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Effects of Parental Migration on Mental Health of Left-Behind Children: Evidence from Northwestern China

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Abstract

China's rapid development and urbanization has induced large numbers of rural residents to migrate from their homes in the countryside to urban areas in search of higher wages. It is estimated that there are more than 60 million left behind children (LBCs) remain in the countryside after their parents migrate. This paper examines the changes in mental health before and after the parents of fourth and fifth grade students out- or return-migrate. We draw on a panel dataset collected by the authors of more than 19,000 students from 252 rural primary schools in northwestern China. Using difference-in-difference and propensity score matching approaches, our results indicate that parental out-migration has a significant negative impact on the mental health of LBCs, as they tend to exhibit higher levels of anxiety and lower levels of self-esteem. However, we find that parental return-migration has no significant effect on the mental health of LBCs.

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Keywords: out-migration, return-migration, mental health, left-behind children, rural China

JEL classification: I12, O12, O15

Effects of Parental Migration on Mental Health of Left-Behind Children: Evidence from Northwestern China

Introduction

Over the last few decades, China's rapid development and urbanization has induced large numbers of rural residents to migrate from their homes in the countryside to urban areas in search of better jobs and opportunities (Hu et al., 2008; Wen and Lin, 2012; MHRSS, 2013). The majority of the internal migrants leave their children behind in home communities with a surrogate caregiver due to either a financial constraint or because of the transient nature of the work in urban areas (Duan and Zhou, 2005; Ye et al., 2006). As a consequence, a new sub-population has emerged in China known as Left Behind Children, henceforth LBCs (Duan and Zhou, 2005). In recent decades the size of this population has increased dramatically. Statistics from the Sixth Population Census show that there were more than 60 million LBCs in China in 2010 (ACWF, 2013).

The emergence of LBCs has drawn attention from many researchers. While extensive research has been conducted on the effect of migration on the health, nutrition, and education of LBCs (Gao et al., 2010; Zhou et al., 2015), one of the most prominent parts of the literature seeks to understand the effect parental migration has on the mental health and emotional well-being of LBCs. Research has found the overall prevalence of behavioral and emotional problems among LBCs to be as high as 44% (Zeng et al., 2009). In general, the literature on the separation of a child from his/her parents shows a positive association between being left-behind and mental health problems, including higher rates of depression, anxiety, loneliness, and low self-esteem (Gao et al., 2007; Jia and Tian, 2010; Zhao et al.,

2014; Zhan et al., 2014; Myerson, 2015). Other research found that the negative effects are mainly due to stress placed on LBCs when they are separated from their parents (Li et al., forthcoming; Wu et al., 2015).

Although previous research has focused on the impact of parental out-migration on children's mental health, less attention has been paid to the effects of parental return-migration. In particular, there is little empirical work done on whether parental return-migration is capable of reversing or alleviating the effects of out-migration. Given China's strict residency permit system (hukou), which only provides individuals access to public and social services in the location of their residency, it is natural that large numbers of the migrant workers periodically return home to the countryside (Wang and Fan, 2006).

While there is evidence of the trends in return-migration and empirical research teams have established a clear connection between parental out-migration and the outcomes of LBCs, to date little research has been conducted on the effects of parental return-migration on the mental well-being of LBCs. An exception, Wu et al. (2015), reported that children who had previously been left-behind but lived with both parents at the time of study tended to experience fewer depressive symptoms. While interesting, this study relied on a single cross-section of data. Therefore, it is difficult to definitively conclude that there is a causal connection between parental return-migration and decreasing symptoms of mental issues among LBCs.

In fact, the weaknesses of the empirical literature are not only confined to the return-migration literature; the current literature base that examines the effects parental out-migration on different mental health outcomes of LBCs also often suffers from a number

of shortcomings. First, a large number of the studies do not have valid comparison groups (Jia and Tian, 2010; Fan et al., 2010). The absence of a comparison group is often due to the fact that many studies rely on cross-sectional rather than panel data to explore the effects of parental migration (Hu et al., 2014; Zhan et al., 2014). Second, a number of studies are based on relatively small samples. For example, Jia and Tian (2010) examined mental health-related outcomes of LBCs with a sample size of only 606 children. Finally, many studies are examining single geographic regions, such as single counties, providing these studies with weak external validity. Specifically, Jia et al. (2010) only examined the situation of LBCs in one county in Shandong province, and He et al. (2012) conducted a study in one sub-prefecture level city in Hubei province.

