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Lanyan Ding

University of Nebraska-Lincoln, dinglanyan@gmail.com

Eric S. Buhs

University of Nebraska - Lincoln, ebuhs2@unl.edu

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Ding, Lanyan and Buhs, Eric S., "Effects of Environment on Depressive Symptoms on Chinese Left-Behind Children" (2017). *The Nebraska Educator: A Student-Led Journal*. 38.

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Effects of Environment on Depressive Symptoms on Chinese Left-Behind Children

Lanyan Ding

Eric S. Buhs, Ph.D.

Department of Educational Psychology

Abstract

Estimates indicate that about 70 million children in China have been left behind in their hometowns by one or both parents as their parents migrate to other places for work opportunities. However, the potential impact of parental migration on the emotional well-being of left-behind children is still unclear. The purpose of this study was to examine depression levels in Chinese left-behind children and to identify potential risk factors contributing to depressive symptoms in this population. Using a nationally-representative, stratified sample from the China Family Panel Studies (CFPS) database (3019 children, ages 10-15), an HLM model was applied at 1) the child level measuring the influence of family structure and individual-level parenting practices, and 2) the county level estimating the effects of rural vs. urban differences and county-level parenting practices. Cross-level effects between child factors and county factors were also examined. The depressive symptoms were measured by the *Center for Epidemiologic Studies Depression (CES-D, Radloff, 1977)*. Findings indicated that the left-behind children were more likely to report higher scores on depressive symptoms indices than children from intact families. Children reporting more positive parenting practices also tended to have fewer depressive symptoms. The effect of family structures on children's depressive symptoms depended on the county-level parental behaviors. Implications for schools and parenting practices were discussed.

Keywords: depression, left-behind children, parenting practices, China, HLM

Effects of Environment on Depressive Symptoms among Chinese Left-Behind Children

Left-behind children in China is a term used here to refer to children who are under 18 and must live separately from their parents for longer than three months due to labor migration (Zhou & Duan, 2006). Due to urbanization and modernization, millions of Chinese parents leave the countryside and migrate to cities to search for better employment opportunities. Around 261 million people migrated in 2010 and this migration is expected to continue rising in the future (Sixth National Population Census in China, 2011). Many migrant workers are unable to take their children with them to their working places, where migrant workers are typically regarded as unofficial residents and are denied access to local social services such as education, health insurance, and housing allowances. This leads to a large and growing number of children that are left behind in their hometowns (usually in rural areas) by one or both parents. In 2010, about 61 million children are left behind in rural China (The All-China Women's Federation, 2013). After parents migrate to cities, the left-behind children usually live with either a single parent (usually the mother), a grandparent, another guardian (i.e., relative, neighbor, or others), or the child is left alone to care for himself or herself.

Effects of Family Structure on Depression in Chinese Children

Attachment theory suggests that a secure attachment relationship increases children's sense of security and feelings of belonging. Children who felt closer to their parents tended to perform better on measures of psychological adjustment and reported lower levels of depression (e.g., Bowlby, 1973, 1980). Unfortunately, labor migration in China brings about traumatic separations between children and parents-this is likely to cause an interruption to attachment and increase the risk of developing affective disorders that lead to depression (e.g., Bowlby, 1973, 1980). These adverse impacts of family separation are also likely to be especially pronounced in Chinese contexts where Confucian philosophy places a strong emphasis on family belongingness and interrelatedness among family members (Wu & Chao, 2005). Individuals with such family beliefs often place a high value on family cohesion and integrity (Greenberger, Chen, Tally, & Dong, 2000). The break-up of these families in China goes against normative family values and magnifies feelings of abandonment and rejection among left-behind children, which in turn increases their vulnerability to emotional disorders.

However, empirical evidence gathered from Chinese families with left-behind children that examines these premises is inconsistent. Several findings have shown higher depressive symptoms in left-behind children (Chan, 2009; Gao, Wang, Liu, & Wang, 2007; He et al., 2012; Wang et al., 2011). In contrast, others reported negligible differences in depressive symptoms between left-behind children and children in intact families (e.g., Ren & Treiman, 2016; Wen & Lin, 2012). The inconsistencies in these findings may be due to regional samples with potential geographical bias. People from the same area often share similarities in childrearing beliefs and

social resources, but regional groups may show differences from groups in other areas. For example, children within the same geographical region tend to receive similar childrearing beliefs while regional differences exist in how parents interact, discipline, and support their children. Incorporating regional differences (i.e., county of residence) into models should allow examinations of whether links between family structure and children's depression might differ across regions. The purpose of the present study was to use a nationally-representative, hierarchically structured database to compare levels of depressive symptoms in left-behind children with those of children from intact families, and to examine potential effects of regional/county differences.

