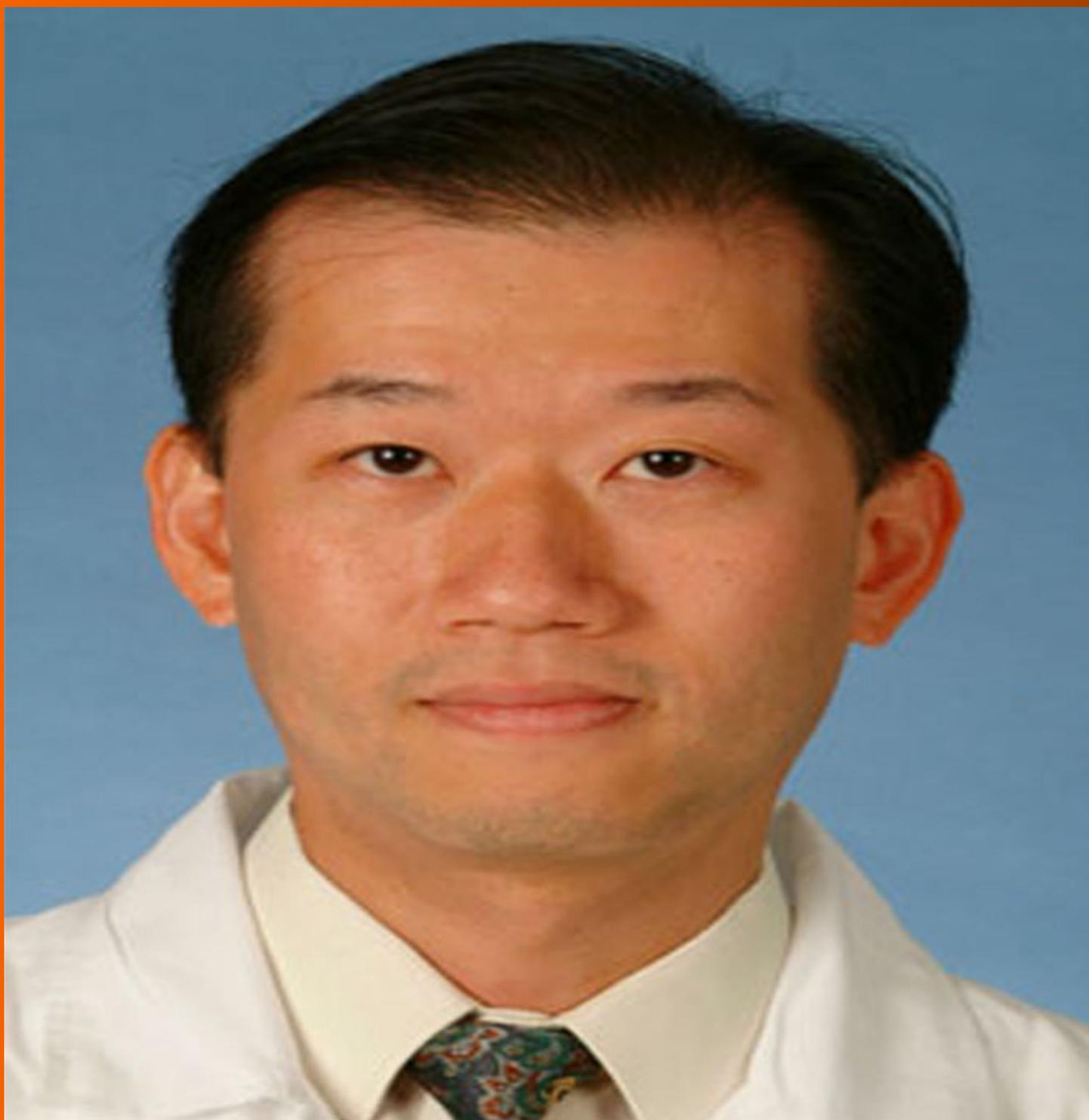


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The *WJCC* is now indexed in PubMed, PubMed Central, Science Citation Index Expanded (also known as SciSearch®), and Journal Citation Reports/Science Edition. The 2019 Edition of Journal Citation Reports cites the 2018 impact factor for *WJCC* as 1.153 (5-year impact factor: N/A), ranking *WJCC* as 99 among 160 journals in Medicine, General and Internal (quartile in category Q3).

RESPONSIBLE EDITORS FOR THIS ISSUE

Responsible Electronic Editor: *Yan-Xia Xing*
 Proofing Production Department Director: *Xiang Li*

NAME OF JOURNAL

World Journal of Clinical Cases

ISSN

ISSN 2307-8960 (online)

LAUNCH DATE

April 16, 2013

FREQUENCY

Semimonthly

EDITORS-IN-CHIEF

Dennis A Bloomfield, Bao-Gan Peng, Sandro Vento

EDITORIAL BOARD MEMBERS

<https://www.wjnet.com/2307-8960/editorialboard.htm>

EDITORIAL OFFICE

Jin-Lei Wang, Director

PUBLICATION DATE

November 6, 2019

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<https://www.wjnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

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ONLINE SUBMISSION

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Retrospective Study

Impress of intergenerational emotional support on the depression in non-cohabiting parents

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Author contributions: Jia YH managed the literature searches and analyses, undertook the statistical analysis; Ye ZH designed the study, wrote the protocol, and wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

Institutional review board statement: This study was reviewed and approved by the Affiliated Sir Run Run Shaw Hospital, Zhejiang University School of Medicine Ethics Committee.

