International Journal of Social Psychiatry
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Int J Soc Psychiatry published online 2 December 2013
DOI: 10.1177/0020764013511068

The online version of this article can be found at:
http://isp.sagepub.com/content/early/2013/11/28/0020764013511068

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International Journal of
Social Psychiatry
0(0) 1–9

DOI: 10.1177/0020764013511068
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Debt and depression among the *Dibao* population in northwestern China

Yanhong Gong,[1,2] Xiulan Zhang,[1] Hong Zou,[2] Donghua Tian,[1] Zhiyong Qu,[1] Weijun Zhang[1] and Yongqiang Chu[1]

Abstract

Background: With the rapid development of economy, depression disorder is not only a public health issue but also a socioeconomic problem and attracting more and more attention in China.

Aims: The target of this study is to examine the prevalence of depression and the related risk factors in the *Dibao* population in northwestern China.

Method: A cross-sectional analysis in a random sample survey conducted in three northwestern Chinese cities in 2007. The data from 4459 respondents with completed Center for Epidemiological Studies–Depression (CES-D) scales were evaluated to explore the key risk factors for depression. Using depression as a binary variable according to the cutoff of the CES-D score and then as a continuous variable, multiple logistic and line regression analysis were performed to compare the odds ratio and the weight of different risk factors for depression.

Results: The prevalence of depression in non-*Dibao* population was 34.7% but that in the *Dibao* population was 50.0% ($p < .001$). After adjusting for important confounders, *Dibao* population had an odds ratio (OR) of 1.38 (95% confidence interval (CI): 1.16–1.63) to have possible depression compared to those non-*Dibao* people. Furthermore, depression was associated with a higher OR of indebtedness (OR: 1.59, 95% CI: 1.31–1.93), and a small amount of debt would increase the possibility of depression for *Dibao* people (OR: 1.69, 95% CI: 1.28–2.23). In addition, gender, body mass index (BMI), tobacco use and social network were also important risk factors for depression in the *Dibao* population. Using depression as a continuous variable, being a member of the *Dibao* population and being indebted will add 2.06 and 1.83 to the CES-D score, respectively, compared with the non-*Dibao* population and not being indebted. A comparison of the odds ratios of depression between the *Dibao* and the non-*Dibao* population showed that factors such as gender, BMI, tobacco use, social network and indebtedness were statistically significant in the *Dibao* population but were not statistically significant in the non-*Dibao* population. Additionally, having a savings account was statistically significant in the non-*Dibao* population but not in the *Dibao* population.

Conclusions: It was not surprising, as proved by other studies, that gender, obesity and social network were risk factors associated with depression in the *Dibao* population. Our findings indicated that a small amount of indebtedness was also closely related to depression in the *Dibao* population.

Keywords

Depression, debt, *Dibao* population, China

Introduction

Among all of the mental illnesses, depression disorders are the most commonly occurring affective or mood disorders in America (Kessler et al., 2003; Strine et al., 2008), Europe (Ayuso-Mateos et al., 2001), South Africa (Tomlinson, Grimsrud, Stein, Williams, & Myer, 2009) and China (Phillips et al., 2009). Patients with depression experience marked impairments in life functioning and well-being. They also reportedly exhibit a reduction in social functioning at a level either equivalent to or more significant than that of patients living with chronic physical illnesses, such as cardiopulmonary disease, arthritis, hypertension and diabetes. Globally, depression accounts for as great a disease burden as ischemic heart disease (World Health Organization, 2002), and it has been projected to become

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the second leading burdensome disease following coronary heart disease by 2020 (Murray & Boston, 1996), imposing a tremendous health burden upon patients.

