Preplanned Studies

Prevalence of Depression and Anxiety Symptoms and the Influencing Factors Among Older Adults Aged 60 Years and Over — 7 PLADs, China, 2024

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Summary

What is already known about this topic?

Mental health problems in older adults have become a major public health concern.

What is added by this report?

The prevalence of depression and anxiety symptoms in adults aged ≥60 years was 13.8% and 8.0%, respectively. Compared with good sleep quality, the odds ratio (95% confidence interval) of depression and anxiety for those with poor sleep quality was 7.88 (6.33, 9.79) and 6.42 (5.02, 8.22), respectively.

What are the implications for public health practice?

Early screening for depression and anxiety, lifestyle interventions and chronic disease management should be strengthened to promote mental health of older adults.

ABSTRACT

Introduction: The prevalence of depression and anxiety among older adults has become a significant public health concern. This study aimed to identify the key demographic and health-related correlates of these mental health issues.

Methods: A cross-sectional survey of seven provincial-level administrative divisions (PLADs) in China was conducted in 2024. The Patient Health Questionnaire-9 (PHQ-9) and Generalized Anxiety Disorder-7 (GAD-7) scales were used to assess the mental health status of older adults. In total, 20, 113 participants aged ≥60 years were included in this study.

Results: The analysis revealed a prevalence rate of 13.8% [95% confidence interval (*CI*): 12.1%–15.5%] for depression and 8.0% (95% *CI*: 7.0%, 9.0%) for anxiety. Depression and anxiety symptoms are more common among older adults who are older, female, and have comorbid chronic diseases, lack of physical activity, and poor sleep quality. Compared with good sleep quality, the odds ratio (*OR*) (95% *CI*) for depression for those with poor sleep quality was 7.88 (6.33, 9.79), and for anxiety was 6.42 (5.02, 8.22), respectively.

Conclusions: Early screening for depression and anxiety, lifestyle interventions and chronic disease management should be strengthened to promote the mental health of older adults.

The increasing prevalence of depression and anxiety among older adults is a growing concern worldwide (*1*). Depression and anxiety disorders impose a substantial burden on older adults, aggravating chronic diseases and increasing dementia risk (*2*). The Healthy China 2030 Action Plan proposes indicators to slow down the rising trends of anxiety and depression, including requirements to promote mental health in this population. The most recent nationwide report on anxiety among older adults was from the Chinese Longitudinal Healthy Longevity Survey (CLHLS) conducted in 2018 (*3*). However, current literature on the mental health of older adults has primarily focused on localized studies or clinical samples. This study aimed to provide a comprehensive overview of the prevalence of depression and anxiety among older adults in China and their associated factors across seven provincial-level administrative divisions (PLADs).

This study employed a multistage stratified cluster probability sampling design to ensure national representation. In the first stage, one PLAD was selected from each of the seven major geographical regions of China, yielding seven areas: Hebei (North China), Liaoning (Northeast China), Jiangsu (East China), Henan (Central China), Guangdong (South China), Chongqing (Southwest China), and Shaanxi (Northwest China). For each selected area, 10 districts/counties were sampled using probability

proportional to size (PPS) sampling, resulting in 70 districts/counties nationwide. In the second stage, three subdistricts/townships were selected from each site using the PPS. In the third stage, two neighborhood committees/villages were sampled from each subdistrict/township using PPS. In the fourth stage, 120 households were selected within each neighborhood committee or village using simple random sampling (SRS). Finally, one eligible individual from each household was randomly selected to participate in the survey. The inclusion criteria were as follows: aged ≥15 years, Chinese residents who considered their current residence as their primary dwelling for at least one month before the survey, and sufficient physical and cognitive abilities to complete the questionnaire. Exclusion criteria included primarily residing in collective settings (e.g., student dormitory, military barracks, prisons, or hospitals) and a diagnosis of dementia or other severe mental health disorders. Quality control: The electronic questionnaire design limited illogical data entry; all investigators received uniform training and examination, the China CDC verified the collected data, and two independent statistical analysts processed, analyzed, and compared the data. In total, 50,400 eligible participants were enrolled, of whom 46,452 completed the survey, yielding a response rate of 92.2%. There were 46,309 participants after excluding missing data on the self-reported anxiety and depression scales, of whom 20,113 were older adults aged ≥60 years.

Mental health was assessed using the Patient Health Questionnaire (PHQ-9) and the Generalized Anxiety Disorder Questionnaire (GAD-7). The PHQ-9 score ranges from 0 to 27 and is categorized as minimal (0–4), mild (5–9), moderate (10–14), moderately severe (15–19), or severe (20–27) (*4*). Anxiety severity was estimated using the GAD-7 total score, which ranges from 0 to 21 and is classified as minimal (0–4), mild (5–9), moderate (10–14), or severe (15–21) (*5*). The Cronbach's alpha coefficient in this study of PHQ-9 and GAD-7 was 0.85 and 0.90, respectively.

