Research Article

Social Support Ameliorate Depressive Symptoms in Left-Behind Children in Rural China: A Cross-Sectional Study

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1. Abstract

Being left-behind is one of explanations for depressive symptom occurrence in left-behind children (LBC) in rural areas. Social environment, school, community could also impact their personality growth and mental health. However, the amelioration effect of social support is not clearly and substantively confirmed. In this paper a cross-sectional study was conducted in a common rural village in China. In this village various social support programs were developed by government at all levels. Concern and care were given to their physical and mental health of all left-behind children. Social-demographic characteristics of 173 children, of which 104 children were left-behind and 69 children were Non-left-behind (Non-LBC), were collected. Depressive symptoms were assessed utilizing a Chinese version of the Children's Depression Inventory to measure the prevalence of depression. Blood samples were collected and three stress hormones were measured utilizing ELISA. The preliminary results showed that the detection rates of depressive symptoms in LBC group and Non-LBC group were 28.85% and 21.74% respectively, with no significant difference. No significant difference of 3 hormones secretion of hypothalamic-pituitary-adrenal cortex axis occurred between LBC group (n=104) and Non-LBC group (n=69) (total n=173). Furthermore no significant difference of 3 hormones secretion occurred between children with depressive symptoms (n=30) and children without depressive symptoms (n=74) in LBC group (n=104). The conclusion could be drawn that social support and care may refrain depressive symptoms in left-behind children in rural areas in China.

2. Key words: Left-behind children; Depressive symptoms; Stress hormone; Social support

3. Introduction

Currently the global incidence of depression is about 4% to 8%. Depression has become the fourth largest disease in the world in terms of disease burden, which is expected to become the second largest human disease after coronary heart disease by 2020 [1]. Depressive disorder is mainly manifested by the severity or duration of sadness that enough affect normal function, decrease or loss of activity interest or pleasant sensation. The etiology of depression is still unclear and may involve genetics, changes in neurotransmitter levels and neuroendocrine function, and psychosocial factors [2]. The effect of genetics on depression occurrence is uncertain, however, depression is more commonly occurred in first-degree

relatives of depression patients, and identical twins share a high incidence of the same disease. Changes in neurotransmitter levels include abnormal regulation of cholinergic, catecholaminergic and serotonergic neurotransmitters. Neuroendocrine disorders maybe change the function of hypothalamic pituitary adrenal axis (HPA), hypothalamic-pituitary-thyroid axis (HPT), and growth hormone. Psychosocial factors mainly refer to major life event stresses, such as separation and loss, which are usually happened before severe depressive episodes. But these events do not always lead to persistent and severe depression, except for those people who are susceptible to affective disorder. Hypothalamic-pituitary-adrenal axis activation and subsequent stress hormone release from corticotropin releasing hormone (CRH) to adreno cortico tropic hormone (ACTH), and

cortisol are the crucial characteristics of life stress response [3-5]. The relationship between chronic stress, stress hormones and depression has aroused general interest in clinical practice.

With the economic boom in China, millions of rural workers have moved away from their hometowns to work in big cities. Behind them are their young children, whom are called "left-behind children (LBC)."Since most LBC separate from their parents for a long time and cannot communicate well, this situation might lead to lots of mental problems such as loneliness, inferiority, emotional vulnerability, self-enclosure, depression, and insecurity [6-8].

Depression is the most common psychological problem among LBC [9] .Furthermore, in recent years, the concern and care from governments at all levels for LBC improved greatly their physical and mental health[10], however, the amelioration effect of social support is not clearly and substantively confirmed.

Depressive disorders occur at any age but are typically seen in their fifteen and sixteen, or twenties and thirties years old. Thirty percent of patients in primary care institutions are reported with depressive symptoms, but only less than 10% have severe depression. The detection rate of depression in China is only about 30%; their physical and mental health conditions are usually assessed with some symptom rating scales, such as Hamilton Depression Scale (HAMD-17), Life Events Scale (LES) and Newcastle Depression Diagnosis of Diagnostic Scale (NDI)[11-13]. These scales are limited by strong subjectivity, poor consistency and long time-consuming, sometimes lead to missed diagnosis and misdiagnosis. Substantive evidence such as HPA axis hormone is urgently needed for assisting the diagnosis and identification of depression.