Previous studies have suggested a relationship between depression and low socioeconomic status (SES) (Akhtar-Danesh & Landeen, 2007; Burvill, 1995; Dohrenwend et al., 1992; Wilson, Chen, Taylor, McCracken, & Copeland, 1999), low social support (Monroe, Bromet, Connell, & Steiner, 1986), declining or poor health status (Street, 2003; Street, O'Connor, & Robinson, 2007), disability (Lynch, Kroencke, & Denney, 2001), adverse life events (Keller, Neale, & Kendler, 2007) and female gender (Piccinelli & Wilkinson, 2000). In addition, depression and depressive symptoms have been strongly associated with financial adversity or strain (Coiro, 2001; Reading & Reynolds, 2001; A. Schulz, Parker, Israel, & Fisher, 2001; Starkey, Keane, Terry, Marx, & Ricci, 2012; Zimmerman & Katon, 2005). For example, A. J. Schulz et al. (2006) found that financial stress was the strongest direct predictor of symptoms of depression. Additionally, McLoyd and Wilson (Coiro, 2001) interpreted depression as a 'normative and situational response to economic hardship'. It appears that individuals may experience a myriad of stress-related mental and physical symptoms and illnesses as financial distress increases (Lyons & Yilmazer, 2005; O'Neill, Sorhaindo, Xiao, & Garman, 2006; Prawitz, Garman, Sorhaindo, O'Neill, & Kim, 2006; Reading & Reynolds, 2001). It is important to note that there may be a two-way causation between psychological well-being and economic status, although this simultaneity is difficult to test, as we discuss below. For example, individuals with a history of depression, mental illness and stress may have erratic employment and earnings histories, thereby generating financial difficulties, including indebtedness (Bridges & Disney, 2010). In addition, past psychological problems may also prevent such individuals from coping with adverse financial shocks (Chernomas, 1990). Bartel and Taubman (1986) attributed mental illness completely to adverse economic circumstances. Afterward, Theodossiou (1998) continued to presume a unidirectional link from economic events to psychological events, and other studies have also attempted to explore the simultaneous link between economic and psychological circumstances, either by assuming that individual responses to economic shocks are mediated through unmeasured individual characteristics (Bjorklund, 1985) or by estimating an explicit simultaneous model of the relationship between these two factors (Hamilton, Merrigan, & Dufresne, 1997).

China is the largest developing country in the world, with an estimated population of 1.37 billion. According to the latest results, there were about 21 million citizens receiving the lowest cost of living in urban areas by the end of October 2012 (The Ministry for Civil Affairs of People's Republic of China, 2012). Along with the development of modern China, many urban communities essentially have discarded many of the Chinese traditions that create high levels of social support besides the low SES, deprivation and financial stress, even financial indebtedness. However, it is not known how common depression is or which risk factors operate among the lowest life-supporter population in urban China. Studying this population may offer insights into the causes and prevention of depression that will be applicable in both developing and developed countries. Therefore, we investigated the prevalence of depression among the population receiving the lowest cost-of-living allowance in urban northwest China, examined the risk factors of depression and explored the differences between China and other countries with regard to depression.

Method

Study design

The data in this study were derived from the Chinese Urban Social Protection Survey, which was conducted in 2007 by the Provincial Civil Affairs Sector and the School of Social Development and Public Policy at Beijing Normal University. Three-stage cluster sampling was used to select households for survey in three northwestern Chinese cities (Lanzhou and Baiyin in the Gansu province and Xining in the Qinghai province). In the first two stages, the probability proportional to the size sampling was used to select districts and communities according to their population sizes. A total of 100 households were selected by simple random sampling from each selected community. Household representatives were surveyed through face-to-face interviews. The response rate was 89%, and all respondents provided informed consent.

The survey tapped into a wide range of background characteristics of households and detailed sociodemographic information on each household member, including self-rated health, various health-related behaviors, debts, exercise, illness, social network, children's learning and the Center for Epidemiological Studies–Depression (CES-D) Scale. The surveyed households and household respondents totaled 4661 and 13,051, respectively. Potential subjects in this study were the 4661 survey respondents who reported health-related behaviors and self-administered the CES-D at the time of the survey.

Measures

Dependent variable. The CES-D Scale Chinese edition (Wang, 1999) was used to assess depressive symptoms. This scale is the most widely used depression screening scale and is frequently applied to community-based studies. The Chinese version of the CES-D scale showed good reliability and validity across all ages of the urban population (Zhang et al., 2010). The Cronbach's alpha reliability was .86 in the baseline survey and .88 in the follow-up survey. It

is composed of 20-item questions that measure symptoms of depression in four domains: Depression Affect, Somatic Complaints/Activity Inhibition, Positive Affect and Interpersonal Difficulties. During the examination, participants were instructed to complete the CES-D form by indicating how often they experienced each symptom in the past week. The response uses a 4-point scale ranging from 0 to 3 that indicates the following frequencies: 'rarely or none of the time, or less than 1 day', 'some or little of the time, or 1–2 days', 'occasionally or a moderate amount of the time, or 3–4 days' and 'most of the time, or 5–7 days'. However, the scale is reversed for questions 4, 8, 12 and 16. High total scores indicate worse depressive symptoms. A total score of more than or equal to 16 for the test was selected as the cutoff for possible mild to major depression.