Parenting Practices and Depression in Chinese Left-Behind Children

An effort to uncover potential effects of being left behind will also need to incorporate an examination of individual differences in parenting behaviors that might have affected parent-child relationships and child outcomes. Evidence suggests a consistent correlation between parenting characteristics and children's depressive experiences (e.g., MacKinnon, Henderson, & Andrews, 1993). Parental rejection (e.g., criticism and indifference), low warmth, and neglect have been found to be associated with higher risk of depression (e.g., Betts, Gullone, & Allen, 2009; Clark & Ladd, 2000). In contrast, children who experienced parental warmth were better able to develop a social confidence that benefits children's well-beings. Positive parenting practice (e.g., warmth, support, and acceptance) could buffer children from adverse experience that might lead to depressive symptoms (e.g., Laible, Carlo, & Raffaelli, 2000).

In China, labor migration has changed the typical family environment and has resulted in more long-term separations between children and parents. Children are often left-behind in hometowns to live with a single parent or grandparents, who tend to have difficulty providing high-quality rearing environments. Remaining caregivers usually face an increased burden of daily life stress, having less time to spend on child rearing or supervision, and they are typically less emotionally supportive of their children than parents in intact families (Amato, 2005). Remaining single parents may also feel more angry toward spouses and become less affectionate toward their children. These familial vulnerabilities could bring detrimental consequences to psychological well-being of both parents and children. Also, children being raised by grandparents, who tend to have lower educational levels and different parenting practices and values relative to birth-parents, may have difficulty getting help with their emotional needs and with their studies. Children cared for by grandparents have a higher likelihood of experiencing less care, malnutrition, mental disorders, and health problems (Duan, et al. 2009; Robson, et al., 2008; Mills, Mills, & Reicks, 2007). An increased risk of child neglect may also occur during parental absences (Gu et al. 2011; Zhong et al. 2012). Migrant parents in long-term family separations often have difficulty maintaining parental care and detecting signs of emotional

stress or disorder in their children. In addition, good Confucian parents are expected to fulfill responsibilities by applying harsh strictness to assure offspring's success. Restrictive supervision from parents (called *guan*, or *to govern*, in Chinese) is usually viewed as care, concern, and responsiveness in Asian cultures (Chao & Tseng, 2002). The lower level of parental involvement for left-behind children may also contribute to children interpreting this as neglect and a lack of care that would tend to decrease self-worth and create more negative self-schema. All of these factors are likely to combine to put Chinese left-behind children at a higher risk for depressive symptoms.

The majority of previous studies regarding emotional development among Chinese left-behind children, however, have focused on the demographic characteristics of parents. Little is known about the potential impact of specific parenting practices in this population. The present study examined whether parenting behaviors were associated with depressive symptoms in a large group of Chinese left-behind children. For these reasons, left-behind children were expected to display higher levels of depressive symptoms than children from intact families.

Rural vs. Urban Differences in Child Depression

In addition to family environment, the broader social environments or communities where children live also have been found to be associated with their emotional development, with rural vs. urban differences being an especially important factor. A large body of evidence has indicated rural vs. urban differences in the prevalence of depression. Findings from Li et al. (2013) demonstrated more severe depressive symptoms among rural children from the Yangzhou, Jiangsu Province in southern China. People living in rural areas are more likely to experience depression compared to urban populations-this has been linked to harsher living conditions and associated stressors (Probst et al., 2006). Left-behind children in rural areas also tend to face increased demands for helping with farmwork or housework, have fewer resources available to support mental health development, and thus have more difficulty coping with their own life stress (Chang, Dong, & MacPhail, 2011). This adverse environment is likely to increase vulnerability for developing depressive symptoms among children in rural areas. Some studies, however, found contradictory results (e.g., Duan, Lu, & Zou, 2013; Wang et al., 2015). Wang et al. (2015) indicated that children in urban areas experienced higher depression than rural children from the Zhengzhou, Henan Province in northern China. Considering the disparity in these findings, incorporating the rural vs. urban differences would yield more useful information for understanding the emotional wellbeing of left-behind children across China.

The Present Study

The present study used Hierarchical Linear Modeling (HLM) in which children were nested within organizational units (i.e., counties), effectively examining whether

county/contextual effects (i.e., between-county effects) accounted for variability above and beyond that attributable to the child-level effects variables (i.e., within-county). Another way of stating this is that the main and interactive effects of family structure (left-behind vs. intact families), parenting practices, and rural vs. urban differences on children's depressive symptoms were estimated at two levels: 1) at the child level, where children's depression scores were regressed on the family structure and child-level parenting practices (individually perceived parenting), and 2) at the county level, where depressive symptom scores were regressed on rural vs. urban differences and county-level parenting practices (county-mean levels of parenting). Interactive effects between factors from both levels were also examined (see Figure 1 for the conceptual model and Appendix A for model equations).

