

The influence of empty-nest living on the health of the older people living in the rural areas of Lishui, China

A cross-sectional study

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Abstract

The empty-nest older people are becoming a significant social phenomenon in the rural of China. Most studies on the health of the empty-nest older people contain these older people who have no children or dead children. The emotional experience of the older people with and without children is quite different, our study only chose the empty-nest older people who had children in the rural of Lishui, China. The purpose of this study is to explore the differences of the health conditions between empty-nest and non-empty-nest older people living in the rural areas of China, including items of chronic metabolic diseases, fall injury, and mental health. Our research found that empty-nest older people had higher incidence of fall injury (17.00% vs 6.31%, $P=.006$) and suffer more severe depression ($P=.015$) than the non-empty-nest older people. The adjusted odds ratio of fall injury and depression for empty-nest older people compared with the non-empty-nest older people were 2.76 (95% CI, 1.17–6.48) and 2.25 (95% CI, 1.36–3.67), respectively. Our results suggest that empty-nest older people are more likely to suffer from depression and fall injury than non-empty-nest older people living in the rural of China.

Abbreviations: ADL = activity of daily living scale, BMI = body mass index, OR = odds ratio, SDS = self-rating depression scale, SSRS = social support rating scale.

Keywords: chronic metabolic diseases, depression, empty-nest older people, fall injury

Editor: Ning Zhang.

NH, TS and LX contributed equally to this work.

This work was supported by the National Natural Scientific Foundation of Chinagrants (81602842), the Postgraduate Research & Practice Innovation Program of Jiangsu Province (KYCX17_2028) and Lishui City Science and Technology Project (2019SJZC48).

Data Availability Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Practice Impact Statement (PIS): In addition to suffering from physical disorders, our study also found that rural empty-nest older people were in higher incidence of depression than non-empty-nest older people. So empty-nest elder parents need more emotional care from their children, including their company and listening, etc.

The authors have no conflicts of interest to disclose.

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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How to cite this article: Hu N, Shi T, Xu L, Pan G, Hu Z. The influence of empty-nest living on the health of the older people living in the rural areas of Lishui, China: a cross-sectional study. *Medicine* 2022;101:4(e28691).

Received: 22 July 2021 / Received in final form: 26 December 2021 / Accepted: 6 January 2022

<http://dx.doi.org/10.1097/MD.00000000000028691>

1. Introduction

In China, there is a tradition that parents will live with their adult children, even with a “Si Shi Tong Tang” (a Chinese 4-word phrase that means 4 generations living together) living style, which is particularly common in rural areas. Chinese pay attention to traditional filial piety culture, serving parents around. So living together with parents and even grandparents is a traditional life-style in China. This life-style also provides convenience for agricultural production and caring for young babies. However, since the beginning of the new century, with the continuous development of China’s industrialization process, rural young people is constantly transferred to city to work, breaking the pattern of living together with their parents in the countryside. The Sixth National Census in 2010 reported that 13.3% of the total population was aged 60 or above in China,^[1] which means that China has entered into the ageing society, according to the definition of WHO.^[2] Meanwhile, the number of empty-nest families is dramatically increasing as the urbanization of China occurs. The empty-nest older people refer to those who have not lived in the same housing unit (>10 months per year) with their children, and the non-empty-nest older people refer to those who have lived in the same housing unit (>10 months per year) with their children after they were 60 years old. By the end of 2014, approximately 252 million rural residents mostly at the age between 15 and 59 had moved to urban areas, leaving behind a huge number of older adults in the countryside to live alone or with their spouse as the rural empty-nest older people.^[3] The survey conducted by National Committee on Ageing in 2014 showed that the empty-nest older people accounted for 51.1% of the elder population in China and the number were reaching to 90% by 2030.^[4,5] The empty-nest older

people are becoming a significant social phenomenon in the rural of China; the impact of urbanization on the empty-nest older people deserves more attention from the public.

