



# A Cross-Sectional Study of the Prevalence of and Risk Factors for Depressive and Anxiety Symptoms among the Elderly in Nursing Homes in Hunan Province, China

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## Abstract

**Objectives:** To explore the risk factors for depressive and anxiety symptoms among the elderly in nursing homes in Hunan province, China.

**Design, Setting and Participants:** A cross-sectional study was conducted among the elderly in nursing homes in Hunan Province. Twenty-four nursing homes were selected by multistage cluster random sampling, and 817 elderly residents were investigated using a structured questionnaire.

**Main Outcome Measures:** The main outcome measures included general information, depressive symptoms, anxiety symptoms, social support, stressful life events and sleep quality. Multivariate binary logistic regression was performed to explore the risk factors for depressive and anxiety symptoms among the elderly in nursing homes.

**Results:** The prevalence of depressive and anxiety symptoms among the elderly in nursing homes in Hunan province was 36% and 14.2% respectively. Living in a rural area (OR=1.87, 95% CI: 1.22, 2.86), lower monthly income (OR=2.00, 95% CI: 1.30, 3.01), infrequent visits from relatives (OR=3.14, 95% CI: 2.10, 4.78), alcohol consumption (OR=2.25, 95% CI: 1.24, 4.07), history of fall (OR=1.69, 95% CI: 1.15, 2.48), lower social support (OR=3.80, 95% CI: 2.63, 5.51) and poor sleep quality (OR=4.08, 95% CI: 2.63, 6.32) increased the risk of depressive symptoms; Lower monthly income (OR=3.56, 95% CI: 1.71, 7.42), longer duration of nursing home residency (OR=1.75, 95% CI: 1.10, 2.79), infrequent visits from relatives (OR=3.79, 95% CI: 2.34, 6.14), smoking (OR=1.82, 95% CI: 1.05, 3.15), stressful life events (OR=5.52, 95% CI: 1.27, 23.96) and poor sleep quality (OR=8.57, 95% CI: 3.62, 20.26) increased the risk of anxiety symptoms.

**Conclusion:** The prevalence of depressive and anxiety symptoms among the elderly in nursing homes is relatively high. Lower monthly income, infrequent visits from relatives and poor sleep quality were risk factors for the development of both depressive and anxiety symptoms.

**Strengths and Limitations of this Study:** This is the first study to examine the risk factors for both depressive and anxiety symptoms among the elderly in nursing homes in Hunan province.

The study provides valuable information on depressive and anxiety symptoms among the elderly in nursing homes, and the findings may be helpful for preventing depressive and anxiety disorders. The study is limited by its cross-sectional study design and the use of self-reported data.

**Keywords:** Depressive symptoms; Anxiety symptoms; Elderly; Nursing home; Prevalence; Risk factors

## Introduction

With the increasing of human longevity, the demographic composition of societies is ageing [1]. According to the data of the Sixth National Population Census in 2010, the number of people aged 60 years and older was approximately 177 million, accounting for 13.26% of the total population [2]. However, the reduction in family size due to China's previous one-child policy has led to a shortage of family caregivers who can provide home-based long-term care for older adults [3]. All of these factors have increased the demands and requirements for nursing homes [4]. Unfortunately, the elderly living in nursing homes suffer from more psychological problems than those at home as a result of lacking freedom and family support [5]. As the elderly population grows, the severe

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physical and mental health problems of the elderly population pose a considerable challenge to nursing homes and health care systems.

Depression is one of the most common mental disorders among older adults [6], which has led to increasing global concern as the number of older adults rises [7,8]. Depressive symptoms comprise symptoms of unease and somatic complaints including depressed mood that may accompany, but do not necessarily indicate, clinical depression [9], which were much more prevalent [10]. Older people with depressive symptoms may experience functional impairments and increase mortality from both suicide and illness [11,12]. Besides, depressive symptoms may reduce quality of life and have a negative impact on the daily functioning of the elderly [13,14]. According to a meta-analysis in 2012, the prevalence of major depression among Chinese community-based elderly aged 75 years and older ranged from 4.6% to 9.3% [8]. It was reported that the depressive risk of the elderly living in nursing homes was 3 to 4 times higher than that of the elderly in the society [15].