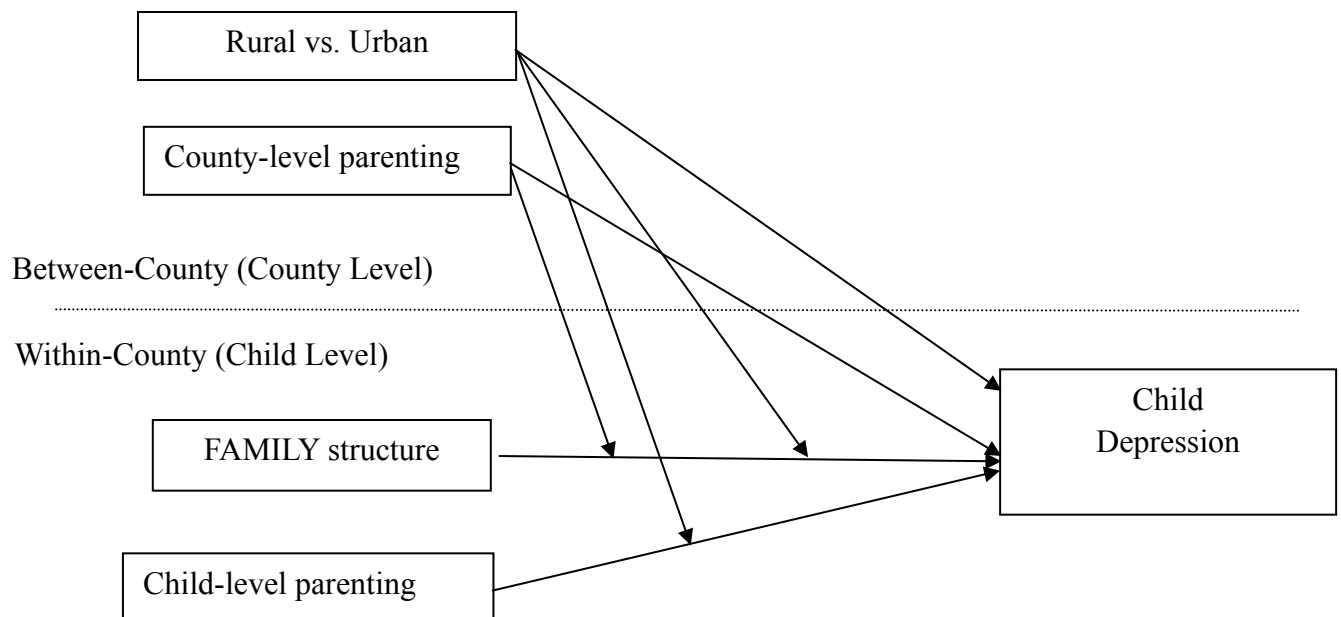


Figure 1. Conceptual HLM of the Impact of Family Structure, Parenting, and Rural vs. Urban Differences on Depressive Symptoms among Chinese Left-Behind Children (for equation details see Appendix A). County-level parenting = the average of parenting scores for each county, FAMILY structure= left-behind children vs. children from intact families, Child-level parenting= individually perceived parenting practices.

Research Questions

1. Did family structure (left-behind vs. intact families) predict children's depressive symptoms? If so, did this relationship vary depending on whether children were living in the rural vs. urban areas?
2. Was parenting practice predictive of children's depressive symptoms? If so, did this relationship vary depending on whether children were living in rural vs. urban areas?
3. Did the relationship of family structure to children's depressive symptoms depend on parenting practice perceived by children?
- 4.

Methods

The CFPS Data Sample

The present study used archival data sources from the China Family Panel Studies (CFPS). CFPS is a nationwide and longitudinal survey of the Chinese families, including 42,590 individuals (8990 children from age 0 to 15 and 33600 adults) from 16,000 households in 25 provinces. Four waves of data collection (2010, 2011, 2012, and 2014) have been carried out thus far. The data used in the present study is the third wave CFPS 2012 in which a total of 43,067 individuals (8,620 children from age 0 to 15 and 34,447 adults) from 13,453 households were included in the sample. All family members age 10 or older answered the questionnaire by themselves in an in-person interview. Information for children younger than age 10 was provided by the primary caregiver of the children. The target population for the present study was children from age 10 to 15. A total of 115 children were excluded because the parental separation is not due to labor migration but other reasons such as divorce, incarceration, or parental death. An additional 16 children were excluded due to no household registration. A total of 3019 children age 10-15 were included in the data analysis (characteristics of sample see appendix B).