Independent variables. SES was the primary area of interest. We collected data about the income, expenditure and debts of the *Dibao* population by questionnaire. The *Dibao* population often had no stable source of finances except for the minimum living standard subsidy. Indebtedness was the primary independent variable and was divided into two levels (yes/no) in this investigation of the low income and expenditures for the *Dibao* population.

Confounders. The confounding variables were classified by age (<25, 25–34, 35–44, 45–54, >55 years), gender (male, female), marital status (married, unmarried), education (junior high school or less, high school, college or more), disability status (yes, no), being sick or injured in the last month (yes and no), self-rated health (very good, good, not bad and bad), tobacco use (never, former, current), alcohol consumption (no or occasionally drink, drink at least once per week), physical activity (frequent exercise: yes, no), strength of social network (strong, moderate, weak) and academic performance of children (very good, good, not bad, bad).

Body mass index (BMI) was calculated as the weight in kilograms divided by the height in meters squared (<19, 19–<25 and ≥25 kg/m^2). The strength of the social network was assessed ordinally using 12 questions that addressed whether the household could obtain help from different sources when the family encountered substantial financial hardship. These sources were friends (non-neighbors); colleagues (non-neighbors); neighbors; parents or parents-in-law; children; other relatives; work units; community; government; and trade unions, the Communist Youth League, the women's federation, the disabled person's federation or another social organization (e.g. a charity foundation or a religious or minority organization). Responses were scored ordinally (1, certainly; 2, maybe; 3, difficult to say; 4, probably not; 5, certainly not) and aggregated and subdivided into three categories (the 25% of subjects with the lowest scores were defined as possessing a strong social network, the 25% with the highest scores were defined as possessing a weak network, and the remainder were defined as possessing a network of moderate strength).

Analyses. The preliminary analyses were first performed using the chi-square test to determine which factors were associated with depression in the *Dibao* population. Binomial regression with a logit link was then used for the dependent variable depression status (yes/no) to estimate the univariate and multivariate odds ratios of depression with and without controlling for other risk factors. A total continuous score of the CES-D Scale was used for the outcome, and a linear regression model was used to estimate the effects of the factors affecting depression. Interactions were deconstructed using simple effect analyses that tested the influence of indebtedness on the depression status/score in the subsamples stratified on the *Dibao* population (yes/no). Stata 10.0 software was used for all analyses in this article.

Results

Overall, members of the *Dibao* population accounted for 27.47% (3385/13,051) of all respondents. One member per household reported the self-administered CES-D, and 4459 participants with complete CES-Ds were included in the analysis, with a response rate of 98%. The range of the CES-D total score was 0–52 (mean: 13.8, *SD*: 8.8). The prevalence of depression for the *Dibao* population was 50.0%, but the prevalence of depression in the non-*Dibao* population was 34.7% ($p < .001$). The percentage of indebtedness was 15.6% in *Dibao* population, and the most common amounts for debt were less than 10,000 yuan (70.33%), followed by 10,000–20,000 yuan (15.16%), more than 30,000 yuan (9.28%) and 20,000–30,000 yuan (5.23%). According to the cutoff, 37.78% of participants were considered to have mild to major depression, and the percentages of depression with and without indebtedness in the *Dibao* population were 51.6% and 43.1% ($p < .001$), respectively, and 45.8% and 35.7% in the non-*Dibao* population, respectively.

Table 1 shows the sociodemographic characteristics of the subjects, differentiated by indebtedness status. Compared with subjects without debts, subjects in the *Dibao* population who were indebted were more likely to be older, male, less educated and married; likely to have higher BMIs, and likely to be disabled, injured or ill, in a stronger social network, physically inactive and depressed. These characteristics were similar in the non-*Dibao* population.

In multivariate analyses, using depression as a binary variable according to the cutoff of the CES-D score, depression was associated with the *Dibao* subjects and indebtedness compared with the non-*Dibao* subjects and non-indebtedness (odds ratio (OR) = 1.38, 1.59; 95% confidence interval (CI) = 1.16–1.63, 1.31–1.93, respectively).