Late-life anxiety is a significant public health burden. Epidemiologic data suggests that approximately one in ten older adults has an anxiety disorder which can lead to years of suffering [16,17]. Anxiety may result in significant impairment to their quality of life [18]. A review indicated that the elderly living in nursing homes were more likely to suffer from anxiety compared to community-dwelling older adults. The prevalence of anxiety among the institutionalized elderly adults ranged from 3.2% to 20.0%, while among community-dwelling elderly were 1.4% to 17.0% [19]. Moreover, depressive and anxiety symptoms in older adults are often overlooked and untreated, causing delays in receiving treatment [20].

It is of great significance to identify individuals with depressive and anxiety symptoms and intervene to reduce the occurrence of depressive and anxiety disorders. Several studies in the current literature have demonstrated that many factors are associated with depressive and anxiety symptoms among older adults, such as marital status, physical health, social support, economic status, sleep quality and stressful life events [15,21-25]. However, most of those studies were conducted among community-dwelling older adults.

Therefore, our study aimed to investigate and explore the prevalence of and risk factors for depressive and anxiety symptoms among the elderly in nursing homes in Hunan province, China. We hope that this study will provide some valuable information for depressive and anxiety disorders prevention among the elderly in nursing homes in China.

## Materials and Methods

### Study design

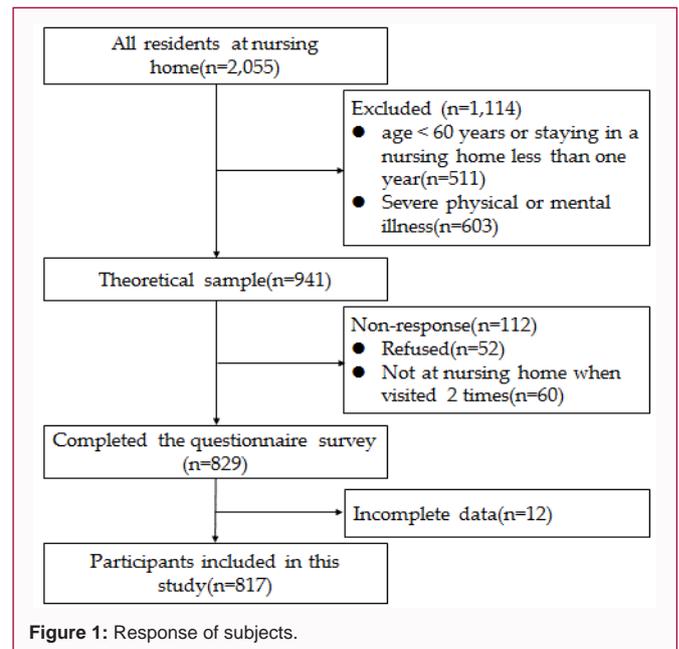
This cross-sectional study was conducted in Changsha, Hengyang and Yiyang City in Hunan Province, China, from October to December 2018. The study was approved by Xiangya School of Public Health at Central South University (No.XYGW-2018-49). Informed consent was obtained from all participants.

### Sample size calculation

Sample size was calculated using the formula for cross-sectional studies, as follows:

$$N = \frac{Z_{1-\alpha/2}^2 P(1-p)}{d^2}$$

where  $Z_{1-\alpha/2}=1.96$  when  $\alpha=0.05$ ,  $p$  is the prevalence of anxiety symptoms (which was 20% according to a previous study [42]), and



$d$  is admissible error (which was 3% here). According to the formula, the estimated sample size was 751, which included an extra 10% to allow for subjects lost during the study.