Measures

Family Structure. Consistent with previous studies, the present study defined the left-behind children as children who are under 18 and with either both parents or one parent absent (Zhou & Duan, 2006). Children's family structure type was categorized into two types based on their primary caregivers and coded as either: 1) the left-behind children who are either living with only one parent or living with someone other than a parent due to parental labor migration, 2) children in intact families. The family structure was dummy coded as 0= left-behind children and 1=children from intact families.

Rural vs. Urban Contexts. The potential regional or county differences were examined by using a categorical variable for the rural vs. urban counties. A total of 162 counties were

classified into two types of residence areas (rural counties=92, urban counties=70) according to the guidance by the National Bureau of Statistics of the People's Republic of China. The variable of rural vs. urban differences was dummy coded as 0=rural, 1=urban.

Parenting Practices. Parenting practices were measured by 14 items adapted from the *Childrearing without Violence* (2008). Sample items include: "Parents/ guardians liked to talk with you" and "Parents/guardians told stories to you." Children were asked to grade their parents' behaviors based on a five-point Likert scale (1=never, 2=seldom, 3=sometimes, 4=usual, 5=always). Scores for all items are added up to get a sum score ranging from 14 to 70, with the highest score indicates the more supportive and optimal parenting practices. Cronbach's alpha for the scale used in this study was .81 (M=43.54, SD=7.82).

For the HLM analysis, the parenting practices were examined as a continuous variable at both county-level and child-level. Since the relative position of children with regard to the mean of each group (vs. absolute value) is of interest, Group Mean Centering for child-level variables was applied to produce more accurate and interpretable estimates of the intercepts (Enders & Tofghi, 2007; Raudenbush & Bryk, 2002). Therefore, the county-level parenting practices were computed into county-mean parenting (*MEANparent*) to estimate the relationship between county-mean scores of parenting practice and children's depressive scores. The child-level parenting practices were computed as center-within-county parenting (*CWCparent*) estimating the relationship between individual parenting perceptions and children's depressive symptoms.

Depression in Children. The depressive symptoms of children were measured by a 20-item scale of the *Center for Epidemiologic Studies Depression (CES-D, Radloff, 1977)*. The *CES-D* has been widely applied in western studies (e.g., Guarnaccia, Angel, & Worobey, 1989). The Chinese version used here was developed and validated in studies of Chinese adolescents (Chen, Yang, & Li, 2009). Participants were asked to rate their feelings in the past week on a 4-point Likert scale indicating 1= rarely or none of the time (less than 1 day), 2= some or a little of the time (1-2 days), 3= 3 occasionally or a moderate amount of time (3-4 days), 4= all of the time (5-7 days). The *CES-D* has four factors: somatic symptoms (e.g., "My sleep was restless"), depressed affect (e.g., "I felt depressed"), positive affect (e.g., "I enjoyed life"), and interpersonal problems (e.g., "people were unfriendly"). All items are added to produce a total score. Cronbach's alpha for the scale used in this study was .85 (M=31.58, SD=6.56).

Data Analysis

SPSS 23.0 was used for descriptive analysis of all variables. The one-way ANOVA tests were used to test score differences for children's depressive symptoms among six age groups. The t-tests were applied to assess differences in children's depressive symptoms by rural vs. urban differences, gender, and family structure. Initial correlational analyses were used to test relationships between demographic variables and children's depressive symptoms indices. Non-

significant variables were excluded from subsequent regression analyses. The HLM was estimated in SAS 9.4 to examine both the contribution of child-level factors (family structure and child-level parenting) and county-level factors (rural vs. urban differences and county-level parenting) to children's depressive symptoms. A typical four-step approach was used to construct the model in which unconditional effects were tested at Step 1; The child-level main effects of family structure and child-level parenting were examined at Step 2; The county-level main effects of rural vs. urban differences and county-level parenting were estimated at Step 3; Finally, interactions between both level predictors were assessed simultaneously (Hofmann, 1997; Raudenbush & Bryk, 2002; Woltman, Feldstain, MacKay & Rocchi, 2012) (equation details see Appendix A).

Results

Results for Depression

Table 1 presents descriptive statistics on children's depression scores by age, gender, family structure, and rural vs. urban differences. The t-tests indicated a significant difference in the scores for children's depressive symptoms between rural and urban areas ($t(2551) = 6.15, p < .0001$). Children in rural areas reported higher scores in depressive symptoms ($M = 32.03, SD = 6.58$) than children in urban areas ($M = 30.09, SD = 6.39$). Similarly, left-behind children reported higher scores on depressive symptoms indices than children from intact families ($t(2557) = 1.92, p < .0001$). There was no significant difference in scores for children's depressive symptoms between genders ($t(2644) = 1.16, p = .244$) or children's depression scores among six age groups in a one-way ANOVA test ($F(5, 2644) = 1.36, p = .24$).