Informed consent statement: All involved subjects gave their informed consent (written) prior to study inclusion.

Conflict-of-interest statement: The authors declare no conflict of interest.

Data sharing statement: No additional data are available.

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Abstract

BACKGROUND

Mental health is one of the important dimensions of health, while depression is an important indicator of mental health evaluation.

AIM

To investigate the association between intergenerational emotional support and depression of non-cohabiting parents (≥ 45 years old) in China.

METHODS

We used the fourth wave data from the China Health and Retirement Longitudinal Study (2015). The data was made up of ten main modules, the associated two datasets, and five constructed datasets. The first step is to select the corresponding module data according to the purpose of this study. Moreover, the data of the six modules are integrated by the unique ID code and we choose depression and non-cohabiting items as the selection conditions. 4810 samples were selected, which mainly included data on intergenerational emotional support and the individual scores on depressive symptoms.

RESULTS

The average age of 4810 respondents was (60.56 ± 14.613) years old. Females were accounted for more than half of the samples (52.6%). 74.0% respondents from rural areas and approximately 63.3% of the participants had a chronic disease. The mean value of the CESD-10 score was 13.06 (SD5.225). Both faces to face and phone contacts were protective factors on depression symptoms in the mid-aged and seniors in China ($P < 0.05$). In terms of the frequency of face to face contact, the more frequently you met your parents, the lower your parents' depressive score was. Also, phone contact variable results are displayed as a positive

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Manuscript source: Unsolicited manuscript

Received: May 23, 2019

Peer-review started: May 23, 2019

First decision: September 9, 2019

Revised: September 21, 2019

Accepted: October 5, 2019

Article in press: October 5, 2019

Published online: November 6, 2019

P-Reviewer: Wang YP

S-Editor: Dou Y

L-Editor: Wang TQ

E-Editor: Qi LL



correlation completely between inter-generational contacts from children and depressive symptoms in non-cohabiting parents in China. Children's education level and income level were also reducing the risk of depression in non-cohabiting parents. However, gender, children's numerous, chronic disease and chronic disease number were the risk factors.

CONCLUSION

Intergenerational emotional support is associated with depressive symptoms in non-cohabiting parents in China. However, the relationship was also affected by other variables.

Key words: Depression; Inter-generational support; Affective interaction; Emotional support

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Core tip: The increasing prevalence of depression among the mid-elderly is an emerging major public health problem in China. Intergenerational emotional support is associated with depressive symptoms in non-cohabiting parents in China. And to provide an intuitive and realizable intervention point for public campaigns or family education programs for community mental health services.

Citation: Jia YH, Ye ZH. Impress of intergenerational emotional support on the depression in non-cohabiting parents. *World J Clin Cases* 2019; 7(21): 3407-3418

URL: <https://www.wjgnet.com/2307-8960/full/v7/i21/3407.htm>

DOI: <https://dx.doi.org/10.12998/wjcc.v7.i21.3407>

INTRODUCTION

Mental health is one of the important dimensions of health, while depression is an important indicator of mental health evaluation^[1]. Globally, it is estimated that 4.4% of the world's population suffering from depression, with a total number of more than 300 million (World Health Organization, 2017). The increasing prevalence of depression among the mid-elderly is an emerging major public health problem in China, the prevalence of geriatric depression around 17%, and as high as 39.86%^[2,3].

Syntheses of the available epidemiological literature indicated that depression could decrease physical function, daily life ability, cognitive decline, and so on^[4]. Many studies have already shown that depression was associated with many factors, such as gender^[5], alcohol^[6], economic status^[7] and social capital^[8]. Among the many causes of depression, social capital may be particularly important^[9,10]. A recent literature reported that emotional support was more closely related to depression than instrumental support, especially in adults aged 18 to 50^[11]. At current China, population aging and massive rural-to-urban migration not only changed the family system but also changed the contact mode between parents and their non-cohabiting adult children. In addition, face to face contact is more difficult to achieve for elderly parents whose adult children live far away from them. However, there are few studies on this topic and the results are inconsistent.

The objective of our study was to assess the association between the frequency of contact and the risk of depression between elderly parents and non-cohabiting adult children. We hypothesized that not regularly associating with non-cohabiting adult children increases the risk of subsequent depression of mid-aged and elderly parents. In other words, both face-to-face and telephone contact have positive effects on depression in the elderly. Meanwhile, we also used a comparative method to identify whether there was a difference in effectiveness between phone contact and face-to-face contact. Based on the above, we expected to provide an intuitive and achievable intervention point for public activities or family education projects for Community Mental Health Service.

MATERIALS AND METHODS

Participants

China Health and Retirement Longitudinal Study (CHARLS) presided over by the Peking University, is a nationally representative longitudinal study of Chinese community-dwelling residents aged 45 and older and their spouses. It was designed based on the Health and Retirement Study in the United States, the English Longitudinal Study of Ageing, the Survey of Health, Ageing and Retirement in Europe, and similar longitudinal aging surveys in other countries^[12,13].