The overall goal of this study is to examine the effect of parental out-migration and, especially, return-migration on the mental health of LBCs. To meet this goal, we have three specific objectives. First, we examine the prevalence of parental out-migration and return-migration among households in our sample. Second, we present the correlations between mental health scores and parental out-migration and return-migration. Third, we use difference-in-difference and propensity score matching approaches to begin to estimate whether there is a causal relationship between parental out-migration (or return-migration) and the mental health of LBCs.

Data

The data used in this paper come from two rounds of surveys conducted by the authors in 2012 and 2013. A total of 19,934 students in 252 elementary schools participated

in our survey. In the following subsections, we present the sampling protocol, data collection effort, and a description of the study's main variables.

Sampling

The study's sample is from two areas of western China, Tianshui prefecture, Gansu Province and Yulin prefecture, Shaanxi Province. Gansu province is the second-poorest province in the country (per capita GDP of \$3100), while Shaanxi ranked 14th among China's 31 administration regions in 2012 (per capita GDP of \$6108) and was among the slowest growing provinces in China during the 2000s (NBS, 2011). Tianshui prefecture is a prefecture with a large number of poor counties in one of China's lowest resource provinces. In contrast, Yulin prefecture is a relatively affluent area in a middle-income province. Together, we believe these two prefectures remain broadly representative of the rural areas in China's northwest region.

The next step was to choose the sample schools. To do so we obtained a complete list of all 435 primary schools in the two prefectures from each county's Bureau of Education. Then, we applied two exclusion criteria to this list of 435 schools. First, we excluded schools with fewer than 50 students in the fourth and fifth grade combined. This was done in order to safeguard against excessive attrition, as China's government is currently consolidating existing rural schools into new large centralized schools. Second, we excluded those schools with more than 150 students in the fourth and fifth grade combined, because we were concerned that we would not finish each school's surveys in a single day. After limiting our sample in this manner, we then randomly selected one school from each township in each of the counties in both prefectures. Within each school, one class was randomly chosen in both

the fourth and fifth grade. We chose to survey in grades 4 and 5 since students of this age were old enough to be able to fill out their own survey forms, but also young enough to be followed for a sufficient period of time.

Based on these lists, we finally selected 252 schools and 19,934 students to be included in our sample. However, by the end of the study there was some attrition. The attrition was due in part to the research team's inability to follow-up with students who had transferred schools or were absent (due to illness or injury) on the day of the follow-up survey (851 students). Additionally, some student surveys could not be used in the analysis due to invalid responses on the mental health questionnaires (975 students) and missing information on the student surveys (1,342 students). In total, 3,168 students were excluded from our analysis (15.9% of our sample). Though the total rate of attrition is high compared to other studies conducted with children in rural China (Mo et al., 2014; Lai et al., 2015), we used a statistical imputation to check whether our results suffer from any bias arising from attrition. We find that our results are robust and therefore the attrition does not appear to affect our findings. After imputing missing values, 17,635 students were included in our analysis.

Data collection

Our research group conducted two waves of surveying with fourth or fifth grade students attending sample schools. The first wave of the survey was a baseline survey in September 2012 at the beginning of the academic school year. The second wave of the survey was an endline survey conducted in May 2013. In each wave of the survey, our enumeration teams completed a student survey with three blocks.

Mental health

The first block of the survey employed three internationally-recognized psychological scales to measure the mental health of the students. These scales include the Mental Health Test (MHT), a social anxiety scale for children (SASC), and a self-esteem scale (SES). These scales were all administered and proctored by our survey team in the classroom.

The MHT scale primarily measures general anxiety and has been used extensively across China as a measure of mental health on grade school students in urban contexts (Deng et al., 2002). It has a reliability measure of 0.84–0.88 and a retest reliability measure of 0.78–0.86 (Wang, 2011). The test includes 100 yes/no questions, 10 of which are validity questions used to detect whether the student is answering the questions honestly. If the student answered yes to more than 7 of these questions the test is considered invalid. The remaining 90 points make up a student's MHT score, where a lower score corresponds to lower risk for mental health problems. A total score of 65 or higher indicates high risk for mental health problems and a need for professional help.