Table 1

Descriptive Statistics for Children's Depressive Symptoms by Age, Gender, Family Structure, Rural vs. Urban Differences

		Depressive Symptoms	
		<i>Mean</i>	<i>SD</i>
Age	10	31.69	6.74
	11	32.24	6.55
	12	30.76	6.50
	13	31.70	6.82
	14	31.37	6.03
	15	31.77	6.62
Gender	Male	31.42	6.54
	Female	31.72	6.58
Family Structure	Left behind	33.66	6.69
	Intact family	31.61	6.52
Rural vs. Urban	Rural	32.03	6.58
	Urban	30.09	6.39

Results for HLM

Initial correlational analyses demonstrated that demographic variables such as age and gender were not significantly associated with children's depressive symptoms indices. Accordingly, these variables were eliminated from subsequent regression analyses. The HLM design was preferred because this model takes into account potential shared variances nested within a higher-level unit (Raudenbush & Bryk, 2002). Children who are nested within the same county unit are more likely to share variability due to common impacts from higher-level variables (e.g., childrearing beliefs and educational resources). If a county places a high value on parenting practices, then this would affect the emotional development of all children living in the same county. When analyzing the effects of higher-level predictors on children-level variables, HLM takes into account the fact that there are correlated effects (e.g., higher-level influences and error terms) among children from the same county (Vitale, 2008).

A typical four-step approach was used to construct the model (Hofmann, 1997; Raudenbush & Bryk, 2002; Woltman et al., 2012). In Step 1, the analyses used a fully

unconditional model to estimate the *Intraclass Correlation Coefficient (ICC)*, indicating a significant amount of variability in the depression scores that are attributed to county-level groupings (Raudenbush & Bryk, 2002). Given the significant effects of clustering between children within the same county ($ICC=.18 > 5\%$), an HLM was needed to test the county-level effects (Bliese, 2000). The restricted maximum likelihood (REML) estimation and SAS PROC MIXED was used in the data analysis.

In the following steps of HLM analyses, a sequence of nested models was tested to compare the fit of models based on -2 Res Log Likelihood (-2RLL), Akaike information criterion (AIC), and the Bayesian information criterion (BIC) (Hofmann, 1997; Raudenbush & Bryk, 2002; Woltman et al., 2012). Specifically, child-level variables (i.e., family structure, child-level parenting) were entered subsequently to Step 2; County-level variables (i.e., rural vs. urban, county-level parenting) were entered subsequently to Step 3. In the final model, predictors for both levels were added together to test cross-level effects in Step 4. The best model for this data was selected out with significant log likelihood difference and the smallest magnitude of fit indices as -2RLL=8398.8, AIC=8412.8, BIC=8434.4 (see Table 2).

Table 2

Model Fit Indices

Four-step Models with predictors		-2 RLL	AIC	BIC
Step 1	Unconditional model			
Step 2	FAMILY	8963.1	9631.5	11552.1
	Child-level parenting	8900.3	1021.6	19915.2
	FAMILY, Child-level parenting	8414.1	8428.4	18449.6
Step 3	Rural vs. urban	16618.7	16622.7	12662.9
	County-level parenting	16707.6	16713.1	16729.4
	Rural vs. urban, County-level parenting	9957.2	8861.2	9899.3
Step 4	FAMILY, Rural vs. urban County-level parenting, Child-level parenting	8398.8	8412.8	8434.4

Note. FAMILY= Family structure (left-behind children vs. children from intact families), child-level parenting= center-within-county parenting (individually perceived parenting practices), rural vs. urban= rural vs. urban differences (0=rural, 1=urban), County-level parenting =county-mean parenting practices (the averages of parenting scores for each county).

As can be seen in Table 3, the results of the HLM on children's depression scores indicate that there were three statistically significant predictors. At the child level, left-behind children were significantly related to higher depression scores ($b=-4.17$, $t = 2.04$, $p<.05$) after holding constant other predictors (rural vs. urban differences, child-level parenting, county-level parenting). The effect of more supportive parenting practices perceived by individuals was negatively related to children's depressive symptoms after controlling for the family structure and all county-level variables ($b=-.19$, $t = -3.51$, $p<.001$). Both of the county level factors (rural vs. urban differences and county-level parenting) did not display a significant main effect on children's depressive symptoms. Moreover, the cross-level analysis indicated that being left-behind was significantly related to higher depressive symptoms even when the county-level parenting practices were more supportive ($b=-.09$, $t = -1.92$, $p<.05$).

