domestic work[33] and had higher exposure to agricultural hazards and higher farm-related injures than non-left-behind children.[34] Those early adversities may contribute to elevated initial depressive symptom levels through the increase in adaptive challenges for children already dealing with the stressful demands and circumstances that occur during this period.

Labour migration is a common event in developing countries, and studies have shown that left-behind children expressed greater feelings of anger, confusion and worry when compared with their peers.[9 35 36] Chinese left-behind children experienced significant mental health problems (eg, psychosocial dysfunction, and emotional and behavioural problems) in different parts of China.[3 37] Studies found that children with both parents migrating had the lowest life satisfaction among the three groups of rural children.[5] However parents' migration status was not associated with depression and anxiety in multivariable regression models in this study, which was consistent with a previous study conducted in Thailand.[35] A possible explanation may be that most

left-behind children lived with mothers. Mothers could provide a link to the relationships with migrating fathers and ensure more frequent communication between children and their fathers. In traditional families, mothers are primary caregivers for children.[9] In a family, if a mother stays at home when a father leaves, this might mitigate the disadvantage of both parents migrating. The risk factors related to depression and anxiety were similar for the three groups of children, such as interpersonal communication and social support. Low-level social support was significantly associated with depression and anxiety disorders in this study, and had also been found in other studies.[7 20] Left-behind children living with mother/father who had higher social support than those living with other guardians.[38] From this perspective, at least one parent, especially the mother, should stay with their children because they play an important role for children in coping with adverse events, developing social skills and safety knowledge. Mothers are also important for childhood development in cognition and socialisation.

In this study, we also found that girls and senior high school students had a higher risk of anxiety than boys and junior high school students, but not for depression. Senior high school students faced with college entrance examination, which may lead to psychological stress. Anxiety disorder frequently occurs together with depression and may precede depression in some situations.[39] This study showed that depression and anxiety disorder increased the risk for each other. Preventions that

ameliorate depression may also reduce the risk of anxiety. The observation that internet use increased the risk of anxiety but decreased the risk of depression needs further research.

A few limitations of this study should be noted. First, despite the efforts to ensure the representativeness of the sample, the participants were a convenience sample from one rural county in North China, thereby limiting our ability to generalise the findings to left-behind children in other areas of the country. Second, a cross-sectional design prevents a trajectory analysis of mental disorder and a causal interpretation of the findings. For example, sleep problems might be a cause or a consequence of depression and anxiety. Further study is needed to explore these issues using longitudinal study design. Third, the sample was recruited from schools, which limited our ability to examine the impact of parental migration on school attendance. Finally, owing to a small sample of mother-only-migration (only 25 children), we could not assess differences in depression and anxiety disorder comparing mother-only-migration and father-only-migration.

CONCLUSIONS
Despite these potential limitations, this study makes a significant contribution to existing research by elucidating psychological development of children with parents' migration. Future health promotion and intervention efforts should seek to increase the public attention to the mental healthcare of left-behind children and take measures to promote their social communication skills and social support, especially for children with both parents migrating.

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