### Study population and procedure

A multi-staged cluster randomized sampling method was used to select a representative sample of elderly adults living in nursing homes in Hunan Province. In the first stage, one city each from northern Hunan, southern Hunan and central Hunan (Changsha City, Hengyang City and Yiyang City) was selected based on geographical regions. One county was then randomly chosen from each selected city: Changsha County, Hengyang County and Yuanjiang County. In the second stage, two urban districts (Kaifu and Yuelu) from Changsha City and two townships (Xingsha and Tiaoma) from Changsha country were randomly selected. Similarly, Yanfeng and Shigu from Hengyang City and Xidu and Jingtou from Hengyang County were randomly selected. Ziyang and Heshan from Yiyang City and Qionghu and Caowei from Yuanjiang County were randomly chosen. In the third stage, two nursing homes were randomly selected from each selected urban district and township; a total of 24 nursing homes were finally selected.

Resident populations in selected nursing homes were included in our study if they met the following inclusion criteria: (1) aged 60 years and above; (2) duration since entering the nursing home of more than one year; (3) physical and mental ability to participate in interviews. Participants were excluded if they had (1) a severe hearing impairment or a language barrier, (2) a history of severe cognitive deficits diagnosed by a physician, and (3) a terminal illness.

There were 2,055 residents in the 24 nursing homes; 511 were excluded because they were younger than 60 years old or had been in a nursing home less than one year, and 603 were excluded due to severe physical or mental illness. The theoretical sample size was 941 people, of which 112 were not investigated for various reasons (response rate: 88.1%). Of the remaining 829 elderly adults, 12 were excluded due to incomplete data. Finally, a total of 817 elderly adults were included in the data analysis in this study. The enrolment procedure is shown in Figure 1.

**Table 1:** Characteristics of study subjects residing in nursing homes.

Variables	n	%
<b>Residence</b>		
Urban area	594	72.7
Rural area	223	27.3
<b>Sex</b>		
Male	376	46
Female	441	54
<b>Age</b>		
≤70 years	165	20.2
>70 years	652	79.8
<b>Education</b>		
Primary school and below	364	44.6
Junior high school	203	24.8
Senior high school and above	250	30.6
<b>Medical insurance</b>		
Yes	766	93.8
No	51	6.2
<b>Have one child or more</b>		
Yes	746	91.3
No	71	8.7
<b>Marital status</b>		
Stable	302	37
Unstable*	515	63
<b>Monthly personal income</b>		
≤3,000 CNY	568	69.5
>3,000 CNY	249	30.5
<b>Duration of admission</b>		
1-3 years	566	69.3
>3 years	251	30.7
<b>Frequency of visits from relatives</b>		
Often	596	72.9
Seldom	221	27.1
<b>History of chronic disease</b>		
Yes	620	75.9
No	197	24.1
<b>Smoking</b>		
Yes	132	16.2
No	685	83.8
<b>Alcohol use</b>		
Yes	96	11.8
No	721	88.2
<b>History of fall</b>		
Yes	228	27.9
No	589	72.1
<b>Social support</b>		
High(>30)	382	46.8
Low (≤30)	435	53.2

<b>Stressful life events</b>		
Yes	725	88.7
No	92	11.3
<b>Sleep quality</b>		
Good	267	32.7
Poor	550	67.3

\*Including being widowed, divorced and never married

**Data collection and measurements**

Our pretrained interviewers went to the nursing homes of the elderly subject’s to explain carefully the aim and plan of the study and the interests and rights of the participants. They then interviewed participants face to face after each participant had given written informed consent. If the participants were illiterate, the written consent form was signed by a family member or a manager in the nursing home. The elderly had the right to decline to participate in the study without any penalty, and they could drop out if they wanted to at any time during the investigation. Consequently, all procedures were performed in accordance with ethics standards. If the individual was not at nursing home, we would record the reason. Our interviewers were required to check their questionnaires carefully every day.