This cross-sectional study was conducted in an ordinary village in Heze City, Shandong Province, China. It is a typical Chinese rural area. In this village various social support programs are developed by government at all levels and concern and care are given to all left-behind children (LBC) for their physical and mental health. Non-left-behind children (Non-LBC) aged 6-14 years were recruited as control. The study aims to evaluate the role of social support in depressive symptoms amelioration in LBC in rural area.

4. Subject and Methods

4.1. Environment and Participants

The research protocol was reviewed and approved by the Institutional Ethics Committee. The field research was conducted in an ordinary village of Cao County, Heze City, Shandong Province, China from September 2017 to December 2018. More than 200 children aged

6-14 year old live in this village. Among them more than half are left-behind children (LBC). Left-Behind Children (LBC) are defined as one living with him/her self or with other family member except their parents. Non-Left-Behind Children (Non-LBC) are defined as those living with their parents. LBC aged 6-14 years were recruited as well as non-LBC at same age range as control. Informed consent was obtained from all participants or their legal guardians. With general inquiry, physical examination and laboratory tests, all participants are with no any organic disease. Children with organic diseases were excluded from this research.

4.2. Social Support Measures

For more than 5 years various social support programs have been developed by local government at all levels. Concern and care measures are as follows but not limited to: concern and care are given to all LBC for their physical and mental health by enthusiastic and kind-hearted volunteers. Village cadres, school teachers, village doctor, and other volunteers provided social and psychological interventions to LBC at regular intervals. For example, each LBC was interviewed at regular intervals to communication with a pairing volunteer. He or she was encouraged to express his or her feelings, especially negative mood. Besides, all LBC were randomly assigned to interventions like "gratitude visits" and "three good things". Each child was encouraged to find his or her positive psychological resources, such as character strengths, hope, meaning of life, and social connections. In all these social and psychological interventions, positive emotions such as savoring, gratitude and serenity were laid with special emphasis.

4.3. Data Collection

Social-demographic data of each child was collected. For the LBC group, their starting age of left-behind (0~1 years old, 1~3 years old, 3~8 years old), left-behind duration (<1, 1-3, >3 years), and lifestyle (living independently, living with other family members except parents) were recorded especially. All children were assessed on a professional depression scale. A total of 179 children's data were collected. Data of 104 LBC and 69 Non-LBC were analyzed at last. Six children were not included in the final analysis due to incomplete data.

4.4. Depression Inventory

Each participant was assessed utilizing a Chinese version of the Children's Depression Inventory to measure the prevalence of depressive symptoms. The Inventory was invented by Shanghai Mental Health Center with a total of 27 items. The higher the score, the severer the degree of depression. Score of 0~11 was considered

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2

as normal, score of 12~18 was considered ad mild depression, and score of more than 19 was considered as severe depression. The internal consistency coefficient of the Inventory is 0.75.

4.5. Determination of HPA Stress Hormone Levels

About 1.5mL of fasting blood sample was taken from the cubital vein of each child at 8:00 a.m. of the day and placed at room temperature (about 24°C) for 1 h. The serum was segregated after centrifugation at 2500 r/min for 15 min. The levels of stress hormones CRH, ACTH and cortisol in serum were determined by enzyme-linked immunosorbent assay (ELISA). These ELISA kits were purchased from CUSABIO, USA.

4.6. Statistical Process

Data were analyzed by χ^2 test and t-test utilizing SPSS 17.0 software. The difference was statistically significant at $p < 0.05$.

5. Results

5.1. Depressive Symptoms Detection Rates between LBC and Non-LBC

The detection rate of depressive symptoms in the whole sample was 26.01% (45/173). The detection rate of depressive symptoms in the LBC group was 28.85% (30/104), meanwhile the detection rate of depressive symptoms in the non-LBC group was 21.74% (15/69) (Table 1). The detection rate in the LBC group was a little bit higher than that of the non-LBC group, however, the difference was not statistically significant (χ^2=1.089, p=0.297>0.05).

5.2. Relevance between Left-Behind Factors and Depressive Symptoms in LBC

We further stratified the data of the LBC group (n=104) according to different left-behind starting age, left-behind duration and lifestyle (Table 2). In this group 74 children were normal without any depressive symptoms; meanwhile 30 children were with depressive symptoms. The results showed that the younger the left-behind starting age and the longer the left-behind duration, the higher the depressive symptoms detection rate. However, the difference were not statistically significant (χ^2=1.296, p=0.523 and χ^2=1.587, p=0.452). There is no correlation relationship between the difference in left-behind lifestyle and the detection rate of depressive symptoms. In this group almost 100% LBC stay with their family members except their parents. Only one case lives independent and he did not show any depressive symptoms.