Table 1. Profile of depression by *Dibao* and non-*Dibao* population with and without debts.

Characteristic	Total (N)	%	*Dibao*		Non-*Dibao*	
			With debts (%)	Without debts (%)	With debts (%)	Without debts (%)
Age (years)						
<25	2307	17.77	0.23	99.77	0.14	99.86
25–34	1417	10.92	3.68	96.32	1.25	98.75
35–44	2093	16.12	9.60	90.40	4.73	95.27
45–54	2532	19.50	22.52	77.48	5.64	94.36
≥55	4633	35.69	18.28	81.72	3.18	96.82
Gender						
Male	6278	49.02	14.27	85.73	3.55	96.45
Female	6530	50.98	9.68	90.32	2.84	97.16
Education						
Junior high school or Less	6749	54.62	12.54	87.46	3.23	96.77
High school	4111	33.27	14.62	85.38	3.86	96.14
College or more	1496	12.11	4.35	95.65	1.89	98.11
Marital status						
Married	8154	68.54	15.04	84.96	3.70	96.30
Single/separated/ Widowed	3742	31.46	10.67	89.33	2.63	97.37
BMI (kg/m^2)						
<19	1628	12.52	8.01	91.99	2.40	97.60
19–<25	9748	74.94	12.89	87.11	3.09	96.91
≥25	1632	12.55	11.55	88.45	4.17	95.83
Disability status						
No	12,730	97.86	11.72	88.28	3.08	96.92
Yes	278	2.14	17.29	82.71	7.59	92.41
Get sick or injured in last month						
Yes	541	4.16	24.00	76.00	7.28	92.72
No	12467	95.84	11.11	88.89	3.01	96.99
Self-rated health						
Very good	1259	9.80	4.57	95.43	2.31	97.69
Good	5971	46.49	6.90	93.10	2.67	97.33
Not bad	4561	35.51	16.46	83.54	3.34	96.66
Bad	861	6.70	24.04	75.96	5.34	94.66
Very bad	191	1.49	21.84	78.16	14.42	85.58
Tobacco use						
Never	8472	65.13	9.95	90.05	2.63	97.37
Former	1342	10.32	10.56	89.44	3.46	96.54
Current	3194	24.55	17.16	82.84	4.49	95.51
Alcohol drinker						
Never	11,226	86.30	12.15	87.85	3.18	96.82
At least once per week	1782	13.70	10.60	89.40	2.93	97.07
Physical activity						
Yes	5618	44.46	10.50	89.50	2.99	97.01
No	7019	55.54	13.65	86.35	3.41	96.59
Social network strength						
Strong	1083	8.33	27.94	72.06	7.42	92.58
Moderate	1921	14.77	34.10	65.90	9.67	90.33
Weak	10,004	76.91	5.84	94.16	1.45	98.55
Children's academic achievement						
Very good	133	5.98	25.00	75.00	15.05	84.95
Good	1016	45.68	35.16	64.84	8.97	91.03
Not bad	1052	47.30	38.41	61.59	10.82	89.18
Bad	23	1.03	28.57	71.43	31.25	68.75

(Continued)

Table 1. (Continued)

Characteristic	Total (N)	%	*Dibao*		Non-*Dibao*	
			With debts (%)	Without debts (%)	With debts (%)	Without debts (%)
Saving accounts						
Yes	697	5.42	1.45	98.55	5.65	94.35
No	12,165	94.58	1.31	98.69	5.10	94.90
Depression						
No	2678	64.27	30.51	69.49	7.31	92.69
Yes	1489	35.73	51.65	48.35	11.61	88.39

Depression was associated with obesity (BMI > 25 kg/m^2) compared with normal weight (OR: 1.44, 95% CI: 1.16–1.78). Depression was also associated with self-rated health of very poor or poor health but not with very good health (OR: 3.47, 2.46; 95% CI: 1.89–6.38, 1.70–3.55, respectively), with tobacco use compared with never smoked (OR: 1.33, 95% CI: 1.05–1.70) and with a weak social network compared with a strong social network (OR: 0.76, 95% CI: 0.63–0.92). Using depression as a continuous variable, a line regression model was used to compare the weight of the independent variables, the coefficient of *Dibao* was 2.06, and the coefficient of indebtedness was 1.83 ($p < .001$), which means that being a member of the *Dibao* population and being indebted will add 2.06 and 1.83 to the CES-D score, respectively, compared with the non-*Dibao* population and not being indebted (Table 2).