The data we used come from the fourth wave of CHARLS, which was held in 2015 publicly released on May 31, 2017, covered 21789 people (689 died) in 12236 households in 451 villages/communities. The data was made up of ten main modules, the associated two datasets (sample information and cross-sectional weights), and five constructed datasets. In our study, the data selection process is as follows: The first step is to select the corresponding module data according to the purpose of this study. Six module data (Demographic background/Family information/Family transfer/Health status and functioning/Housing Characteristics/Individual income) enter the preliminary selection. Then, the data of the 6 modules are integrated by the unique ID code to obtain 21095 samples. Thirdly, 20967 samples were obtained with depression items as the selection conditions. Fourthly, filter with face to face item to get 12131 cases. Lastly, the final sample of 4810 people were obtained by deleting the sample of living with children.

Assessments and measurements

Depression: In our study, Depression variable was measured by the Chinese version 10-item short form of the Center for Epidemiologic Studies-Depression Scale (CESD-10). The 10 items consist of eight negative-oriented questions and two positive-oriented issues. Negative aspects include "I was bothered by things that don't usually bother me" and positive ones are "I felt hopeful about the future" and "I was happy". Each item was scored on a four-point scale, 0 = rarely or none of the time (< 1 d), 1 = some or a little of the time (1-2 d), 2 = occasionally or a moderate amount of the time (3-4 d), and 3 = most or all of the time (5-7 d). The two positive items were scored inversely. The CESD-10 score ranged from 0 to 30, the severity of depressive symptoms with scores. The scale represents a good reliability and validity of participants (Cronbach's $\alpha = 0.81$)^[14,15].

Frequency of contact: Trained interviewers utilized verbal questions to assess contact frequency with non-cohabiting adult children, which was our primary exposure of interest. Participants were asked, "How often do you see (child's name)?" The problem will be abbreviated "face to face" in the text and "How often do you contact with (child's name) either by phone, text message, mail, or email, when you didn't live with (child's name)?" Will be abbreviated "phone contact". Ten response options were available for the two questions, ranging from 1 = "almost every day", 2 = "2-3 times a week", 3 = "once a week", 4 = "every two week", 5 = "once a month", 6 = "once every three months", 7 = "once every six months", 8 = "once a year", 9 = "almost never" to 10 = "other". Up till now there was no specific study to indicate the best critical point for effectiveness of social contact, however, previous studies have shown that face-to-face or phone contact once a month or once a week has protective effects on depression in elderly^[16]. On account of the previous researches, we divided the respondents into four groups according to the frequency of their "phone" and "face-to-face" contact. The first group was consisted of participants who responded that they had frequent phone contact (ranging from 1-3) and frequent face-to-face contact (ranging from 1-4). The second group 2 was comprised of participants who responded that they had infrequent (ranging from 4 to 9) phone contact and frequent face-to-face contact. The third group was comprised of participants who responded that they had frequent phone contact and infrequent face-to-face contact (ranging 5-9). The fourth group was comprised of participants who responded as having infrequent phone contact and infrequent face-to-face contact^[17].

Other variables: Other variables that may affect contact frequency and depressive symptoms were also included in the analysis. These variables were divided into three categories: demographic characteristics, socio-economic characteristics, and current health conditions.

Statistical analysis

For the descriptive statistics, we used independent-sample *t*-test and ANOVA to compare the variables. After testing collinearity, stepwise multiple logistic regression analysis was used to explore the correlation between various factors and depression

risk of non-cohabiting parents. Statistical significance is expressed as ¹ $P < 0.05$, ^m $P < 0.01$, ⁿ $P < 0.001$. Data were analyzed using SPSS19.0.

RESULTS

Study characteristics of population

The general characteristics and each groups' contact frequency of the total participants are provided in [Table 1](#). In the all participants, the mean value of CESD-10 score is 13.06 (SD5.225). The proportion of mid-aged and elderly persons in China could meet their children at least once a month is 65.5%, and 50.4% could communicate with their children at least once a week by phone, text message, mail or email. In terms of demographic factors, the average age was (60.47 ± 15.012) years old; females accounted for more than half of the samples (51.9%). The mean number of adult children was 2.77 (SD = 1.316). The specific classification information is as follows: 17.5% had one child, 32.2% had two, 21.3% had three, 13.4% had four, and 15.6% had five children or above. On the gender of family children, only 22.6 % of households have girls, 15.6% have boys, and more than 61.1 % have both. Among socio-economic and health factors, almost 100% had some formal education. Among them, 15.7% had attained primary school (1-6 years), junior to senior school (7-12 years) education accounted for 52.2%, and 32.0% had attained university education (over 13 years). In term of income, half (50.1%) of the children earn between 10001 and 50000 Yuan a year. Respondents from rural areas (74.0%) were more than twice of those from urban areas (25.4%). Approximately 63.3% of the participants had chronic disease, the mean number of diseases was 1.97 (SD = 0.846), and 62.5% of the respondents suffer from more than two chronic diseases.