The SASC has been widely used in China and has proved to be reliable and valid in previous research (Zhou and Fan, 2001; Yuan et al., 2012). The SASC is capable of assessing a child's emotional, cognitive, and behavior problems associated with the social anxiety. The scale is made up of 10 items; each item requires the student to self-rate himself/herself on a three-point scale ranging from "never" to "always." A higher score is indicative of a higher level of social anxiety.

The Rosenberg SES is a brief and unidimensional measure of self-esteem, which has been translated and previously used in China (Song et al., 2011; Wang et al., 2013).

According to previous studies, the internal reliability and factor structure of the test are psychometrically sound across many languages, including Mandarin (Wang et al., 2013). The scale is made up of 10 items, that require the respondent to self-rate himself/herself on a four-point scale ranging from “strongly agree” to “strongly disagree” with five statements that employ reverse scoring. Scores on the SES range from 0 to 30, where a higher score indicates higher levels of self-esteem.

Parental migration

The second block of the survey provides data on the key independent variable, parental migration history. This information is derived from the survey questionnaire filled out by students under the supervision of enumerators. As a way of cross-checking, homeroom teachers were asked to verify the information on parental migration status provided by each student. From this information, we are able to determine the four types of households of interest in this study: *New Migrant* households (both parents are at home at baseline and at least one parent out-migrated during the period between the baseline and endline surveys), *Never Migrant* households (both parents are at home at baseline and neither parent out-migrated during the period between the baseline and endline surveys), *Return* households (both parents migrated at baseline and at least one parent returned home during the period between the baseline and endline surveys), and *Never Return* households (both parents migrated at baseline and neither parent returned home during the period between the baseline and endline surveys).

Other covariates

The third block of the survey collected data on the basic socioeconomic and demographic information of sample students. Because these variables may directly affect mental health, by controlling for them we may be able to more efficiently measure the effects of parental out-migration and return-migration on mental health. Specifically, we collected information on each student's *gender, age, grade*, whether they are an *ethnic minority*, and whether they are a *boarding* student. The survey questionnaire also included questions on household characteristics, such as *assets*,¹ *father's level of education, mother's level of education*, and *number of siblings*.

Methodology

We use difference-in-difference and propensity score matching approaches to examine whether parental out-migration and return-migration affect the mental health of LBCs. In order to conduct this analysis, our sample students were divided into two treatment groups and two comparison groups along the lines of out-migration (*New Migrant* households and *Never Migrant* households) and return-migration (*Return* households and *Never Return* households). These two treatment-comparison sets are analyzed separately.

In terms of our analysis, we first employ a difference-in-difference approach to test the impact of parental out- or return-migration on the mental health outcomes of LBCs. Then, we use two matching approaches to check whether our results are robust to our estimation strategy. Finally, we extend the cross-sectional matching estimators to a longitudinal setting

¹ Asset is calculated by each account of family durable goods multiplying by their prices, then sum all index and take the logarithm.

and implement a difference-in-difference matching estimation approach in an attempt to control for an additional unobserved factors.

Difference-in-Difference Approach

We employ a Difference-in-Difference (hereafter, DID) approach to compare the mental health of students in the treatment group before and after their parents out- or return-migrated to students in the respective comparison group. The equation estimated is as follows:

$$\Delta Score_{is} = \alpha + \beta \cdot MIG_{is} + \delta \cdot X_{is} + \gamma \cdot Score_{is,baseline} + \lambda \cdot S_s + \varepsilon_{is} \quad (1)$$

where the dependent variable, $\Delta Score_{is}$, indicates the change in one of the measures of mental health of student i in school s between baseline and endline. MIG_{is} is the treatment variable (*New Migrant* for the out-migration analysis, and *Return* for the return-migration analysis) and β is the parameter of interest. The term X_{is} is a vector of covariates that are included to capture the characteristics of students and their households, such as *gender*, *age*, *ethnic minority*, *grade*, and *number of siblings*. The $Score_{is,baseline}$ represents the baseline mental health scores of student i in school s . The school effects are captured by λ . We account for the clustered design by constructing Huber-White standard errors clustered at the school level.