The empty-nest older people left alone are thought to be more susceptible to mental disorders. It was reported that the empty-nest older people with no or partial self-care ability, chronic diseases, and lower income were more vulnerable to mental disorders, and that the lack of self-care ability and receiving chronic diseases were risk factors of mental disorders for the non-empty-nest older people.^[6] Mental health problems among the older people may decrease their social and physical activities, generate unsociability and self-grief, and reduce their quality of life.^[7] In addition to suffering from mental health problems, the empty-nest older people may also have differences in accidental injuries and chronic diseases from the non-empty-nest older people. Fall injury, as a threat to the older life and health, has been paid more attention recently, because the injury caused by falling down is a major leading cause of chronic disability for the older people.^[8] A study conducted by Mahesh et al^[9] reported that 42.2% of the older people in the southern Karnataka had histories of falling down in the past 1 year and various risk factors present at home contributed to falling. However, there are few reports about fall injury focusing on the empty-nest older people especially who live in the rural of China.

The purpose of our study was to explore the differences of the health conditions between empty-nest and non-empty-nest older people living in the rural areas of China, including items of chronic metabolic diseases, fall injury, and mental health.

2. Materials and methods

2.1. Ethics committee approval

The study was reviewed and approved by a human research ethics committee at The Soochow University (Ethics Approval Reference Number:# 20160001), and it was in compliance with the declaration of Helsinki. Written informed consent was obtained from all individual participants included in the study.

2.2. Participant selection

A questionnaire-based cross-sectional study was conducted in Lishui (latitude: 28°N), a city in southeast China where 16.6% of total population was aged 60 or above. Participants were recruited according to the following inclusion and exclusion criteria during the period from March, 2017 to February, 2018. Inclusion criteria are shown as follows: older people aged 60 or over; who live in the rural of Lishui after 60 years and at least 1 year; who signed informed consent; who have children alive and have normal behavior ability; who conform with the definition of the empty-nest or the non-empty-nest older people. Exclusion criteria: the older people who are unable to complete the investigation, with cognitive disorders and serious diseases, such as deafness, psychiatric disorders, and Alzheimer disease.

2.3. Study design and investigation

The survey was mainly carried out by community health workers. Before conducting the questionnaire, they received uniform training on the content of the questionnaire and interview methods. Community health workers had a one-to-one and face-to-face investigation and inquiry for each participants, and

recorded demographic characteristics of participants, including sex, age, education, marital status, income, career, medical insurance, body mass index (BMI), smoking, drinking, workload and exercise, and so on. Ecpidate database was used for data entry.

A self-administered questionnaire on fall injury and chronic metabolic disease in older adults was designed for this study. The questionnaire included the occurrence of fall injury in the past year (no=0, yes=1), the occurrence of fall injury after 60 years old (no=0, yes=1). The diagnosis of hypertension, hyperlipidemia, and diabetes should be subject to the diagnosis of medical institutions above the county level. Activity of daily living scale (ADL), self-rating depression scale (SDS), and social support rating scale (SSRS) were inquired by surveyors, and scores of these questionnaires were calculated on the basis of the tabulator's instructions. ADL was used to evaluate the participants' activities of daily living. Lawton and Brody compiled ADL in 1969. ADL can be divided into 2 parts, including physical self-maintenance scale and instrumental activities of daily living, with total of 14 entries. ADL uses a 4-leveling method. ADL scores were graded as follows: normal (≥ 95), mild dependence (75 to 95), moderate dependence (45 to 75), and severe dependence (< 45). SDS was developed by William W.K. Chung in 1965 to 1966 to measure depression. SDS consists of 20 items, including 2 items of psycho-affective symptoms, 8 items of physical disorders, 2 items of psychomotor disorders, and 8 items of depressive psychological disorders. Each item is composed of 7 grades. The standardized score of the SELF-rating depression scale (standardized score = total pain / 80×100) was divided into normal (< 50), mild depression (50–60), moderate depression (60–70), and major depression (≥ 70). SDS can directly reflect emotional feelings, and now is widely used in the evaluation and monitoring of therapeutic effect in elderly patients. SSRS was used to assess the level of social support in older adults. SSRS consists of 10 items, which can be divided into 3 dimensions: objective social support, subjective social support, and utilization degree of social support. Among them, objective social support refers to the actual social support received by the individual, subjective social support is the emotional support perceived by the individual, and the utilization of social support reflects the individual's way of talking and the situation of participating in activities. The scale has an overall score of 66. The higher score means a higher level of social support. The scores of < 22 , 23 to 44, and 45 to 66 respectively represent low, medium, and high levels of social support. The internal consistency Cronbach α coefficient of each dimension of the scale ranged from 0.825 to 0.896, and the correlation coefficient between each dimension and the scale ranged from 0.724 to 0.835, showing good reliability and validity.