5.3. HPA Stress Hormone Levels Comparison

The stress hormones (CRH, ACTH and cortisol) in the serum both in LBC group (n=104) and in non-LBC group (n=69) were determined by ELISA. Although there is a little bit increase for CRH, ACTH and cortisol levels in LBC group compared to those in non-LBC group, there is no statistically difference between 2 groups (p>0.05) (Figure1).

In LBC group, although these was a rise in three stress hormone levels of children with depressive symptoms, no statistically difference occurredas compared to those of children without depressive symptoms (p>0.05) (Figure 2). Similar results were seen in non-LBC group (Figure 3).
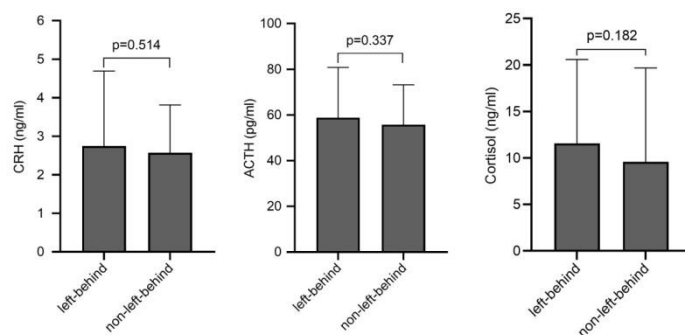
Figure 1: Hormone secretion of hypothalamic-pituitary-adrenal cortex axisin LBC group (n=104) and non-LBC group (n=69) (total n=173).
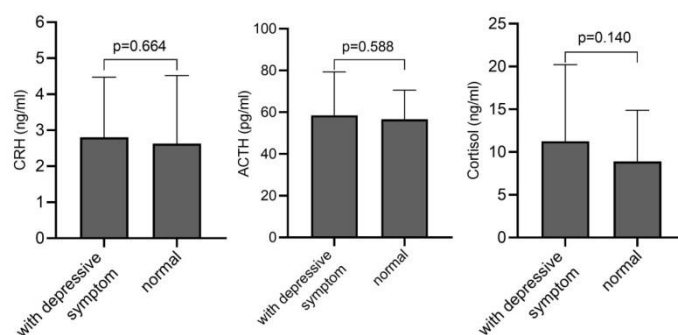
Figure 2: Hormone secretion of hypothalamic-pituitary-adrenal cortex axisin children with depressive symptoms (n=30) and children without depressive symptoms (n=74) in LBC group (n=104).
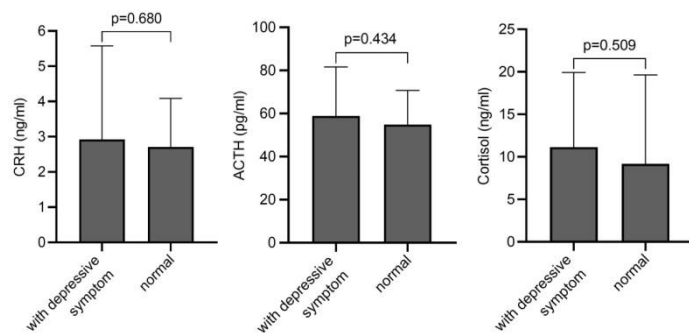
Figure 3: Hormone secretion of hypothalamic-pituitary-adrenal cortex axisin children with depressive symptoms (n=15) and children without depressive symptoms (n=54) in non-LBC group (n=69).

Table 1: Children with depressive symptoms in two groups.

Groups	Depressive symptoms	Normal	Total
Left-behind children	30	74	104
Nonleft-behind children	15	54	69
Total	45	128	173

Table 2: Different left-behind factors and depressive symptoms relevance.