Matching Approaches

In addition to the DID estimator, we also used two matching approaches to check whether our results are robust to our choice of estimators. These matching approaches are Propensity Score Matching (PSM) and Bias-Corrected Matching (BCM). PSM allows the analyst to match a student in the treatment group with a similar student from the comparison

group. In this study, we use the nearest neighbor matching method with replacement. In our BCM approach, we enforce exact matching by county. Each treatment observation is matched to three control observations within the same county with replacement. Both forms of matching effectively control for continuous differences between our treatment and control households. Therefore, we are able to interpret the difference in their mental health outcomes as the effect of parental out- or return-migration.

In addition to employing both PSM and BCM strategies, we also employ Difference-in-Difference Matching (DDM) approaches. This is due to the fact that matching methods can only match observations based upon observable covariates, and therefore are not able to account for unobservable covariates. To control for unobservable factors, particularly time-invariant factors, we extended the cross-sectional matching estimator to a longitudinal setting and implement additional DDM estimation for both the PSM and BCM approaches.

Results

Prevalence of Out- and Return-Migrant Households

Similar to the state of migration in many other rural areas in China (Rozelle et al., 1999), many households were already in the migrant labor force in 2012 when we conducted the baseline survey. Of the 17,635 households in our sample, there were 8,677 (49.2%) households in which at least one parent had out-migrated (Table 1-1, column 1, row 1). In addition, our study finds that the number of *New Migrant* households in our sample rose rapidly during the study period. Among the 8,958 households that did not have any migrating parents in 2012 (column 1, row 2), at least one of the parents in 2,707 of these households (30.2%) entered the migrant labor force between the September 2012 and the May 2013

(column 2, row 2). Our sample also included a subset of households that did not send out any migrant during the study period. Specifically, 6,251 households (35.4% of the total sample) did not migrate in either period (column 3, row 4). This group of households is our *Never Migrant* sample and provides the comparison group against which we can measure the impact of parental out-migration.

Table 1-1. Patterns of out-migration in sample households in 2012 and 2013, Gansu and Shaanxi Province, China.

	Migration status in 2012	Out-migration status in 2013	
	(1) Number of households in 2012	(2) Any Parent Migrated	(3) Neither Parent Migrated
[1] Any parent migrated	8677	6171	2506
[2] Neither parent migrated	8958	2707	6251
[3] Total number of households	17635	8878	8757

Data source: Authors' survey.

Column (1)=Column (2)+Column (3)

The households in columns 2, row 1 and 2 are always migrant households. These households are all dropped from the multivariate analysis of out-migration.

The households in column 3, rows 1 and 2 are return migrants (or those households in which households had a migrant in 2012 and in 2013 had returned home). These households are all dropped from the multivariate analysis of out-migration.

Total *New Migrant* households (or those households in which the parents did not migrate in 2012 and migrated in 2013) are found in column 2, row 2. *Never Migrant* households are found in column 3, row 2.

Among our sample there were also 2,201 households (12.5% of the total sample) where both parents had out-migrated at baseline (Table 1-2). Of these 2,201 households, 1,071 households (6.1% of the total sample) had at least one parent return-migrate in the period between the baseline and endline surveys. This group of households comprises our *Return* household sample. In addition, there were 1,130 households (6.4% of the total sample) in which no parent returned home by the time of the endline survey (column 5, row 3). This group of households is our *Never Return* sample and provides the comparison group against which we can measure the impact of parental return-migration.

Table 1-2. Patterns of return-migration in sample households in 2012 and 2013, Gansu and Shaanxi Province, China.

	Migration status in 2012	Return-migration status in 2013	
	(1) Number of households in 2012	(2) Any Parent Returned	(3) Neither Parent Returned
[1] Any parent at home	15434	2266	13168
[2] Both parents migrated	2201	1071	1130
[3] Total number of households	17635	3337	14298

Data source: Authors' survey.

Column (1)=Column (2)+Column (3)

The households in columns 4 and 5, row1 and 2 include the households that out-migrated during the survey.

These households are all dropped from the multivariate analysis of return-migration.

The households in columns 4 and 5, row 4 are not return households. These households are all dropped from the multivariate analysis of return-migration.

Total *Return* households (or those households in which the parents migrated in 2012 and returned home in 2013) are found in column 4, row3. *Never Return* households are found in column 5, row 3.