Inter-generational emotional support and depressive symptoms

Results of the independent variable are shown in [Table 2](#). The results indicated that there was a significantly positive correlation between depressive symptoms in non-cohabiting parents and intergenerational contacts from children in China ($P < 0.05$). In terms of the frequency of face to face contact, the more frequently you met your parents, the lower your parents' depressive score was. Our study suggested that the optimal face to face communication to parent(s) for 2-3 times a week could lower depression obviously (12.50 ± 5.478). Phone contact variable results are displayed a positive correlation completely between inter-generational contacts from children and depressive symptoms in non-cohabiting parents in China. With the decrease of telephone contact frequency, the depression score increased significantly. As for the interaction of face-to-face and telephone contacts, there was no statistical difference between group 1 and group 3, both of which were better than those of the other two groups (group 2 and group 4), and group 4 was the highest score on depression, As shown in [Figure 1A](#) and [B](#).

Other variables and depression

In the bivariate analysis, gender and chronic diseases were associated with the non-cohabiting parents in depression, this result can be seen from [Table 3](#). Women have a higher depression score than men, and people with chronic diseases are more prone to depression than normal ones. There was no significantly difference in residence areas. In the study, the results exhibiting of non-cohabiting parents in depression were acceptable.

In the multivariable ([Table 3](#)) analysis, education level (children), income (children), children's numerous, chronic diseases' number, together with gender of family children were statistically significant on depression. [Table 3](#) also indicated that education level (children), income (children) were the protective factors of depressive symptoms. However, children's number and chronic diseases' number were the risk factors. In terms of age, there's no obviously statistical difference with the depression of the non-cohabiting parents in China.

In all, there was a significantly positive correlation between depressive symptoms in the non-cohabiting parents and inter-generational contact from children in China. The relationship was also affected by other variables such as demographic factors, socio-economic factors, and current health conditions. Their trend relationship with depression can be shown in [Figure 1C-F](#).

Regression analysis

We use the multivariate linear stepwise analysis method to confirm the relationship between the 10 factors with the depression of the non-cohabiting parents in China. 6 models were established. We selected the model6 ($P < 0.05$) to interpret the variables and depression.

Table 1 Descriptive statistics of the study sample (4810)

Variables		mean/n (%)	SD
Dependent variable	Depressive symptoms (CESD-10 ¹ score) (0-30)	13.06	5.225
Independent variable	Face to face	3.94	2.546
	Almost every day	1224 (25.4)	
	2-3 times a week	448 (9.3)	
	Once a week	532 (10.9)	
	Every two weeks	434 (9)	
	Once a month	526 (10.9)	
	Once every three months	494 (10.3)	
	Once every six months	502 (10.4)	
	Once a year	516 (10.7)	
	Almost never	33 (0.7)	
	Missing	110 (2.3)	
	Phone contact	2.95	2.302
	Almost every day	531 (11)	
	2-3 times a week	809 (16.8)	
	Once a week	1086 (22.6)	
	Every two weeks	655 (13.6)	
	Once a month	471 (9.8)	
	Once every three months	108 (2.2)	
	Once every six months	47 (1)	
	Once a year	15 (0.3)	
	Almost never	301 (6.3)	
	Missing	787 (16.4)	
	Demographic factors	Age	60.47
45-50 (ref.)		583 (12.1)	
51-60		1479 (30.7)	
61-70		1543 (32.1)	
71-		1011 (21)	
Missing		194 (4)	
Gender			
Male (ref.)		2310 (48)	
Female		2494 (51.9)	
Missing		6 (0.1)	
Children's number		2.77	1.316
1 child		842 (17.5)	
2 children		1548 (32.2)	
3 children		1024 (21.3)	
4 children		644 (13.4)	
5 and above		752 (15.6)	
Gender of family children ²			
Male	1086 (22.6)		
Female	748 (15.6)		
Both	2940 (61.1)		
Missing	36 (0.7)		
Socio-economic factors	Education level ³ (children)		
	Illiterate	1 (0.0)	
	1-6 years education	756 (15.7)	
	7-12 years education	2509 (52.2)	
	13 years education and above	1538 (32.0)	
	Missing	6 (0.1)	
	Income (children) ⁴	2.96	1.215
No income	946 (19.7)		

	1-10000 yuan	271 (5.6)	
	10001-50000 yuan	2139 (44.5)	
	50001-100000 yuan	920 (19.1)	
	More than 100000 yuan	534 (11.1)	
	Areas of China		
	Urban	1224 (25.4)	
	Rural (ref.)	3559 (74.0)	
	Missing	27 (0.6)	
Current health conditions	Chronic disease		
	No	1767 (36.7)	
	Yes	3043 (63.3)	
	Chronic diseases number ⁵	1.97	0.846
	1	1143 (37.6)	
	2	860 (28.3)	
	3 and above	1040 (34.2)	

¹CEDS-10: Center for Epidemiologic Studies Depression Scale (Range 0-30, Mean = 13.06, SD = 5.225);

²Gender of family children: Classify all children in the family by sex into three categories (1 = male; 2 = female; 3 = both);