Left-behind factors		No depressive symptoms (n=74)	With depressive symptoms (n=30)
Starting age	0~1year	25	13
	1~3year	24	10
	3~8year	25	7
Duration	<1year	5	1
	1~3year	16	4
	>3year	53	25
Lifestyle	Live alone	1	0
	Withfamily members	73	30

6. Discussion

Since the 1990s the number of LBC in rural China has continued to increase. As of 2015, the number of LBC aged 0-17 years old in China reached about70 million, of which the number of LBC in rural areas was about 55 million [14]. Many investigations have shown that left-behind children have a great disparity in physical and mental health compared with non-left-behind children. Though a few researches believed that mental health of left-behind and non-left-behind children in middle school have no significant difference [15], more and more evidence showed that depression is one of the most common psychological problems in LBC especially in rural

area [16]. Meta-analysis showed that the overall depressive symptom detection rate of Chinese LBC was 30.9%, which is higher than non-LBC [17] .There were age and region distribution difference in rates of depression symptom in LBC. Higher rates were found both in low age and western provinces in China [18].

Being left-behind is one of explanations for depressive symptom occurrence in LBC in rural areas. Besides, many other factors including age, gender, peer interaction, parents' expectation, family satisfaction, self-esteem, school academic achievement, frequency of meeting parents, and etc could also impact their personality growth and mental health. Chinese government at all levels have noticed this problem and kicked off many actions to contain mental disorder of LBC. A few years have gone; however, the amelioration effect of social support from social environment, school, and community is not clearly and substantively confirmed.

We selected a common rural village in Shandong Province, a big labor export province in China, where a large number of young and middle-aged people go out to work and leave their children at home. In the small village we recruited 173 children in total, of which 104 cases were left-behind and 69 cases were non-left-behind. We used a Chinese version of the Children's Depression Inventory to evaluate their mental health status. We found that with the social support, the detection rate of depressive symptoms in the LBC group was 28.85%. There were a little bit drops as compared with the meta-analysis data (30.9%) [17]. Though the depressive symptoms detection rate in the LBC group was a little bit higher than that in the non-LBC group (28.85% vs 21.74%), there was no statistically significant difference. In this sample, although the left-behind starting age and duration might be possible to promote induction of depressive symptoms, no statistically significant difference occurred as well. Stress hormone levels both in LBC and non-LBC also supported this result as substantive evidence.

In February 2016, the State Council of China issued the "Opinions on strengthening care and protection of left-behind children in rural areas" for the first time, and then "left-behind children care" had been written in the national "13th Five-Year Plan Guideline". The government at all levels have attached great importance to LBC care in rural areas, especially paid close attention to the protection of their rights and interests. Many volunteers routinely visit LBC, and help them from every aspect [19-20]. Currently LBC in rural areas in China obtain much more concern and care from local government, and their physical and mental health situation get more and more attention from public and community. Besides, modern

communication tool application (such as use we chat app in mobile phone) shortens the psychological distance between parents who go out to work and left-behind children who stay at home. Left-behind factor may still have effect on depressive symptoms, but with the social support, the impact is not significant.

Evidence proved that positive education interventions could prevent depression in Chinese adolescents [21]. Positive emotions can reduce negative emotions. In this cross-sectional study, we observed that village cadres, schoolteachers, village doctor, and young volunteers used many positive education tools. For example, savoring is a technique that helps people to enjoy and fully engage their positive emotions. They adopted it to help children reduce their depressive symptoms and negative emotions significantly. Gratitude interventions were employed to lower levels of depression and promote life satisfaction. Serenity was cultivated also to reduce children's negative emotions. All these interventions are effective because positive emotions broaden children's cognitive and behavioral repertoires and build up their psychological resources [22]. Positive emotions expand children's attention and negative emotions narrow attention, positive emotions can undo lingering effect on emotions by augmenting children's attention to a broader scope. Besides, positive emotions build psychological resilience that can help children better cope with negative emotions.

The stress hormone cortisol change might be of value as biomarkers for early diagnosis of depression. Until to now, the pathogenesis of depression is unclear. Genetics and neurotransmitter level change might be involved with susceptible population who are more likely to develop depression under the life event stress such as separation and loss during their childhood. Stress-induced HPA axis activation result in increased hormone secretions. It is worth noting that early life stress can make a long-lasting change in the HPA axis response to stress, and has a profound effect on depression occurrence in adults. In this work cortisol serum level in left-behind children was a little bit higher than that in non-left-behind children, even though there was no significant difference. The underlying mechanism is not clear and further research is guaranteed.

7. Conclusion

In conclusion, a little bit more depressive symptom was identified in left-behind children compared to non-left-behind children. Being left-behind might induce symptoms but the impact was not so great. Social support and care may have great value for depression prevention.

8. Acknowledgements

9. Declaration of Competing Interests

The authors declare that they have no competing interests.

10. Funding

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