Socio-demographic information was collected, including residence before entering into nursing home, sex, age, education level, medical insurance, number of children, marital status, monthly personal income, duration of residence in the nursing home, the visitation frequency of relatives, history of chronic disease, smoking status, alcohol consumption status and history of falls in the past year. Education level was classified into three categories: primary school or below, junior high school and senior high school and above. Marital status was dichotomized into stable and unstable. Unstable marital status included divorce, loss of a partner and never married. The frequency of visits from relatives was assessed through a single item that asked the participants to select the frequency of visits from their relatives from the following choices: once or more per week, 1-3 times per month and less than once per month. The answers were used to classify the participants into two groups: high (once or more per month) and low(less than once per month). For the purpose of this study, chronic disease referred to chronic non-communicable diseases, including cardiovascular disease, hypertension, chronic obstructive pulmonary disease, type 2 diabetes and others. Smoking was defined as an average of at least one cigarette per day in the last year. Alcohol consumption was defined as drinking a glass of wine per day in the last week.

Depressive symptoms were assessed by the Geriatric Depression Scale-30 (GDS-30), which has been widely used for the elderly worldwide [26]. The validity and reliability of GDS-30 have been extensively assessed in China [27,28]. The GDS consists of 30 true/false questions. The total score ranges from 0 to 30 points, and participants who score 11 and above are considered to have depression symptoms. Scores ranging from 0 to 10 indicate normal, 11-20, mild depression, and 21-30, moderate to severe depression [29].

Anxiety symptoms were measured by item 7 of the Generalized Anxiety Disorder scale (GAD-7) [30]. The subjects were asked whether they had experienced 7 symptoms in the past two weeks. Examples of the experience were “Feeling nervous or anxious”, “You can’t stop or control worry” and “It’s hard to relax”. Four choices were available for each item: “0=none”, “1=several days”, “2=more than half

**Table 2:** Factors associated with depressive symptoms among elderly adults living in nursing homes.

Variables	Participants(n)	Prevalence of Depression (%)	Crude OR (95% CI)	Adjusted OR (95% CI) <sup>†</sup>
<b>Residence</b>				
Urban area	594	26.3	1	1
Rural area	223	61.9	4.56(3.29,6.32)	1.87(1.22,2.86)
<b>Monthly personal income</b>				
>3,000 CNY	249	16.9	1	1
≤ 3,000 CNY	568	44.4	3.93(2.71,5.69)	2.00(1.30,3.01)
<b>Frequency of visits from relatives</b>				
Often	596	25.3	1	1
Seldom	221	64.7	5.40(3.88,7.53)	3.14(2.10,4.78)
<b>Alcohol consumption</b>				
No	721	33.3	1	1
Yes	96	56.3	2.58(1.67,3.97)	2.25(1.24,4.07)
<b>History of fall</b>				
No	589	32.8	1	1
Yes	228	44.3	1.63(1.19,2.23)	1.69(1.15,2.48)
<b>Social support</b>				
High	382	15.4	1	1
Low	435	54	6.43(4.60,9.00)	3.80(2.63,5.51)
<b>Sleep quality</b>				
Good	267	14.6	1	1
Poor	550	46.4	5.05(3.46,7.38)	4.08(2.63,6.32)

<sup>†</sup>Adjusted for sex, age, education, medical insurance, having children, marital status, duration of nursing home residency, and history of chronic disease, smoking, stressful life events, and all variables shown in the table

of the days", and "3=almost every day". The total score ranges from 0 to 21 points, and the cut-off score is 10 with score lower than 10 indicating non-anxiety [31]. The Chinese version of GAD-7 has been widely used and well validated in multiple studies and demonstrated good internal consistency in the current study, with a Cronbach's  $\alpha$  coefficient of 0.88 [32-34].

Social support among the elderly was assessed using the Social Support Rating Scale (SSRS), which has been widely used in China and has a Cronbach's  $\alpha$ =0.762 [35]. The scale consists of three parts: objective support, subjective support, and availability of social support. In this study, subjects with lower social support were identified when the scale score was lower than the mean.

Stressful life events were assessed using the Life Events Scale for the Elderly (LESE) [36]. The LESE was developed based on previous scales and has been proven to have reliability and validity among the Chinese elderly population. It includes 46 items grouped into three main domains: health-related problems, marital and family problems and social and other problems. Participants are determined to have stressful life events when any of these events have occurred and they indicate that they feel stressed.