2.4. Statistical analysis

Statistical analyses were performed by using SAS software (version 9.2, SAS Institute, Cary, NC). Continuous variables were represented by mean and standard deviation, the difference of normal distribution continuous variables in empty-nest older people and non-empty nest older people was tested by using 2-sample test and Wilcoxon–Mann–Whitney test was used for abnormal distribution continuous variables. Categorical variables were expressed by frequency and percentage, and the difference of categorical variables in empty-nest older people and non-empty-nest older people was tested with Chi-square test or

Fisher exact test. Age, BMI, activity of DLS score, SDS score, and SSR scale score were normal distribution, expressed by mean \pm standard deviation. Smoking, drinking, annual income per household, exercise, chronic disease incidence, and fall injuries were abnormal distribution, expressed by frequency (%). Multivariate unconditional logistic regression analysis was performed to calculate the adjusted odds ratio (OR) of empty-nest older people compared with the non-empty-nest older people for fall injury and depression. With all tests 2-tailed, it is considered to be statistically significant that a value $P < .05$.

3. Results

3.1. Demographic characteristics of the empty-nest and non-empty-nest older people

A total of 364 rural older people whom met the screening criteria were recruited in the study. Among them, 253 were the empty-nest older people and 111 were the non-empty-nest older people. The participants ranged in age from 60 to 85 with a mean age of 69.07 ± 6.06 years, 180 (49.45%) of whom were men. No significant differences were seen in age, BMI, sex, marital status, education, workload, exercise, smoking and drinking between the empty-nest older people and the non-empty-nest older people ($P > .05$, Table 1). There was significant differences in income between the empty-nest older people and the non-empty-nest older people ($P = .004$).

Table 1
Baseline characteristics of the empty-nest and non-empty-nest older parents.

Variables	Non-empty-nest older (n = 111)	Empty-nest older (n = 253)	P
Age, y	68.65 \pm 6.32	69.25 \pm 5.94	.326
BMI, kg/m ²	23.72 \pm 3.64	23.14 \pm 3.25	.188
Gender			.631
Male	57 (51.35)	123 (48.62)	
Female	54 (48.65)	130 (51.38)	
Smoking	21 (18.92)	60 (23.72)	.311
Drinking	39 (35.14)	79 (31.23)	.463
Education			.098
Uneducated	28 (25.23)	91 (35.97)	
Primary school	48 (43.24)	109 (43.08)	
Secondary school	21 (18.92)	32 (12.65)	
High school or above	14 (12.61)	21 (8.30)	
Marital status			.300
Married	100 (90.09)	218 (86.17)	
Single (divorced, spouse)	11 (9.91)	35 (13.83)	
RMB			.004
Unanswered	17 (15.32)	31 (12.25)	
<5000	20 (18.02)	85 (33.60)	
5000–15,000	37 (33.33)	88 (34.78)	
\geq 15,000	37 (33.33)	49 (19.37)	
Workload			.129
Everyday	66 (59.46)	166 (65.61)	
Once a few days	8 (7.21)	27 (10.67)	
Never	37 (33.33)	60 (23.72)	
Exercise			.754
Everyday	39 (35.45)	95 (38.00)	
Once a few days	14 (12.73)	36 (14.40)	
Never	57 (51.82)	119 (47.60)	

BMI = body mass index, RMB = annual income per household.

3.2. Chronic metabolic diseases in empty-nest and non-empty-nest older people

We investigated the prevalence and the treatment of 3 chronic metabolic diseases among these rural older people, including hypertension, diabetes mellitus, and hyperlipidemia (Table 2). The prevalence rates of hypertension, diabetes mellitus, and hyperlipidemia in all older people were 36.26%, 10.44%, and 13.19%, respectively; the percentage of treatment for hypertension, diabetes mellitus, and hyperlipidemia were 81.06%, 68.42%, and 29.17%, respectively. There were no significant differences in the prevalence and the treatment of the 3 chronic metabolic diseases between the empty-nest older people and the non-empty-nest older people ($P > .05$).