Table 3

Results of HLM on Children's Depression Scores

Levels	Variable s	Estimate	S.E.	df	t
Child Level	FAMILY, γ_{10}	-4.17*	2.04	1126	2.04
	Child-level parenting, γ_{20}	-0.19**	0.05	1126	-3.51
County Level	Rural vs. urban, γ_{01}	-0.59	0.45	1126	-1.30
	County-level parenting, γ_{02}	-0.11	0.09	158	-1.15
	FAMILY* rural vs. urban, γ_{11}	0.10	0.25	1126	0.40
Interactions	FAMILY* County-level parenting, γ_{12}	-0.09*	0.05	1126	-1.92
	Rural vs. urban *Child-level parenting, γ_{21}	-0.02	0.03	1126	-0.49

Note. * $p < .05$. ** $p < .001$. FAMILY=family structure (left-behind children=0, children from intact families=1). Child-level parenting = center-within-county parenting practice. County-level parenting = county-mean-parenting practice. Rural vs. urban= rural vs. urban differences (0=rural, 1=urban). -2RLL =8398.8, AIC=8412.8, BIC=8434.4.

Considering the significant effects of FAMILY*County-level parenting on children's depressive symptoms, a follow-up test of the intercept and slope was further examined for children from different family structures. There was a significant effect of county-level parenting for intact-family children on depression scores but no significant effects for left-behind children. Results are consistent with our assertion that children from intact families benefit from living in a county with a high average value of supportive parenting and tend to display a .20 unit decrease in depression scores, whereas left-behind children appear to gain little from county-level positive parenting practices (see Table 4).

Table 4
The Regression Parameters for Family Structure

Label	Estimate	S.E.	df	t
Intercept for FAMILY	32.01	0.06	1126	-2.15
Intercept for INTACT	31.13	0.08	1126	-4.05
Slope for LEFT	-0.11	0.09	1126	-1.25
Slope for INTACT	-0.20***	0.07	1126	-3.08

Note. *** $p < .001$. LEFT= left-behind children. INTACT=intact family children.

Discussion

The present study examined the relationship among family structure (left-behind children vs. intact family children), parenting practices, rural vs. urban differences, and children's depressive symptoms in a nationally-representative Chinese child/early adolescent population. Because we detected a significant difference in children's depressive symptoms among 162 Chinese counties (rural counties=92, urban counties=70) and the nested variability among children living within the same county, HLM was applied to examine these effects at two levels. Three important findings have emerged from the present study. Left-behind children reported higher scores on depressive symptoms indices than children from intact families. Second, results indicated children reporting more positive parenting practices tended to have fewer depressive symptoms. In addition, the impact of family structure on children's depressive symptoms depends on county-level parenting practices; that is, intact family children with more supportive parenting practices reported a lower level of depression scores.

Family Structure and Children's Depressive Symptoms

The present study indicated that left-behind children were more likely to report a higher level of depressive symptoms than children from intact families. This result answered our first research question that prompted this project: does family structure (left-behind vs. intact families) affect children's depressive symptoms? Our findings supported evidence from previous Chinese family studies (e.g., Liu, Li, & Ge, 2009; He et al. 2012; Ren & Treiman, 2016; Wang et al. 2011) that suggested that this is the case. Because they are separated from parents for long periods, left-behind children are less likely to obtain support for dealing with their emotional disturbances and stressors. Left-behind children likely have a sense of being abandoned and rejected by their parents, and this may result in a low sense of self-worth and increase the risk of

depression (Ren & Treiman, 2016). In addition, our findings indicated that the relationship between family separation and children's depressive symptoms did not appear to depend on whether the county is rural or urban. One possible explanation is that emotional needs for family integrity are universal for children across different socioeconomic statuses.

In considering these negative effects of family separation on children's emotional development, future studies should examine whether or not left-behind children might benefit from policies for improving access to education and health care (especially mental health services). Findings from the present study may also have implications for school administrators. Giving the potential disorders in emotional development for left-behind children, schools may be able to provide them with counseling services. Improving mental health support and reducing social discrimination against left-behind children would help them better adjust to the school environment (Ren & Treiman, 2016). School administrators who provide a more supportive environment for left-behind children may also see benefits in student mental health and academic performance. Left-behind children might be able to use school personnel as attachment figures and perhaps the school context as a more effective secure base for children to explore academic activities and interpersonal relationships. Improving the school-parent communication and support is probably another good way to reduce the risks related to being left behind.