The basic demographic information and lifestyle factors collected included age, sex, household registration, education level, number of chronic diseases (cardiovascular diseases, cancers, chronic obstructive pulmonary disease, hypertension, and diabetes), sleep quality, and physical activity. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), with a score of ≥5 indicating sleep disturbance (*6*).

Characteristics of older adults aged ≥60 years were reported as means with 95% confidence intervals (*CI*s) for continuous variables. Percentages with 95% *CI*s were used as categorical variables. Anxiety and depression prevalence among older adults was presented as point estimates with 95% *CI*s. Differences between subgroups were assessed using Rao-Scott χ^2 tests. Multilevel modeling of complex survey data was used to explore factors associated with depression and anxiety. All estimates incorporated sampling weights, non-response adjustment weights, and post-stratification correction weights to ensure population representativeness. Missing values for educational level were not imputed because the proportion of missing data was <1.0%. Statistical analyses were conducted using the SAS software version 9.4 (SAS Institute Inc., Cary, NC, USA). All tests were two-tailed, and statistical significance was defined as $P<0.05$.

Among the 20,113 older adults included in the analysis, the mean age was 68.9, with males accounting for 48.7% and urban residents accounting for 34.8%. Specific demographic information is shown in Table 1. Table 2 summarizes the participants' characteristics according to their depression and anxiety symptoms. The prevalence of depressive symptoms among older adults was 13.8% (95% *CI*: 12.1%, 15.5%), while the prevalence of anxiety symptoms was 8.0% (95% *CI*: 7.0%, 9.0%). Depression and anxiety symptoms were more common among people who were older in age, female, had lower educational levels, comorbid chronic diseases, poor sleep quality, or inadequate physical activity.

Table 3 shows the results of logistic regression analysis of multiple factors of PSQ-9 and GAD-7 symptoms. The respondents who were female, had chronic diseases, and sleep disturbance were more likely to suffer from depression. Notably, older adults with sleep disturbance had a significantly higher proportion of depression symptoms [odds ratio (*OR*)=7.88, 95% *CI*: 6.33, 9.79]. Middle school education level (*OR*=0.81, 95% *CI*: 0.66, 0.99), high school education level (*OR*=0.61, 95% *CI*: 0.47, 0.79), and >5 sessions of physical activity per week (*OR*=0.71, 95% *CI*: 0.62, 0.82) appeared to have a protective effect against depression. Regarding anxiety symptoms, females, and those with chronic diseases were more likely to suffer from anxiety symptoms. Sleep disturbance also showed a significantly higher proportion with anxiety (*OR*=6.42, 95% *CI*: 5.02, 8.22).

TABLE 1. Characteristics of the surveyed older adults aged 60 and above from 7 PLADs in China, 2024.

Subgroup	*n*	*n* (weighted)	Weighted mean/proportion (95% *CI*)
Demographic characteristics			
Age in years (mean)			68.9 (68.7, 69.1)
Age group (years)			
60–69	10,756	61,399,716	59.6 (58.1, 61.0)
70–79	7,613	34,095,710	33.1 (31.8, 34.4)
≥80	1,744	7,557,263	7.3 (6.7, 8.0)
Sex			
Female	9,992	52,854,691	51.3 (49.9, 52.7)
Male	10,121	50,197,999	48.7 (47.3, 50.1)
Residence			
Urban	9,309	35,827,294	34.8 (29.5, 40.0)
Rural	10,804	67,225,396	65.2 (60.0, 70.5)
Education level			
Primary school or below	10,483	50,510,349	49.1 (45.5, 52.7)
Middle school	6,494	33,061,530	32.1 (30.0, 34.3)
High school	2,584	15,783,333	15.3 (13.5, 17.2)
College or above	518	3,503,449	3.4 (2.3, 4.6)
Health characteristics			
Number of chronic diseases			
0	7,233	38,828,781	37.7 (35.3, 40.0)
1	6,340	32,337,043	31.4 (30.3, 32.5)
≥2	6,540	31,886,866	30.9 (28.8, 33.1)
Depression score (mean)			1.8 (1.6, 2.0)
Depression severity			
None	17,043	88,807,957	86.2 (84.5, 87.9)
Mild	2,125	10,067,776	9.8 (8.5, 11.0)
Moderate	597	2,672,107	2.6 (2.1, 3.1)
Severe	348	1,504,850	1.5 (1.2, 1.7)
Anxiety score (mean)			1.1 (0.9, 1.2)
Anxiety severity			
None	18,305	94,808,272	92.0 (91.0, 93.0)
Mild	1,281	5,991,532	5.8 (5.0, 6.6)
Moderate	345	1,487,674	1.4 (1.2, 1.7)
Severe	182	765,212	0.7 (0.5, 1.0)
Sleep disturbance			
Yes	8,097	39,313,936	38.2 (35.8, 40.5)
No	12,016	63,738,754	61.9 (59.5, 64.2)
Times of physical activity per week			
0–2	10,442	53,171,332	51.6 (48.8, 54.4)
3–4	1,620	8,219,861	8.0 (7.1, 8.9)
≥5	8,051	41,661,496	40.4 (37.9, 43.0)