A comparison of the ORs of depression between the *Dibao* and the non-*Dibao* population showed that factors such as gender, BMI, tobacco use, social network and indebtedness were statistically significant ($p < .05$) in the *Dibao* population but were not statistically significant ($p > .05$) in the non-*Dibao* population. Additionally, having a savings account was statistically significant for depression (OR: 0.31, 95% CI: 0.13–0.72, $p = .006$) in the non-*Dibao* population but that was not a risk factor for depression (OR: 1.13, 95% CI: 0.89–1.44, $p = .304$) in the *Dibao* population (Table 3).

Discussion

In this cross-sectional study, we found that the prevalence of depression for the *Dibao* population was higher than for the non-*Dibao* population in northwestern China, with a similar tendency for subjects with and without debts. This research examined the risk factors for depression and the relationship between depression and indebtedness among *Dibao* families.

It was not surprising that being obese and having a weak social network are risk factors and that exercise is a protective factor for depression, as these findings have also been demonstrated by other studies. However, we found that tobacco use did not add to the prevalence of depression in either the *Dibao* or the non-*Dibao* populations; this finding conflicted with the finding of a prior study reporting that tobacco use can moderate depression (Bridges & Disney, 2010). The simple cross-tabulations suggested a strong association between a depressed psychological status and self-reported problems of indebtedness. To explore this association, we estimated the OR after controlling for confounding factors and found that a savings account was not a statistically significant risk factor for depression in the *Dibao* population but was an important risk factor in the non-*Dibao* population. In addition, being female, being obese, using tobacco and having a weak social network were not risk factors for depression in the non-*Dibao* population but were associated with depression in the *Dibao* population.

Social network was an important factor associated with depression and researchers have identified the influence of social networks on health through some behavioral mechanisms including (1) the forces of social influence, (2) the levels of social engagement and participation, (3) the regulation of contact with infectious disease and (4) access to material goods and resources (Berkman, 2000). These mechanisms are not mutually exclusive but may operate simultaneously and may also have an effect on depression in the *Dibao* population.

Indebtedness of less than 10,000 yuan was an important risk factor for depression in the *Dibao* population, but this indebtedness had a minimal depressive effect on the non-*Dibao* population. These results can be interpreted to indicate that the *Dibao* people are ordinarily unable to repay their debts because they do not have a stable source of income, which causes a situation in which even small debts may become a psychological burden for them. First, the positive association between the probability of reporting depression and self-reported problems of indebtedness and financial stress arises irrespective of any underlying 'objective' indicators of the financial position of the household – only a weak link exists between 'objective' measures of the financial position of the household and psychological stress. Second, self-reported measures of financial difficulties are indeed related to 'objective' measures of the financial position of the household. So although 'objective' measures have a limited direct effect on psychological well-being, they

Table 2. Risk factor associations with depression.

Characteristic	Adjusted OR	95% CI		*p*	β	*p*
	Outcome: depression vs no depression				Outcome: continuous CES-D score	
BMI (kg/m²)						
19–<25	Referent					
<19	1.10	0.84	1.45	.493	0.66	0.239
≥25	1.44	1.16	1.78	.001	1.19	0.008
Disability status						
No	Referent					
Yes	1.32	0.90	1.94	.150	−0.17	0.831
Get sick or injured in last month						
No	Referent					
Yes	1.23	0.93	1.63	.154	0.76	0.196
Self-rated health						
Very good	Referent					
Good	1.05	0.78	1.42	.728	−0.41	0.495
Not bad	1.19	0.89	1.61	.242	0.39	0.517
Bad	2.46	1.70	3.55	0	3.65	0.000
Very bad	3.47	1.89	6.38	0	6.24	0.000
Tobacco use						
Never	Referent					
Former	1.33	1.05	1.70	.020	2.13	0.000
Current	1.22	1.02	1.46	.032	1.14	0.002
Alcohol drinker						
Never	Referent					
At least once per week	1.19	0.96	1.48	.107	1.22	0.006
Physical activity						
Yes	Referent					
No	0.74	0.64	0.85	0	−2.07	0.000
Social network strength						
Strong	Referent					
Moderate	1.13	0.95	1.35	.167	0.23	0.537
Weak	0.76	0.63	0.92	.006	−1.91	0.000
Indebtedness						
No	Referent					
Yes	1.59	1.31	1.93	0	1.83	0.000
Dibao						
No	Referent					
Yes	1.38	1.16	1.63	0	2.06	0.000
Saving accounts						
Yes	Referent					
No	1.01	0.80	1.26	0.975	0.63	0.164