³Education level: Including 11 levels, 1 = no formal education (illiterate); 2 = didn't finish primary school but could read and/or write; 3 = sishu/home school; 4 = elementary school; 5 = middle school; 6 = high school; 7 = vocational school; 8 = two or three-year college/associate degree; 9 = four-year college/bachelor degree; 10 = master degree; 11 = doctoral degree/PH.D. (were grouped into 4 groups based on the quartiles: 1 = 1 no formal education (illiterate); 2 = 2-4 (1-6years education); 3 = 5-7 (7-12 years education); 4 = 8-11 (13years education and above));

⁴Income: Total income of children in the past year, ranging from 1 (no income) to 12 (more than 300000 yuan);

⁵Chronic disease's number: Total number of diagnosed chronic diseases (hypertension, dyslipidemia, diabetes or high blood glucose, cancer or malignant tumor, chronic lung diseases, liver disease, heart attack, stroke, kidney disease, stomach or other digestive disease, emotional or psychiatric problems, memory-related diseases, arthritis or rheumatism, asthma) (range 0-14, Mean = 1.97, SD = 0.846).

According to the t-value of modle 6 in Table 4, there are six items with significant levels: chronic disease's number, children's education, face to face, Children's income, phone call and genders. In addition, according to the standardized regression coefficient, chronic disease's number score was the highest, followed by children's education, and gender is the lowest. It also can be seen from the positive and negative values of regression coefficient that three terms (children education level, income, face to face and phone call) have a negative relationship with depression, which means that the higher the education level of children, the lower the score of depression. The regression coefficient of chronic disease's number, and genders are all positive, which means that who has the higher the number of chronic diseases, more likely to be depressed.

DISCUSSION

This longitudinal study, after analyzing the known confounders, further identified that the risk of depression of mid-aged and elderly people in China who did not live with their adult children was related to the frequency of contact with their adult children, and the optimal frequency of association. Previous studies have indicated that the older people's social networks affect their physical and mental health by alleviating stress and promoting health-related behaviors^[18-20]. How does the contact frequency and way impact on depression of the middle-aged and elderly with their adult children? However, few existing studies have quantitatively assessed the effects of such important relationships, and the related conclusions are also inconsistent. An evidence from South Korea indicates that face-to-face and phone contacts are both protective factors for depression between the elderly and non-cohabiting adult children^[17]. However, Teixeira *et al*^[21] said that phone call or video online is no substitute for face-to-face visits, as these connections have no effect on reducing the risk of depression in older people.

Our study found that face-to-face and phone contacts are positive factors on depression in non-cohabiting parents in China, which is basically the same as Roh *et al*^[17]'s research, but in terms of the frequency of emotional connection, we get slightly different results from him. Specifically, the more frequent of the intergenerational communication, the lower the depression scores of middle-aged and old people. The