Sleep quality in the past month among the elderly was assessed using the Pittsburgh Sleep Quality Index (PSQI) [37]. It contains 18 items grouped into seven components and scored from 0 to 3, with 0= "not difficult" and 3= "very difficult". The total score ranges from 0 to 21 points and participants with a score of 5 and above are defined as having poor sleep quality.

**Statistical analysis**

The data were analyzed using SPSS version 18.0 (SPSS/IBM,

Armonk, New York, USA). Data are described as the mean  $\pm$  SD for continuous variables and n (%) for categorical variables. The stepwise Wald test binary logistic regression was used to identify risk factors for depressive and anxiety symptoms. The strength of association was estimated as Odds Ratios (OR) and 95% Confidence Intervals (CI). All statistical tests were two-tailed and p<0.05 was considered statistically significant.

**Results**

**Characteristics of study subjects**

Among the 817 participants, the average age was 79.10  $\pm$  8.71 years. Approximately 90% of the subjects had medical insurance and had at least one child. More than half of the participants had a monthly income lower than 3,000 CNY and had resided in a nursing home for less than 3 years. A minority of the participants smoked and consumed alcohol. A majority of the individuals had experienced at least one type of chronic disease, had experienced at least one stressful life event and had poor sleep quality. The results are shown in Table 1.

**Prevalence of depressive and anxiety symptoms**

A total of 294 elderly adults living in nursing homes reported depressive symptoms in the past month. The prevalence was 36%. Among them, 21.9% of elderly adults reported having mild depressive symptoms and 14.1% of them reported having moderate to severe depressive symptoms. The prevalence of anxiety symptoms among the elderly was 14.2% in nursing homes, and of comorbid depressive and anxiety symptoms 13.3%.

**Risk factors associated with depressive symptoms**

Multivariate binary logistic regression analysis indicated that

**Table 3:** Factors associated with anxiety symptoms among elderly adults living in nursing homes.

Variables	Participants(n)	Prevalence of Anxiety (%)	Crude OR (95% CI)	Adjusted OR (95% CI) <sup>†</sup>
<b>Monthly personal income</b>				
>3,000 CNY	249	3.6	1	1
≤3,000 CNY	568	18.8	6.19(3.08,12.44)	3.56(1.71,7.42)
<b>Duration of admission</b>				
1-3 years	566	9.9	1	1
>3 years	251	23.9	2.86(1.92,4.27)	1.75(1.10,2.79)
<b>Frequency of visits from relatives</b>				
Often	596	7.4	1	1
Seldom	221	32.6	6.07(4.00,9.19)	3.79(2.34,6.14)
<b>Smoking</b>				
No	685	11.5	1	1
Yes	132	28	2.99(1.91,4.67)	1.82 (1.05,3.15)
<b>Stressful life events</b>				
No	92	2.2	1	1
Yes	725	15.7	8.40(2.04,34.58)	5.52(1.27,23.96)
<b>Sleep quality</b>				
Good	267	2.2	1	1
Poor	550	20	10.88(4.71,25.09)	8.57(3.62,20.26)

<sup>†</sup>Adjusted for location of nursing homes, sex, age, education, medical insurance, having children, marital status, history of chronic disease, alcohol consumption, history of fall, and all variables shown in the table

the risk factors for depressive symptoms among elderly adults living in nursing homes were living in a rural area(OR=1.87, 95% CI: 1.22, 2.86), lower monthly income (OR=2.00, 95% CI: 1.30, 3.01), infrequent visits from relatives (OR=3.14, 95% CI: 2.10, 4.78), alcohol consumption (OR=2.25, 95% CI: 1.24, 4.07), history of fall (OR=1.69, 95% CI: 1.15, 2.48), lower social support (OR=3.80, 95% CI: 2.63, 5.51) and poor sleep quality (OR=4.08, 95% CI: 2.63, 6.32) after adjusting for variables such as sex, age, education, medical insurance, having children, marital status, duration of nursing home residency, history of chronic disease, smoking and stressful life events. The results were shown in Table 2.