Abbreviation: *CI*=confidence interval; PLADs=provincial-level administrative divisions.

TABLE 2. Prevalence of depressive and anxiety symptoms in the participants by different characteristics from 7 PLADs in China, 2024.

Subgroup	Depressive symptoms			Anxiety symptoms		
	Weighted % (95% *CI*)	χ^2	*P*	Weighted % (95% *CI*)	χ^2	*P*
Age group (years)		79.1	<0.001		4.6	0.076
60–69	11.6 (10.0, 13.2)			7.5 (6.3, 8.6)		
70–79	16.7 (14.6, 18.7)			8.6 (7.1, 10.0)		
≥80	19.2 (16.0, 22.4)			9.8 (7.7, 11.9)		
Sex		123.4	<0.001		96.0	<0.001
Female	17.5 (15.4, 19.6)			10.8 (9.3, 12.3)		
Male	10.0 (8.5, 11.4)			5.0 (4.3, 5.8)		
Residence		1.6	0.211		1.7	0.196
Urban	12.4 (9.5, 15.3)			7.1 (5.3, 8.8)		
Rural	14.6 (12.6, 16.7)			8.5 (7.2, 9.8)		
Education level		75.1	<0.001		69.5	<0.001
Primary school or below	17.7 (15.4, 20.0)			10.7 (9.2, 12.3)		
Middle school	11.1 (9.6, 12.6)			6.2 (5.3, 7.2)		
High school	8.3 (6.8, 9.8)			3.9 (2.9, 5.0)		
College or above	7.9 (3.7, 12.1)			3.1 (1.0, 5.2)		
Number of chronic diseases		145.0	<0.001		113.1	<0.001
0	6.1 (4.9, 7.3)			4.1 (3.1, 5.0)		
1	12.1 (10.6, 13.5)			7.1 (5.8, 8.4)		
≥2	25.0 (22.0, 28.1)			13.7 (12.0, 15.4)		
Sleep disturbance		327.5	<0.001		263.7	<0.001
Yes	29.6 (26.5, 32.7)			17 (15.0, 18.9)		
No	4.1 (3.1, 5.1)			2.5 (1.9, 3.1)		
Times of physical activity per week		24.5	<0.001		18.8	<0.001
0–2	15.7 (13.6, 17.7)			9.4 (8.0, 10.8)		
3–4	13.2 (10.0, 16.4)			7.5 (5.3, 9.6)		
≥5	11.6 (10.0, 13.2)			6.3 (5.3, 7.4)		
Total	13.8 (12.1, 15.5)			8.0 (7.0, 9.0)		

Abbreviation: *CI*=confidence interval; PLADs=provincial-level administrative divisions.

DISCUSSION

Using a nationwide cross-sectional survey based on the 7 PLADs dataset, this study examined the prevalence of depression and anxiety among older adults across diverse demographic backgrounds. Anxiety and depression were more common among older adults who were female, had lower educational levels, comorbid chronic diseases, poor sleep quality, or inadequate physical activity, several of which were modifiable. This study's findings underscore the importance of lifestyle interventions and strengthening the prevention and management of chronic diseases to support healthy aging.

This study showed that the prevalence of depression and anxiety symptoms among older adults was 13.8% (95% *CI*: 12.1%, 15.5%) and 8.0% (95% *CI*: 7.0%, 9.0%), respectively. Compared with the prevalence of anxiety symptoms of 11.24% among older adults in the CLHLS conducted in 2018 (*3*), the prevalence of anxiety symptoms in this study was lower. This difference may be due to variations in the age composition of the participants in the two studies; the CLHLS included a higher proportion of older adults, and since anxiety incidence increases with age, this could explain the higher prevalence observed. Additionally, differences in the survey years may have contributed to this result. Analyses of the global

TABLE 3. Multivariable logistic regression analysis of depressive and anxiety symptoms in older adults from 7 PLADs of China, 2024.