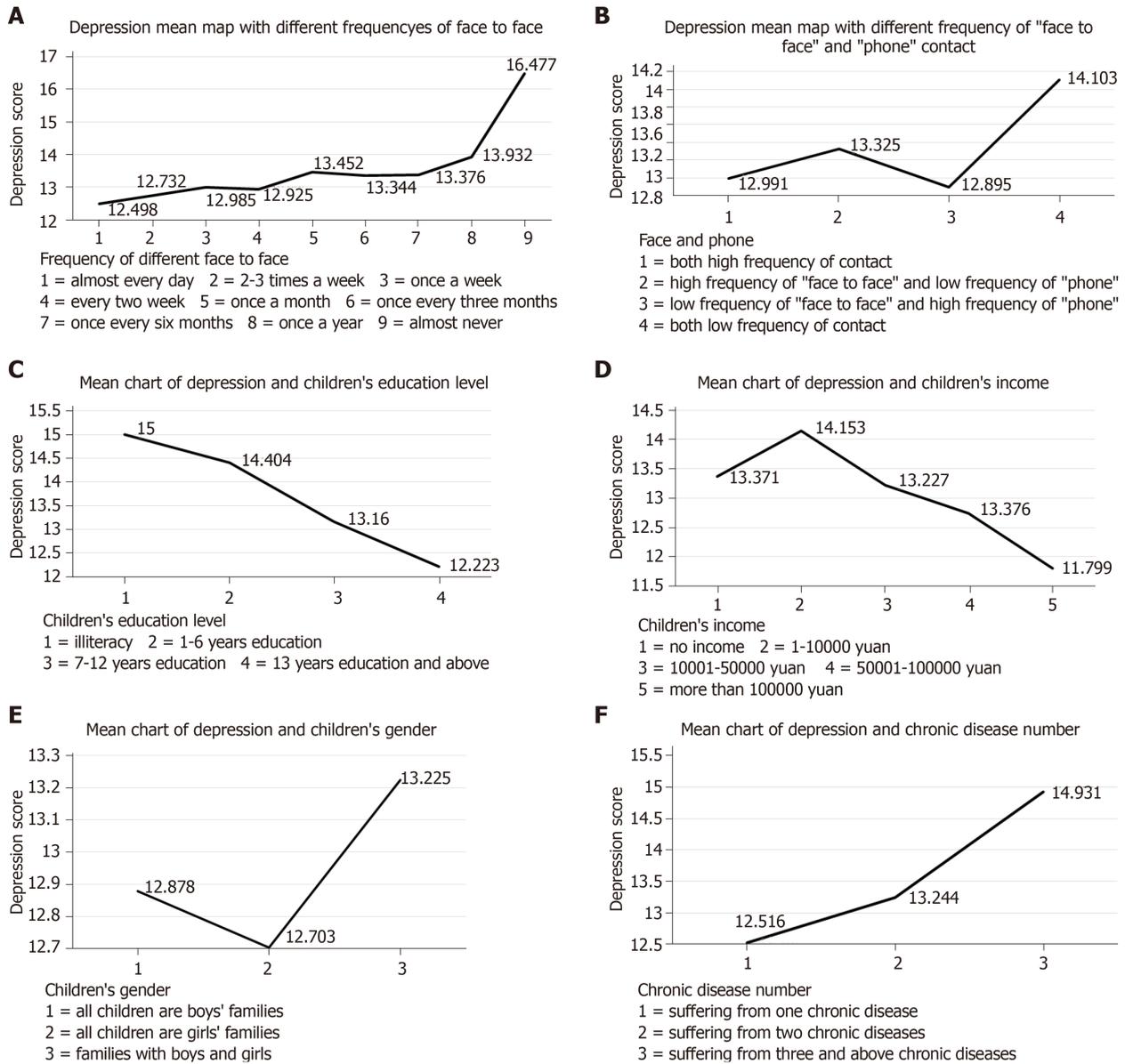


Figure 1 Mean chart. A: Mean chart of depression and face to face; B: Mean chart of depression and face and phone; C: Mean chart of depression and children's education level; D: Mean chart of depression and children's income; E: Mean chart of depression and children's gender; F: Mean chart of depression and chronic disease number.

frequency of contact between the non-cohabiting parents and their children is a two-way variable and our research suggest that the best frequency of contact is recommended to make a phone call every day and visit 2-3 times a week, if the optimal frequency of contact is not achieved, we suggest that at least one phone call a week and at least visit once every 2 wk, which is an intuitive and operable deadline. Considering the diversification of contact ways related to changes in technological development and the family system, our study examined the differences between phone contacts and face-to-face as well. The results indicated that there was no statistical difference between the group 1 (the frequent face-to-face and frequent phone contact) and the group 3 (infrequent face-to-face and frequent phone contact) in depression scores, and in the four-group comparison, the two groups scores were lower. Therefore, we can conclude that group1 is the best mode of intergenerational emotional connection, but if condition do not allow, group 3 also can reduce the depression of middle-aged and elderly Chinese. While the group 4 (lack of both kinds of contact) showed the highest risk of depression. The results indicated that we should try our best to make face to face and phone contact with our parents, if face to face contact is not achieved, we should make phone contact with our parents as much as possible. Although phone contact could not be conceived as an actual activity, it has the characteristic of higher accessibility in modern China and can provide

Table 2 The results of intergenerational emotional support on depressive symptoms

Variables	Depressive symptoms (cesd-10 score) (0-30) ¹	F	P value ²
Dependent variable	Depressive symptoms	13.06 ± 5.225	
Independent variable	Face to face		6.622 0.000 ^a
	almost every day	12.50 ± 5.478	
	2-3 times a week	12.73 ± 5.158	
	once a week	12.99 ± 4.764	
	every two weeks	12.92 ± 5.290	
	once a month	13.45 ± 5.107	
	once every three months	13.34 ± 5.043	
	once every six months	13.38 ± 4.895	
	once a year	13.93 ± 5.353	
	almost never	16.48 ± 6.723	
	Phone contact		5.334 0.000 ^a
	almost every day	12.97 ± 4.804	
	2-3 times a week	12.90 ± 4.872	
	once a week	13.14 ± 4.915	
	every two weeks	13.83 ± 5.261	
	once a month	14.13 ± 5.492	
	once every three months	14.13 ± 6.148	
	once every six months	13.91 ± 5.790	
	once a year	12.70 ± 4.773	
	almost never	12.20 ± 6.815	
frequency of contact ³		5.717 0.001 ^a	
Group 1: (both) (ref)	12.99 ± 5.071		
Group 2: (face to face)	13.33 ± 4.958		
Group 3: (phone)	12.90 ± 6.103		
Group 4: (neither)	14.28 ± 5.987		

¹Values are mean ± SD;

²Interval;

^aP < 0.001;

³Group 1 (≥ every two week in frequency of “face to face” contact and ≥ 1 time/wk in frequency of “phone” contact); group 2 (≥ every two week in frequency of “face to face” contact and < 1 time/wk in frequency of “phone” contact); group 3 (< every two week in frequency of “face to face” contact and ≥ 1 time a week in frequency of “phone” contact) and group 4 (< every two week in frequency of “face to face” contact and < 1 time a week in frequency of “phone” contact).

emotional support to parents. To some degree, with the increasing enrichment of economy and material, these results implied that the emotional needs of non-cohabiting parents are becoming more and more important in the intergenerational communication.