**Risk factors associated with anxiety symptoms**

Multivariate binary logistic regression analysis indicated that the risk factors for anxiety symptoms among elderly adults living in nursing homes were lower monthly income (OR=3.56, 95% CI: 1.71, 7.42), longer duration of nursing home residency (OR=1.75, 95% CI: 1.10, 2.79), infrequent visits from relatives (OR=3.79, 95% CI: 2.34, 6.14), smoking (OR=1.82, 95% CI: 1.05, 3.15), stressful life events (OR=5.52, 95% CI: 1.27, 23.96) and poor sleep quality (OR=8.57, 95% CI: 3.62, 20.26) after adjusting for variables such as location of nursing homes, sex, age, education, medical insurance, having children, marital status, history of chronic disease, alcohol consumption and history of fall. The results were shown in Table 3.

**Discussion**

The present study selected 24 nursing homes in both urban and rural areas of Hunan province using a multistage cluster random sampling method. Based on a large population, our study found that the prevalence of depressive and anxiety symptoms was 36% and 14.2% respectively among elderly nursing home residents. This result is comparable to a previous study conducted among Chinese elderly adults living in nursing homes, which reported that 16.8% of

participants had depressive symptoms and 5.8% of which had anxiety symptoms [38]. However, with similar institutions and populations, Smalbrugge *et al.* estimated that the prevalence of pure depression, pure anxiety and comorbid anxiety and depression among nursing home residents was 17.1%, 4.8% and 5.1%, respectively [39]. Seitz *et al.* reported that more than 30% of older adults in long-stay care homes exhibited clinically significant depressive symptoms [40]. Creighton *et al.* reported that 26.7% of elderly residents in aged care facilities had anxiety disorders [41]. An explanation for the variance in these estimates may be the ethnic and sociocultural differences between different countries. Moreover, this variance may result from differences in facilities, equipment, quality of nurses and care among different institutions.

Some related researches showed that the prevalence of depressive and anxiety among elderly nursing home residents was higher than that of older adults living in the community [15,40,42]. One possible explanation is that the elderly adults living in institutions are relatively older and have worse health and more chronic diseases compared to community-dwelling older adults [15,40]. Another possible explanation is that institutionalized elderly adults have lost some obscure protective factors that are available to community-dwelling adults, thus making them more vulnerable to depressive and anxiety symptoms. Therefore, it is crucial for nursing homes to pay more attention to the mental health of the elderly. Depression and anxiety screening of the institutionalized older population on admission might detect potentially vulnerable individuals.

Our study found that the institutionalized elderly adults living in rural areas had a higher risk of developing depressive symptoms than those living in urban areas, which is consistent with a study of community-dwelling elderly adults [43]. On the one hand, low Socioeconomic Status (SES) is more prevalent in rural areas than in urban areas and leads to poor utilization of health services [44]. On

the other hand, the equipment and personnel allocation in nursing homes in rural areas are inferior to those in urban regions, which lead to dissatisfaction with their ability to meet demands and cause a series of problems.

Alcohol drinking has been accepted as a risk factor for depressive symptoms [45]. Our study found that the institutionalized elderly adults who drunk had a higher risk of developing depressive symptoms than those didn't. The result was in accordance with a study conducted in the community [46]. A study conducted among 373 elderly individuals showed that at-risk drinking was associated with more severe depression and may have a negative impact on health and treatment outcome, it is important that physicians consider alcohol use in depressed older adults [47].

The present study also found that a history of fall was associated with depressive symptoms, which parallels other studies carried out in China and in other countries [48-50]. It may be that the chronic pain caused by fall was strongly associated with depressive symptomatology [51,52].

Lack of social support is also a main risk factor for depressive symptoms, which is in agreement with conclusions from previous studies [15,53]. For instance, Drageset *et al.* reported that social support is positively correlated with depression among 60 nursing home residents [54]. While Han *et al.* stated that social support obtained by depressive patients can help them alleviate depressive symptoms [55].