Parenting Practice and Children's Depressive Symptoms

The significant relationship between child-level parenting practices and depressive symptoms suggested that positive parenting practices were also related to lower scores for depressive symptoms. Findings for the second research question are also consistent with a critical role that we hypothesized for parenting practices in children's emotional development. Children with more positive parental behaviors were less likely to have depressive symptoms, whereas children with less caring parents tended to have a higher level of depressive symptoms. Results are consistent with western literature findings regarding parenting practices effects on children's depressive symptoms (Garber, Robinson, & Valentiner, 1997; Walker, Garber, & Greene, 1993). Authoritative parenting styles, characterized by high levels of warmth, support, acceptance, and encouragement of autonomy would typically provide children with more positive views about themselves and the world, which in turn has been associated with a decrease of the emergence of children's depressive symptoms (Baumrind, 1978). This finding has important implications for parents' facilitation of children's emotional development in China. For example, future studies can examine whether or not parents can spend more time with children on playing and reading books together see a benefit in the mental health of their children. Encouraging children to express their thoughts might be another good way to foster a positive sense of self-worth. When children do something wrong, parents can ask reasons and discuss how to make things correct.

Moreover, findings indicated that county-level parenting practices moderated the relationship between family structure and children's depressive symptoms. This result answered our third research question that examined links to family structure and asked whether children's depressive symptoms depend on perceived parenting by children. Children from intact families reported fewer depressive symptoms when they perceived their parents as having more positive parenting practices. Left-behind children's depressive symptoms were not impacted by their assessment of their parents' behaviors. One possible explanation is that children from intact families are more likely to experience positive impacts such as positive educational values, roles modeling, and social skills from their parents. On the other hand, the children who are left behind in local areas appear less likely to obtain warmth and support from parents. The unavailability of parental care throughout child development is the biggest challenge for left-behind children, especially when they need parental support for handling stressors or life challenges. One implication is that it will be important to examine how families can facilitate intimacy between left-behind children and their parents. Phones or video-conferencing, for example, might be effective ways to maintain long-distance communication that fosters emotional support. By using phones, left-behind children can talk to parents regularly, exchanging their feelings and obtaining affections from parents (Pan et al., 2013).

Limitations

There are several limitations of this study, indicating several directions for future research. First, the emotional development of these migrant children prior to their parents' migration was not known – this would allow for an examination of change in development perhaps attributable to being left behind. A further study that distinguishes the children left behind in hometowns (i.e., more familiar contexts) and children who migrate with parents to other places would also allow a comparison of emotional development in these groups. Second, the present study followed the practice in previous studies of combining children with both parents absent and children with only one parent absent. However, it is reasonable to assume that after the migration, one less parent at home would lead to a different effect on childrearing and child psychological wellbeing compared to families where both parents migrate. For example, if only one parent was working and that parent migrated, then sent back money, while the remaining parent stayed at home as before, that wouldn't be likely to have the same effect. Similarly, if both parents were working before the migration of one of them, and the remaining parent worked the same job/hours as before, then the parenting situation may not have changed as much. It will be necessary to distinguish between children who have been left by only one parent vs. both parents. Accordingly, it is important that future studies could examine the emotional development of those two groups separately. Finally, findings in the present study

were obtained from a cross-sectional design using the third wave data collected in CFPS 2012. In future research, longitudinal analyses could be able to provide greater support for causal linkages among the family structure, parenting practices, and children's depressive symptoms.

Conclusion

This study used archival data from CFPS 2012 to examine the main and interactive effects of family structure, parenting practices, and rural vs. urban differences on depressive symptoms among Chinese children in an HLM model. Results confirmed our predictions that the main effects of family structure, individually perceived parenting, as well as interactive effects between county-mean parenting and family structure all contributed to the level of depressive symptoms in Chinese children. At the child level, left-behind children were more likely to report a higher level of depressive symptoms than children from intact families. Children with more positive parenting practices also tended to have fewer depressive symptoms. No significant effects from county-level factors were found. The effect of county-level parental behaviors did, however, moderate effects of family structure on children's depressive symptoms. Identifying the depression levels in left-behind children and examining potential factors associated with these depressive symptoms is a first step for developing further interventions to improve mental health for this vulnerable child population. Those planning programs to reduce emotional disorders in Chinese left-behind children would benefit from a better understanding of the role of family structure, parenting practices, and rural vs. urban differences. In addition, exploring the contribution of family variables to depressive symptoms among Chinese left-behind children in a family-centered culture would further our understanding of child development in different cultural contexts.