Correlations between Parental Migration and Mental Health

To determine the correlation between parental out-migration and the mental health of LBCs, we compare the changes in mental health scores between students of *New Migrant* households and *Never Migrant* households. We find that for children whose parents migrated between the two periods the average MHT score increased by 0.81 standard deviations (significant at the 5% level), indicating an increase in general anxiety among sample students. Additionally, the average SASC score of students increased 0.10 standard deviations. At the same time the average SES score decreased 0.09 standard deviations. It is important to note, however, that both measures are insignificant and small in magnitude (Figure 1). Generally, these correlations suggest that the mental health of LBCs deteriorates after their parents out-migrate.

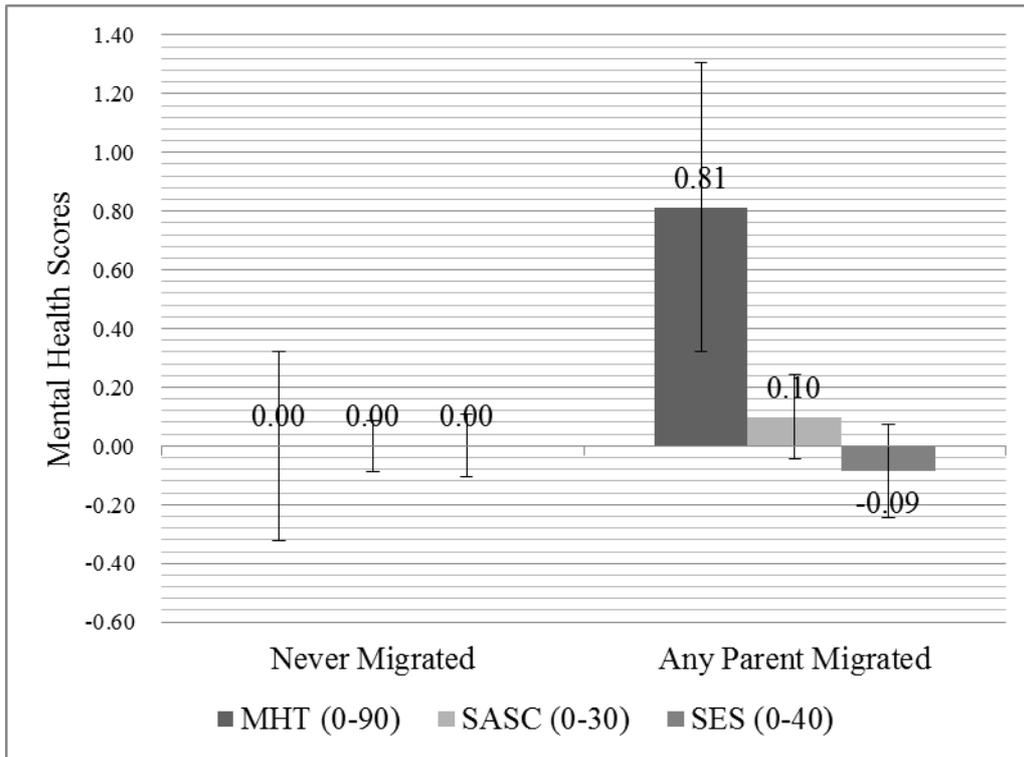


Fig 1. Changes in mental health scores before and after the parents of students out-migrate with 95% Confidence Interval (CI) in different migrant households.

When we examine how mental health measures differ between LBCs from *Return* households and *Never Return* households, we find that parental return does not appear to improve the mental health condition of LBCs. As depicted in Figure 2, the average MHT score of students increased 0.09 standard deviations, the average SASC score of students decreased 0.21 standard deviations, and the average SES score decreased 0.07 standard deviations. These outcomes suggest that general anxiety and self-esteem of LBCs continue to deteriorate when parents return, though the measure of social anxiety of LBCs improves. However, none of these differences are statistically significant. Therefore, it appears that parental return does not improve the mental health condition of LBCs.