OR: odds ratio; CI: confidence interval; CES-D: Center for Epidemiological Studies–Depression.
The model was adjusted for age, gender, education level and marital status.

also have an indirect effect on depression, which is mediated through subjective indicators of financial well-being (Bridges & Disney, 2010). Therefore, it is critical for the Chinese government to assist the *Dibao* population in resolving their indebtedness to alleviate the symptoms of depression, which will result in an improved quality of life for this population.

In conclusion, this study has identified potential risk factors for depression in the *Dibao* population in northwestern China. The results of this study should be considered during further development of social assistance policy. Several issues, including the most effective and efficient assistance targets for the *Dibao* population's debts, should be fully considered in the development of social assistance policy.

Table 3. Comparison of risk factors associated with depression by *Dibao* status.

Characteristic	*Dibao*				Non-*Dibao*			
	OR	95% CI		*p*	OR	95% CI		*p*
Age (years)								
<25								
25–34	1.04	0.30	3.61	.950	1.11	0.09	14.16	.937
35–44	0.66	0.20	2.19	.502	1.42	0.12	16.80	.783
45–54	0.64	0.20	2.11	.466	1.65	0.14	19.38	.692
≥55	0.68	0.21	2.20	.518	1.47	0.12	17.37	.761
Gender								
Male								
Female	1.24	1.03	1.49	.023	1.17	0.86	1.60	.313
Education								
Junior high school or less								
High school	0.98	0.81	1.19	.837	0.93	0.68	1.27	.655
College or more	0.79	0.58	1.07	.127	1.35	0.58	3.16	.487
Marital status								
Married								
Single/separated/widowed	1.13	0.90	1.41	.279	1.11	0.81	1.51	.527
BMI (kg/m^2)								
19–<25								
<19	1.09	0.77	1.55	.631	1.02	0.64	1.63	.936
≥25	1.44	1.10	1.87	.007	1.44	0.95	2.19	.088
Disability status								
No								
Yes	1.54	0.93	2.54	.090	0.91	0.49	1.71	.780
Get sick or injured in last month								
No								
Yes	1.20	0.82	1.77	.353	1.22	0.79	1.90	.368
Self-rated health								
Very good								
Good	1.15	0.81	1.63	.434	0.83	0.42	1.63	.587
Not bad	1.10	0.78	1.57	.580	1.44	0.74	2.79	.281
Bad	2.05	1.31	3.23	.002	3.11	1.47	6.58	.003
Very bad	7.23	3.10	16.84	.000	1.54	0.55	4.32	.417
Tobacco use								
Never								
Former	1.50	1.12	2.00	.006	1.16	0.73	1.85	.534
Current	1.38	1.11	1.72	.004	1.00	0.70	1.42	.978
Alcohol drinker								
Never								
At least once per week	1.32	1.02	1.72	.035	0.84	0.56	1.28	.423
Physical activity								
Yes								
No	0.80	0.67	0.95	.013	0.65	0.49	0.87	.004
Social network strength								
Strong								
Moderate	1.20	0.97	1.48	.094	1.08	0.76	1.53	.675
Weak	0.68	0.54	0.87	.002	0.92	0.63	1.34	.673
Indebtedness								
No								
Yes	1.69	1.28	2.23	.000	1.32	0.99	1.77	.061
Saving accounts								
No								
Yes	1.13	0.89	1.44	.304	0.31	0.13	0.72	.006

OR: odds ratio; CI: confidence interval.

Acknowledgement

The authors wish to thank the study participants for their contribution to the research, as well as current and past investigators and staff. The authors would specifically like to thank Zongxiang Ding, Li Chen and Yu Peng for their research and administrative assistance.

Ethical approval

This study was approved by the institutional ethics committee. Subjects gave informed consent for the work.

Declaration of conflicting interests

The authors declared that they have no conflicts of interest.

Funding

This research was supported by the Fundamental Research Funds for the Central Universities. In addition, the Provincial Civil Affairs Sector supported the study design and data collection.

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