3.3. Fall injuries in empty-nest and non-empty-nest older people

The empty-nest older people suffered from more fall injuries than the non-empty-nest older people (Table 2). The incidence of falls injuries in the past year was 9.88% in the empty-nest older people and 3.60% in the non-empty-nest older people ($P = .042$); the cumulative incidence of fall injuries after 60 years old was 17.00% in the empty-nest older people and 6.31% in the non-empty-nest older people ($P = .006$).

The crude OR of fall injuries in the past year in the empty-nest older people compared with the non-empty-nest older people was 2.93 (95% CI, 1.00–8.64); after adjusting education and income, the adjusted OR was 2.64 (95% CI, 0.88–7.95). The crude OR of cumulative fall injuries after 60 years old in the empty-nest older people, compared with the non-empty-nest older people, was 3.04 (95% CI, 1.32–7.00); after adjusting education and income, the adjusted OR was 2.76 (95% CI, 1.17–6.48).

3.4. Scores of activity of daily living scale, social support rating scale, and self-rating depression scale in empty-nest and non-empty-nest older people

There was no significant difference between the empty-nest older people and the non-empty-nest older people in scores and grades of activity of daily living scale ($P = .315$ and $P = .164$, respectively). The empty-nest older people scored higher on self-rating depression scale than the non-empty-nest older people ($P = .015$), and more empty-nest older people suffered from more

Table 2
Fall injuries, prevalence, and treatment of chronic metabolic diseases of the empty-nest and non-empty-nest older parents.

Variables	Non-empty-nest older (n = 111)	Empty-nest older (n = 253)	P
Hypertension	40 (36.04)	92 (36.36)	.952
Treatment for hypertension	32 (80.00)	75 (81.52)	.838
Diabetes mellitus	14 (12.61)	24 (9.49)	.369
Treatment for diabetes mellitus	9 (64.29)	17 (70.83)	.728
Hyperlipidemia	15 (13.51)	33 (13.04)	.903
Treatment for hyperlipidemia	4 (26.67)	10 (30.30)	1.000
Fall injuries in the past year			.042
Yes	4 (3.60)	25 (9.88)	
No	107 (96.40)	228 (90.12)	
Fall injuries after 60 years old			.006
Yes	7 (6.31)	43 (17.00)	
No	104 (93.69)	210 (83.00)	

Table 3
Scores of activity of daily living scale, social support rating scale, and self-rating depression scale in empty-nest and non-empty-nest older parents.

Variables	Non-empty-nest older (n=111)	Empty-nest older (n=253)	P
ADL score	99.5±2.25	98.09±8.62	.315
Daily living ability grade			.164
Normal	95 (87.16)	208 (82.87)	
Mild dependence	14 (12.84)	38 (15.14)	
Moderate dependence	0 (0.00)	3 (1.20)	
Severe dependence	0 (0.00)	2 (0.80)	
SDS score	38.35±8.71	41.19±7.43	.015
Depression grade			.022
No	54 (48.65)	85 (33.60)	
Mild depression	41 (36.94)	122 (48.22)	
Moderate depression	15 (13.51)	42 (16.60)	
Severe depression	1 (0.90)	4 (1.58)	
SSRS score	38.73±5.96	36.96±7.42	.088
Subjective support	8.45±1.84	7.64±2.47	.009
Objective support	22.98±4.64	21.95±5.4	.120
Utilization of support	7.3±1.86	7.39±2.15	.572

ADL=activity of daily living scale, SDS=self-rating depression scale, SSRS=social support rating scale.

severe depression according to the scores ($P = .022$, Table 3). The crude OR of depression in the empty-nest older people, compared with the non-empty-nest older people, was 1.87 (95% CI, 1.19–2.95); after adjusting education and income, the adjusted OR was 2.25 (95% CI, 1.36–3.67).

Total scores of social support rating scale was no significant difference between the 2 groups ($P = .088$). However, in terms of subjective, the empty-nest older people scored lower than the non-empty-nest older people ($P = .009$, Table 3).