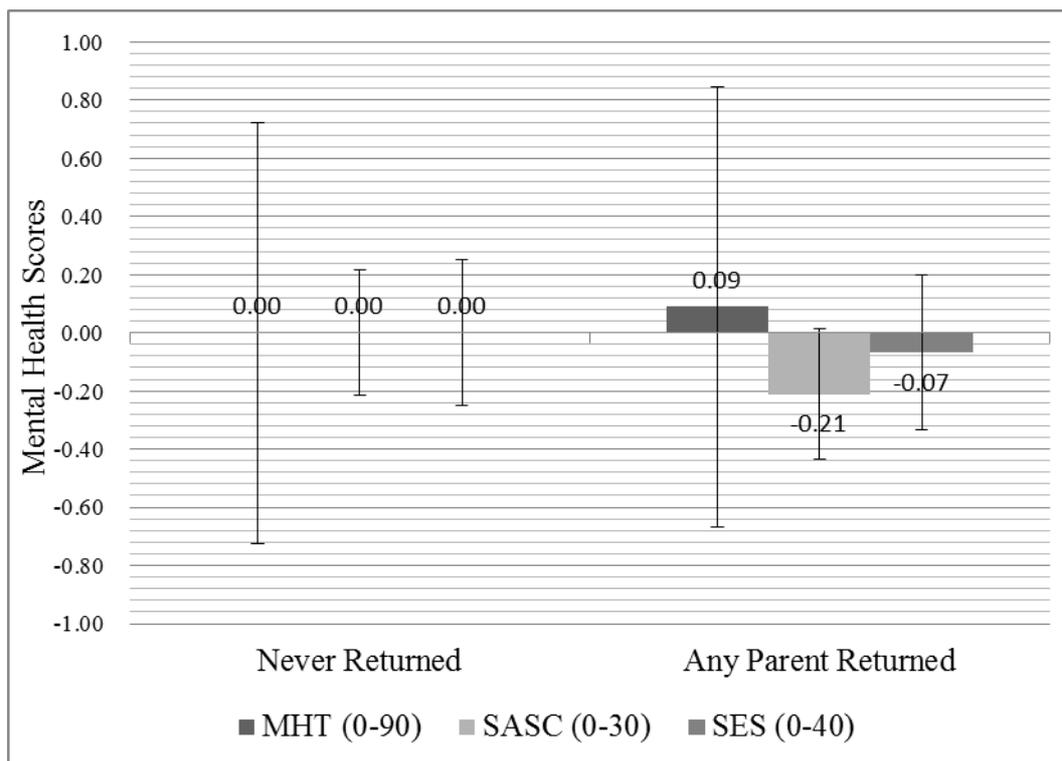


Fig 2. Changes in mental health scores before and after the parents of students returned home with 95% Confidence Interval (CI) in different migrant households.

Multivariate Results

The results from the DID analysis reveal that parental out-migration negatively affects the mental health condition of children when controlling for other factors. Specifically, the MHT and SASC scores of LBCs increase by 1.43 and 0.32, respectively (both significant at the 1% level), while SES scores decrease by 0.17 (significant at the 10% level – Table 2-1). This means that, everything else held constant, the mental health of children in *New Migrant* households worsened compared to children of *Never Migrant* households in the period between the baseline and endline surveys. In particular, measures of anxiety provided by the MHT and SASC significantly increased, suggesting that parental outmigration increases the anxiety levels of LBCs. Additionally, though less significant, the SES scores of LBCs decreased over the study period, suggesting that the self-esteem of LBCs suffered when their parents out-migrated.

Table 2-1. Difference in difference regression results analyzing the effects of out-migration activities of parents on mental health of students, Gansu and Shaanxi Province, China.

Dependent variable: $\Delta\text{Score}_i = \text{Score}_{i, 2013} - \text{Score}_{i, 2012}$	MHT	SASC	SES
VARIABLES	(1)	(2)	(3)
<i>Treatment variable (MIG_i)</i>			
[1] Any Parent Migrated (1=yes; 0=no)	1.43*** (0.28)	0.32*** (0.08)	-0.17* (0.10)
<i>Characteristics of the students</i>			
[2] Male (1=male; 0=female)	-2.10*** (0.25)	-0.63*** (0.07)	0.10 (0.08)
[3] Age (years)	0.17 (0.15)	0.09** (0.04)	-0.32*** (0.05)
[4] Ethnic minority (1=yes; 0=no)	1.30 (1.08)	-0.04 (0.27)	0.43 (0.32)
[5] 5th grade (1=yes; 0=no)	0.75** (0.37)	0.32*** (0.08)	0.71*** (0.12)
[6] Boarding student (1=yes; 0=no)	0.29 (0.49)	0.09 (0.10)	-0.24 (0.14)
<i>Characteristics of the parents and the households</i>			
[7] Log (asset)	-0.13 (0.09)	-0.04* (0.02)	0.07** (0.03)
[8] Father has at least junior high school degree (1=yes; 0=no)	-0.15 (0.27)	-0.13* (0.07)	0.36*** (0.09)
[9] Mother has at least junior high school degree (1=yes; 0=no)	-0.09 (0.31)	0.00 (0.08)	0.13 (0.10)
[10] Number of siblings	0.02 (0.13)	-0.01 (0.03)	-0.11*** (0.04)
[11] Mental health test score of baseline	-0.44*** (0.01)	-0.62*** (0.01)	-0.54*** (0.01)
[12] School dummy	YES	YES	YES
[13] Constant	16.86*** (1.73)	9.00*** (0.50)	17.93*** (0.65)
[13] Observations	8,958	8,958	8,958
[14] R-squared	0.24	0.32	0.26