Our study also from the opposite perspective examined the relationship among adult children’s education achievement, income, with depression in non-cohabiting parents in China, and the results revealed that the higher the adult children’s education achievement and income, may prone to achieve lower depression score. The possible reasons are as follows: (1) Those who with higher education achievements can get more job options, may easier get relatively satisfactory jobs and high salaries; (2) Higher income provides them with an economic foundation to filial to their parents; (3) Families with children of high achievers will receive praise and respect from the surrounding population, and the parents will feel that their children give them a good name and honor in the neighborhood and achieve a traditional sense of glory, thus gaining happiness and satisfaction in spirit; and (4) With the development of aging and urbanization, many adult children go out to work and separation from their parents, so that the phone contact and money support may be a way of compensation for living apart from their parents^[22]. Our study also confirmed these points.

For more reliable results, we also dealt with other variables, such as gender, residence, age, chronic diseases and chronic diseases number. In terms of genders and depression in older adults, our results have been consistent with the existing studies^[23-25], that is, women were more prone to depression than men. On residence

Table 3 Results between other variables and depression

Variables	Depressive symptoms (cesd-10 score) (0-30) ¹	F or t	P value ⁶	
Demographic factors	Age		0.600	0.615
	45-50 (ref.)	12.81 ± 5.070		
	51-60	13.14 ± 5.141		
	61-70	13.02 ± 5.290		
	71-	13.09 ± 5.245		
	Gender		4.641	0.03 ^a
	Male (ref.)	12.85 ± 5.123		
	Female	13.24 ± 5.314		
	Children's number		7.775	0.000 ^b
	1 child	12.20 ± 4.628		
	2 children	13.22 ± 4.903		
	3 children	13.46 ± 5.354		
	4 children	13.20 ± 5.037		
	5 and above	13.00 ± 6.279		
	Gender of family children ²		3.881	0.021 ^a
Male	12.88 ± 4.863			
Female	12.70 ± 4.936			
Both	13.22 ± 5.403			
Socio- economic factors	Education level ³ (children)		30.738	0.000 ^b
	illiterate	15.00		
	1-6 years education	14.40 ± 5.669		
	7-12 years education	13.16 ± 5.264		
	13 years education and above	12.22 ± 4.76		
	income (children) ⁴		13.112	0.000 ^b
	No income	13.37 ± 5.481		
	1-10000 yuan	14.15 ± 5.754		
	10001-50000 yuan	13.23 ± 5.384		
	50001-100000 yuan	12.74 ± 4.781		
	More than 100000 yuan	11.80 ± 4.238		
	areas of China		0.678	0.498
	Urban	13.14 ± 5.181		
	Rural (ref.)	13.03 ± 5.248		
	Current health conditions	Chronic disease		-8.627
No		12.21 ± 4.734		
Yes		13.55 ± 5.431		
Chronic diseases num ⁵			57.750	0.000 ^b
1		12.52 ± 5.049		
2		13.24 ± 5.004		
3 and above	14.93 ± 5.871			

¹CEDS-10: Center for Epidemiologic Studies Depression Scale (Range 0-30);

²Gender of family children: Classify all children in the family by sex into three categories (1 = male; 2 = female; 3 = both);

³Education level: Including 11 levels, 1 = no formal education (illiterate); 2 = didn't finish primary school but could read and/or write; 3 = sishu/home school; 4 = elementary school; 5 = middle school; 6 = high school; 7 = vocational school; 8 = two or three-year college/associate degree; 9 = four-year college/bachelor degree; 10 = master degree; 11 = doctoral degree/PH.D. (were grouped into 4 groups based on the quartiles: 1 = 1 no formal education (illiterate); 2 = 2-4 (1-6years education); 3 = 5-7 (7-12 years education); 4 = 8-11 (13years education and above);

⁴Income: Total income of children in the past year, ranging from 1(no income) to 12 (more than 300000 yuan), mean = 3.01, SD = 0.996;

⁵Chronic disease's number: Total number of diagnosed chronic diseases (hypertension, dyslipidemia, diabetes or high blood glucose, cancer or malignant tumor, chronic lung diseases, liver disease, heart attack, stroke, kidney disease, stomach or other digestive disease, emotional or psychiatric problems, memory-related diseases, arthritis or rheumatism, asthma) (range 0-14, Mean = 2.21, SD = 1.305);

⁶Interval;

^aP < 0.05,

^bP < 0.001.

(urban and rural areas), our study does not have the same conclusions as Hu *et al*^[26,27]. They pointed out that older people in rural areas had more depressive symptoms than