4. Discussion

Most studies on the health of the empty-nest older people contain these older people whose children have died or have had no children. The emotional experiences of the older people with and without children is quite different. Due to the rapid urbanization of China, many young people born in rural areas have left hometown to live in the cities where they work, which has resulted in plenty of “hollow families” (the main labor force of a family is not at home). In fact, the elder who have at least one child is the main form of hollow families in China’s rural areas. In this study, the empty-nest older people who had children but living in an empty nest are the main research objects.

The older people are at a high risk of falling down because of their decline in vision, mobility, and other functions. The falling down proportion among people over 60 years old was ranged from 14% to 53% in some regions,^[9–12] but it reached to 89.87% for the empty-nest elder people living in the urban of China, significantly higher than non-empty-nest older people.^[13] Correspondingly, we observed that the proportion of fall injury of empty-nest older people was higher than non-empty-nest. Although there were no difference in exercise and workload between the 2 groups in our study, the empty-nest older people need more walking activities to meet their living. Patil et al reported that falling most often occurred while individuals were walking.^[13–15] Maybe that is the reason why empty-nest older people are more likely to suffer from fall injury.

The knowledge, attitudes, and behaviors to falling can affect the incidence of fall injuries.^[16,17] When a falling occurs, picking the falling people up immediately or not will affect the outcome. Sometimes it can cause secondary damages. The non-empty-nest older people have more chances to be rescued by family members after their falling down. Usually, the non-empty-nest older people live in better environments than the empty-nest, such as the house with brighter light, the smoother ground around the house, and so on. As a high-risk group of falling, the empty-nest older people should pay more attention to the health services and measures to prevent falling. It is gratifying to note that some artificial intelligence devices are being developed to monitor the falling of the older people.^[18]

In addition to physical disorders, mental health may also be affected by the absence of young families for the older people living in the countryside. We found that rural empty-nest older people were in higher incidence of depression. This finding is consistent with some previous studies, no matter living with spouse or living alone, depression was more severe in the empty-nest rural older people.^[19–22] We also observed that the empty-nest older people obtained less subjective supports than the non-empty-nest, maybe that is one of the reasons why the empty-nest older people suffer from more depression. Loneliness was considered to be a mediating variable between empty-nest syndrome and depression.^[20,23] The empty-nest older people suffered from more loneliness than the non-empty-nest older people.^[24,25] In China’s rural areas, empty-nest parents feel more lonely due to their dispersed living condition, monotonous entertainment, and lack of accompanying children. They usually have less expectations for their future life and fear of dying alone, therefore, it is needed for them to get more emotional care from their children which include company and listening, etc. In this study, the prevalence of chronic diseases such as hypertension, diabetes, and hyperlipidemia in the empty-nest group and the non-empty-nest group was higher than the national average, but there was no significant difference between the 2 groups. This result may be due to the high salt and oil eating habits of elderly people in rural areas of China. On the other hand, it may be due to the small sample size of this study.

It is the first study to report that empty-nesters in rural China are at high risk for depression and fall injuries. It should be noted that there are several limitations in the present study. First, it is not a large-sample study and the sample came from a single center. Second, it is a cross-sectional study with self-administered questionnaires, which has potential retrospective bias. We lacked data to quantify the level of emotional support in the children of empty-nesters, which may lead to a higher incidence of depression among empty-nesters. Further carefully designed and expanded sample size studies are needed to confirm the results of this study.

5. Conclusions

In summary, our findings suggest that empty-nest older people have higher risk on depression and fall injury than non-empty-nest older people living in the rural of China. Children living and working abroad should give their parents more emotional and life supports.

Acknowledgments

The authors gratefully acknowledge the assistance and cooperation of staff in Lishui Center for Disease Control and Prevention and thank all of the participants in the present study.

Author contributions

Naibao Hu and Tala Shi conceived and designed the study; Lanlan Xu and Guotao Pan performed the experiments; Zhiyong Hu and Guotao Pan analyzed the data; Tala Shi and Zhiyong Hu wrote the paper. All authors have seen and approved the final version of the manuscript.

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