Acknowledgements

Duane F. Shell, Department of Educational Psychology Research Professor, provided advice on methods in the early stages of the study. Ian M. Newman, Department of Educational Psychology Professor provided valuable comments on drafts of this manuscript. Authors thank Lok Wa Yuen, Michelle Maas's, and Niran Tamrakar's assistance with the manuscript edition.

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Appendix A. Model Equation

An HLM model was estimated in SAS 9.4 to evaluate the effect of rural vs. urban differences and county-level parenting (county-mean parenting, $MEANparent$) at county level and the effect of family structure and child-level parenting (center-within-county parenting, $CWCparent$) at the children level in terms of children's depression score. The variable of rural vs. urban differences and the family structure were dummy coded with reference groups corresponding to rural areas and left-behind children. The $MEANparent$ and $CWCparent$ were entered as continuous variables.

$$Y_{ij} = \beta_{0j} + \beta_{1j} FAMILY + \beta_{2j} CWCparent + \beta_{3j} Gender + \beta_{4j} Age + r_{ij} \quad \text{Level 1}$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01} URBAN_j + \gamma_{02} MEANparent + u_{0j} \quad \text{Level 2}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11} URBAN_j + \gamma_{12} MEANparent + u_{1j}$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21} URBAN_j + u_{2j}$$

then

$$Y_{ij} = \gamma_{00} + \gamma_{01} URBAN_j + \gamma_{02} MEANparent + \gamma_{10} FAMILY + \gamma_{20} CWCparent + \gamma_{11} URBAN_j * FAMILY + \gamma_{12} MEANparent * FAMILY + \gamma_{21} URBAN_j * CWCparent + u_{0j} + u_{1j} FAMILY + u_{2j} PARENT + r_{ij}$$

where center-within-county $CWCparent = PARENT_{ij} - \overline{PARENT}_j$

$$r_{ij} \sim N(0, \sigma^2) \text{ and } \begin{pmatrix} u_{0j} \\ u_{1j} \\ u_{2j} \end{pmatrix} \sim MVN \left[\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \tau_{00} & \tau_{01} & \tau_{02} \\ \tau_{10} & \tau_{11} & \tau_{12} \\ \tau_{20} & \tau_{21} & \tau_{22} \end{pmatrix} \right]$$

Y_{ij} is the depression for the i^{th} child within the j^{th} county.

γ_{00} is the grand mean of the children's depression.

γ_{01} is the rural vs. urban effect on the mean of children's depression.

γ_{02} is the effect of county-level-parenting mean on the mean of children's depression.

γ_{10} represents the expected family-depression slope in a county with rural vs. urban differences = 0 and $MEANparent = 0$.

γ_{11} is the rural vs. urban effect on the family-depression slope.

γ_{12} is the $MEANparent$ effect on the family-depression slope.

γ_{20} represents the expected $CWCparent$ -depression slope in a county with rural vs. urban differences = 0 and $MEANparent = 0$.

γ_{21} represents the rural vs. urban effect on the $CWCparent$ -depression slope.

u_{0j} is the random rural vs. urban and $MEANparent$ effect on the mean of depression.

u_{1j} is the random rural vs. urban and $MEANparent$ effect for the $CWCparent$ -depression slope.

u_{2j} is the random rural vs. urban effect for the CWC parent-depression slope.

r_{ij} the residual for the i^{th} child within the j^{th} county.

τ_{00} represents the variance among county *depression* means, after controlling for rural vs. urban differences and $MEAN$ parent.

τ_{11} represents the variance among county FAMILY-depression slopes, after controlling for rural vs. urban differences and $MEAN$ parent.

τ_{22} represents the variance among county CWC parent-depression slopes, after controlling for the rural vs. urban differences.

Appendix B. Characteristics of the Sample

		Male		Female		TOTAL	
		N	%	N	%	N	%
Age	10	274	17.3	225	15.7	499	16.5
	11	248	15.6	209	14.6	457	15.1
	12	245	15.5	259	18.1	504	16.7
	13	301	19.0	241	16.8	542	18.0
	14	258	16.3	234	16.3	492	16.3
	15	259	16.3	266	18.5	525	17.4
	Total		1585	100	1434	100	3019
School levels	Elementary	978	61.7	832	58.0	1810	60
	Middle school	568	35.8	557	38.9	1125	37.3
	High school	39	2.5	45	3.1	84	2.8
	Total		1585	100	1434	100	3019
Rural vs. Urban	Urban	300	19.7	285	20.8	585	20.2
	Rural	1220	80.3	1088	79.2	2308	79.8
	Total	1520	100	1373	100	2893	100
Family Structure	Left-behind children	602	39.8	555	39.9	1157	39.8
	Intact families	912	60.2	835	60.1	1747	60.2
	Total	1514	100	1390	100	2904	100