Subgroup	Depressive symptoms		Anxiety symptoms	
	OR (95% *CI*)	*P*	*OR* (95% *CI*)	*P*
Age (years)				
60–69	1		1	
70–79	1.07 (0.93, 1.22)	0.34	0.77 (0.64, 0.93)	<0.01
≥80	1.19 (0.92, 1.55)	0.19	0.82 (0.60, 1.13)	0.22
Sex				
Male	1		1	
Female	1.37 (1.18, 1.59)	<0.01	1.58 (1.38, 1.81)	<0.01
Residence				
Urban	1		1	
Rural	1.04 (0.78, 1.38)	0.79	0.98 (0.75, 1.29)	0.89
Education level				
Primary school or below	1		1	
Middle school	0.81 (0.66, 0.99)	0.04	0.72 (0.58, 0.89)	<0.01
High school	0.61 (0.47, 0.79)	<0.01	0.45 (0.33, 0.62)	<0.01
College or above	0.74 (0.40, 1.37)	0.34	0.46 (0.25, 0.86)	0.02
Number of chronic diseases				
0	1		1	
1	1.68 (1.34, 2.11)	<0.01	1.45 (1.13, 1.85)	<0.01
≥2	3.39 (2.63, 4.36)	<0.01	2.47 (1.92, 3.17)	<0.01
Sleep disturbance				
No	1		1	
Yes	7.88 (6.33, 9.79)	<0.01	6.42 (5.02, 8.22)	<0.01
Times of physical activity per week				
0–2	1		1	
3–4	0.76 (0.55, 1.03)	0.08	0.74 (0.55, 1.01)	0.06
≥5	0.71 (0.62, 0.82)	<0.01	0.70 (0.58, 0.85)	<0.01

Abbreviation: PLADs=provincial-level administrative divisions; *OR*=odds ratio; *CI*=confidence interval.

burden of disease from 1990 to 2019 showed that the prevalence of anxiety disorders and the DALY rate declined (*2*). It is possible that this survey's results were lower than those of the CLHLS conducted in 2018. Regarding the influencing factors of anxiety and depression, this study shows that older adults with sleep disturbances have a very high risk of developing anxiety and depressive problems, with *OR* values of 7.88 (95% *CI*: 6.33, 9.79) and 6.42 (95% *CI:* 5.02, 8.22), respectively. Other studies have also found that poor sleep quality is highly associated with depression and anxiety, but the OR values reported were relatively low. This discrepancy in OR values may be due to differences in the samples, areas, and definitions of poor sleep quality used across studies. In this study, poor sleep quality was defined as a PSQI score of 5 or higher, while other studies have used a cutoff of 7. The China Short-term Health Effects of Air Pollution Study, using the cutoff of 7, found that, compared with good sleep quality, the *OR* (95% *CI*) of anxiety for those with poor sleep quality was 5.12 (3.88, 6.77)(*7*). Regarding the impact of sleep on depression, it was also found that patients with stroke with poor sleep quality were more likely to develop depressive symptoms (*8*). Sleep problems are prevalent among older adults, and improving sleep quality is important for reducing the likelihood of anxiety and depression. Moreover, comorbid chronic diseases severely affect mental health in the older adult population. Previous studies have shown that patients with chronic diseases

have a higher prevalence of anxiety and depressive symptoms (*3*,*9*). This study also found that having multiple chronic diseases increased the risk of depressive and anxiety symptoms.

The findings in this report are subject to at least three limitations. First, the cross-sectional design restricts the ability to establish causal relationships between the identified risk factors and the prevalence of depression and anxiety among older adults. Second, depression and anxiety symptoms were self-assessed rather than clinically diagnosed, which may involve potential inaccuracies due to subjective self-reporting and individual judgment. Finally, reliance on self-reported measures may introduce recall bias.

Future prospective studies are warranted to validate these findings and explore the underlying mechanisms linking identified risk factors to mental health outcomes in older adults. In conclusion, this study found a high prevalence of depression and anxiety among older adults. This highlights the importance of lifestyle interventions and chronic disease management for promoting physical and mental health. The government should pay attention to the mental health issues of older adults, including sleep-related issues, and strengthen the implementation and enforcement of existing plans/work, such as the National Healthy Lifestyle Action and the management of chronic diseases in basic public health services (*10*). Mental health should be integrated into overall healthcare services, and health service programs for older adults should be actively utilized to conduct screening and early intervention for depression and anxiety. They should also enhance public education and promote public knowledge and skills regarding healthy lifestyles and chronic disease prevention and control.

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