Table 4 The results of stepwise multiple linear regression

Modle	independent variables	Regression coefficient		t	Sig ¹
		B	Beta		
Modle 1	Constant	11.301	0.270	41.902	0.000 ^b
	Chronic disease num	1.249	0.126	9.921	0.000 ^b
Modle 2	Constant	14.778	0.570	25.929	0.000 ^b
	Chronic disease num	1.207	0.125	9.667	0.000 ^b
Modle 3	Children's education	-1.084	0.157	-6.907	0.000 ^b
	Constant	13.797	0.595	23.186	0.000 ^b
	Chronic disease num	1.229	0.124	9.889	0.000 ^b
Modle 4	Children's education	-1.093	0.156	-7.006	0.000 ^b
	Face to face	0.228	0.042	5.410	0.000 ^b
	Constant	14.504	0.616	23.551	0.000 ^b
	Chronic disease num	1.245	0.124	10.052	0.000 ^b
Modle 5	Children's education	-0.946	0.159	-5.935	0.000 ^b
	Face to face	0.216	0.042	5.129	0.000 ^b
	Children's income	-0.380	0.089	-4.258	0.000 ^b
	Constant	15.414	0.696	22.136	0.000 ^b
	Chronic disease num	1.261	0.124	10.178	0.000 ^b
Modle 6	Children's education	-1.019	0.161	-6.317	0.000 ^b
	Face to face	0.202	0.042	4.758	0.000 ^b
	Children's income	-0.421	0.090	-4.668	0.000 ^b
	Phone call	-0.146	0.053	-2.787	0.005 ^b
	Constant	14.752	0.765	19.290	0.000 ^b
	Chronic disease num	1.253	0.124	10.120	0.000 ^b
Modle 6	Children's education	-1.026	0.161	-6.365	0.000 ^b
	Face to face	0.203	0.042	4.795	0.000 ^b
	Children's income	-0.417	0.090	-4.620	0.000 ^b
	Phone call	-0.142	0.053	-2.707	0.007 ^a
	Gender	0.438	0.210	2.090	0.037

¹Interval,
^aP < 0.05,
^bP < 0.001.

those in urban areas, and also have more depressive symptoms than younger people. In terms of age, the highest scores on depression were those from 45 to 50 years old, which was consistent with Weingartner *et al*^[28]'s report on Puerto Ricans. This reversal may be related to the earlier onset of chronic diseases in the population coupled with the multiple social problems of adolescent and young adult children facing the younger respondents. Our research also showed that chronic diseases and the number of chronic diseases could increase the depression scores of the non-cohabiting parents in China. Tang^[29]'s views on age, chronic diseases and depression in the old are as follows: age is not a direct factor affecting depression levels in the older adults, but the relationships between age and depression levels are likely to be influenced by other factors, for example health. With the age growing and the decline of health conditions, the depressive symptoms are increasing more. To some extent, our study corroborates this argument, and concludes that the numbers and kinds of chronic diseases are risk factors for depression in non-cohabiting parents.

There are several limitations in this study. On the one hand, we have only used the cross-sectional associations to examine the relationships between contact frequency and depression in non-cohabiting parents in China. On the other hand, CHARLS uses self-report measures which are more prone to measurement errors than clinical or performance assessments. What's more, contact frequency is not a quantitative variable that can fully explain the relationship between the elderly and their adult children. Therefore, we try to make up for these limitations by distinguishing between phone and face-to-face contacts. And the main variable of contact frequency can be

regarded as objective rather than subjective. Therefore, in our research, we strive to minimize the distortion caused by self-report bias to ensure the authenticity of the results.

In summary, our study revealed that a higher frequency of contact from adult children was positively related to fewer depressive symptoms in non-cohabiting parents in China. Under the increasingly severe aging and extensive urbanization conditions in modern China, it is beneficial for the mental health of the non-cohabiting parents by phone contact with their children as much as possible in the absence of face-to-face contact. Next, based on the results of this study, we will formulate specific programs and contents of family emotional support, to verify and improve the programs in further community practice. In order to provide operable suggestions for community work, family intergenerational harmony and the promotion of physical and mental health of the elderly.

ARTICLE HIGHLIGHTS

Research background

China is one of the largest and fastest aging regions in the world and the increasing prevalence of geriatric depression has become a major public health problem.

Research motivation

On the dual changes of population structure and family structure, to explore the impact of intergenerational emotional support on mental health of middle-aged and elderly people.

Research objectives

The aim of the study was to investigate the association between intergenerational emotional support and depression of non-cohabiting parents (≥ 45 years old) in China.

Research methods

We used the fourth wave data from the China Health and Retirement Longitudinal Study (2015). 4810 samples were selected according to the purpose of our study, which mainly included data on intergenerational emotional support and the individual scores on depressive symptoms.

Research results

The average age was (60.56 ± 14.613) years old. Females were accounted for more than half of the samples (52.6%). 74.0% respondents from rural areas and approximately 63.3% of the participants had a chronic disease. The mean value of the CESD-10 score was 13.06 (SD5.225). Both face to face and phone contacts were protective factors on depression symptoms in Chinese (≥ 45 years old) ($P < 0.05$). The more frequently you met your parents, the lower your parents' depressive score was. Also, phone contact variable results are displayed as a positive correlation completely between inter-generational contacts from children and depressive symptoms in non-cohabiting parents in China. Children's education level and income level were also reducing the risk of depression in non-cohabiting parents. However, gender, children's numerous, chronic disease and chronic disease number were the risk factors.

Research conclusions

Intergenerational emotional support is associated with depressive symptoms in non-cohabiting parents in China. However, the relationship was also affected by other variables.

Research perspectives

From the perspective of parents to investigate the influence of emotional support of offspring on the mental health of their parents.

ACKNOWLEDGEMENTS

This study is based on the baseline of the China Health and Retirement Longitudinal Study (CHARLS). We would like to thank everyone who devoted his/her time and effort to the CHARLS project. And we also appreciated the person who have made suggestions for revision and assistance to this paper.

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