Data source: Author's survey.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Robust standard errors in parentheses clustered at school level.

Although there is a clear relationship between parental out-migration and the mental health of LBCs, there is no similar relationship exhibited in the case of parental return-migration (Table 2-2). Although the direction of the effect on the MHT score of LBCs indicates improvement, this result is not statistically significant. Therefore, holding everything else constant, after any parent in a *Return* households returned home, measures of their children's mental health condition were not significantly different from those of children from *Never Return* households. This suggests that although parental out-migration may negatively impact children's mental health, parental return-migration cannot correct or offset the damage done to the anxiety and self-esteem of LBCs.

Table 2-2. Difference in difference regression results analyzing the effects of return-migration activities of parents on mental health of students, Gansu and Shaanxi Province, China.

Dependent variable: $\Delta\text{Score}_i = \text{Score}_{i, 2013} - \text{Score}_{i, 2012}$	MHT	SASC	SES
VARIABLES	(1)	(2)	(3)
<i>Treatment variable (MIG_i)</i>			
[1] Any Parent Returned (1=yes; 0=no)	-0.33 (0.60)	0.02 (0.17)	-0.16 (0.19)
<i>Characteristics of the students</i>			
[2] Male (1=male; 0=female)	-2.83*** (0.56)	-0.82*** (0.15)	0.06 (0.21)
[3] Age (years)	0.63* (0.32)	0.11 (0.08)	-0.17* (0.10)
[4] Ethnic minority (1=yes; 0=no)	0.86 (1.60)	-0.65* (0.38)	-0.19 (0.77)
[5] 5th grade (1=yes; 0=no)	0.66 (0.69)	0.51*** (0.18)	0.50** (0.21)
[6] Boarding student (1=yes; 0=no)	0.96 (1.07)	-0.04 (0.27)	-0.41 (0.32)
<i>Characteristics of the parents and the households</i>			
[7] Log (asset)	0.14 (0.16)	0.01 (0.04)	0.08 (0.06)
[8] Father has at least junior high school degree (1=yes; 0=no)	-0.35 (0.56)	-0.11 (0.17)	0.05 (0.18)
[9] Mother has at least junior high school degree (1=yes; 0=no)	0.74 (0.63)	-0.14 (0.19)	0.38* (0.21)
[10] Number of siblings	0.43 (0.30)	0.13 (0.08)	-0.04 (0.09)
[11] Mental health test score of baseline	-0.41*** (0.02)	-0.59*** (0.03)	-0.59*** (0.03)
[12] School dummy	YES	YES	YES
[13] Constant	5.47 (3.61)	7.26*** (0.92)	19.31*** (1.47)
[13] Observations	2,201	2,201	2,201
[14] R-squared	0.29	0.37	0.34

Data source: Author's survey.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Robust standard errors in parentheses clustered at school level.

The results of the cross-sectional matching analysis support our findings regardless of the matching method used. In the case of parent out-migration, the results of the PSM and BCM approaches find that the coefficient on SASC is positive and statistically significant, and the coefficient on SES is negative and statistically significant (Table 3-1, column 1, rows 1a, 2a and 3a; column 1, rows 1b, 2b and 3b). When PSM and BCM are used to examine the effect of parental return-migration, the coefficients on the three treatment variables are all statistically insignificant (Table 3-2, column 1, rows 1a, 2a and 3a; column 1, rows 1b, 2b and 3b). In addition, the findings remain largely the same when the DDM estimator is used (Table 3-1, column 2; Table 3-2, column 2). Therefore, we find that our results are robust regardless of the estimation strategy used.