Our study found that duration of residency was associated with the development of anxiety symptoms among the elderly in nursing homes. Long duration of stay represented long-time absence from family and relatives, which increased the risk for anxiety symptoms [22]. Given that longer duration of residency and lack of social support were risk factors, depression and anxiety screening on nursing home admission alone would be adequate. Repeat screening of long-stay residents along with interventions to reduce depression and anxiety such as emotional support, pleasurable activities, and where appropriate, antidepressant medication might be beneficial.

The present study also found that the participant's smoking was also related to anxiety symptoms, which parallels a study conducted among 10641 Australian adults [56]. The reason may be that physical dependence and mental dependence caused by long-term use of addictive substances were easy to produce anxiety, irritability and other negative emotions [57].

Stressful life events is also an independent risk factor for anxiety symptoms, which is in agreement with conclusions from previous studies [25,58]. Frias *et al.* reported that stress and negative life events were associated with detrimental effects on both physical and mental health in late-life [59]. Besides, a study conducted among 3056 community-dwelling elderly individuals in the Netherlands indicated that recent life events may contribute to an elevated risk of late-life anxiety disorders [60].

Our study found that the institutionalized older adults with higher monthly personal income had a higher risk of suffering from depressive and anxiety symptoms than those with less, which is consistent with a study that carried out in rural China [23]. Xie *et al.* found that older adults with lower incomes were more likely to suffer from negative emotions. It may be that higher incomes mean better access to healthcare and daily care in nursing homes to some extent,

which were protective factors for depressive and anxiety symptoms.

One interesting finding is that the frequency of visits from relatives is also associated with the development of depressive and anxiety symptoms among elderly adults in nursing homes. Similar results were obtained in another study; that study demonstrated that few relatives to turn to and infrequent contact with relatives represented lack of social support to some extent, which is recognized as a major risk factor for depressive and anxiety symptoms according to Jongenelis and Smalbrugge [16,22,53]. The association may be related to the need for emotional support among the elderly.

Sleep quality was also an independent risk factor for depressive and anxiety symptoms; the institutional elderly with good sleep quality had a higher risk of developing depressive and anxiety symptoms than those with poor sleep quality. The study by Leblanc *et al.* showed the same result [24]. Poor perceived sleep quality has simply been considered a symptom of depression. In addition, recent studies supported a bidirectional relationship between perceived sleep quality and depression and anxiety [58]. Therefore, the results suggest that timely clinical treatments on older adults with history of fall or sleep problems may help to prevent depressive and anxiety symptoms among the elderly in nursing homes.

In the current literature, this is the first study to explore the risk factors for both depressive and anxiety symptoms among the elderly in nursing homes in China. The findings provided valuable information for depressive and anxiety disorders prevention among elderly for such institutions. However, our study also has several limitations to address. First, temporal and causal relationships could not be assessed due to the cross-sectional study design. Second, there may be limitations in measurement accuracy and the classification of depressive and anxiety symptoms based on partially retrospective self-reports. Finally, from the participants' perspectives, there could be a recall bias of the condition as the subjects were asked for some events in the past month prior to study. Therefore, further studies are needed to confirm the findings and garner a deeper understanding.

## Conclusion

The prevalence of depressive and anxiety symptoms among elderly adults in nursing homes in Hunan province is relatively high. Residents of rural areas, lower monthly income, infrequent visits from relatives, alcohol consumption, and history of fall, decreased social support and poor sleep quality were the main risk factors for depressive symptoms. Lower monthly income, longer duration of nursing home residency, infrequent visits from relatives, smoking, stressful life events and poor sleep quality were the main risk factors for anxiety symptoms. The findings provided valuable information for depressive and anxiety disorders prevention and health policy making.

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## Author Contribution

All the authors made substantial contributions to this study. Huilan Xu, Yu Nie, Tingting Zhu were in charge of this work. Shilin-Yin, Wensu Zhou, Yunhan Yu and Xidi Zhu as investigators to collected data. Yu Nie completed data analysis and drafted the manuscript.

## Ethical Approval

The study was approved by Xiangya School of Public Health IRB (No.XYGW-2018-49).

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