Life negative events and depressive symptoms: the China Longitudinal Ageing Social Survey

CURRENT STATUS: UNDER REVIEW

BMC Public Health  ▶ BMC Series

Zhenjie Wang
Peking University
Email: zhenjie.wang@pku.edu.cn  Corresponding Author

Hanmo Yang
Peking University

Pianpian Zheng
Peking University

Bei Liu
Peking University

Zhanyuan Guo
Peking University

Shen Geng
Peking University

Shenda Hong
Georgia Institute of Technology

DOI: 10.21203/rs.3.rs-15671/v2

SUBJECT AREAS
Psychology

KEYWORDS
Older adults, Depressive symptoms, Life negative events exposure, China
Abstract
Background: Although some studies have reported the association between life negative events and depressive disorders, very limited studies have examined the association between life negative events exposure and depressive symptoms risk among Chinese older adults.
Methods: Data were obtained from the China Longitudinal Ageing Social Survey (CLASS), which was a stratified, multi-stage, probabilistic sampling survey, conducted in 2014. General linear regression and logistic regression were used to examine the association between life negative events exposure and depressive symptoms among Chinese older adults.
Results: Life negative events showed statistical dose-response association with depressive symptoms risk after adjustment for the confounding factors (P trend <0.001). Under consideration of life negative events exposure, participants who lived in rural areas, without a spouse or live alone were vulnerable to depressive symptoms.
Conclusions: Life negative events played a risk role of depressive symptoms among Chinese older adults, especially among those in rural areas, females or without a spouse. Our current study is valuable for the development of special prevention depressive symptoms programs among elderly individuals, especially those who have experienced negative events.

Background
Depressive symptoms (DS), which is characterized by symptoms of sadness, depressed mood, and loss of interest, is one of the most prevalent mental disorders across the world [1]. People with DS are usually associated with low quality of life, prevalence of cancer, chronic diseases, suicide, and mortality [2-5]. DS could place a heavy burden on families, communities and health services in both high-income countries and low- and middle-income countries [6, 7].
The prevalence of DS varies widely across countries, from 1% to 16% among middle-aged and elderly people in studies conducted in developed countries [8-10]. As China is facing rapid urbanization and many environmental challenges, the prevalence of DS has been increasing rapidly from 3.9% to 17% among elderly Chinese people in past two decades [11-13].
Several socioeconomic variables were presented to be associated with DS risk [14], although the
associations are inconsistent [10, 13]. A number of studies found inverse or U-shaped associations between age and DS [15-17]. Moreover, low socioeconomic status was found to be associated with severe DS in both men and women, and low education level was found to be related with high risk of DS [18-20]. However, some studies reported no association between income and DS [21] or between education level and DS [14, 17].

Studies have proved that exposure to life negative events, such as serious illnesses, injuries, deaths of loved ones, marital separations, break-ups of steady relationships, onset of unemployment, major financial crises, and so on, is associated with depressive disorders and anxiety [22, 23]. However, there is limited epidemiologic evidence linking life negative events exposure with DS risk among Chinese older population. Therefore, we investigated the association of recent negative events exposure, including serious diseases (self or family member), natural disaster/accident, the death of a family member (spouse, children, or relatives), with depressive symptoms risk using data from the Chinese Longitudinal Ageing Social Survey (CLASS).

Methods

Setting and sample

In the current study, we drew the sample from the Chinese Longitudinal Ageing Social Survey (CLASS) in 2014. The CLASS was collected by the National Survey Research Center, Renmin University. A stratified, multi-stage, probabilistic sampling method to select nationally representative sample was employed, covering 28 of 31 provincial areas in China. In the first stage, 134 counties were randomly selected as the primary sampling units. In the second stage, 462 communities (administrative villages in rural areas and neighborhoods in urban areas) were randomly selected from the primary sampling units. In the third stage, all households in each selected community were mapped and a random sample of 25 households was selected. Finally, one older adult aged over 60 years in each household was randomly surveyed. There were 11,511 older adults were surveyed in total. In the present study, the sample comprised 8711 subjects aged 60 years or older who answered the questions on depressive symptoms and other independent variables of interests, such as demographic variables, health, health serveries, socioeconomic variables, social support and so on. All the participants were
interviewed face-to-face by trained interviewers. During the interview, interviewers should choose an independent and quiet environment, avoid the presence of irrelevant people.

**Measurement**

Depressive symptoms were assessed by using a nine-item Center for Epidemiological Studies Depression Scale (CES-D), including three items assessed positive feelings, two items assessed negative emotions, two items assessed somatic symptoms, and two items assessed sense of marginalization. 9-item CES-D was reliable and valid for detecting non-psychotic mental disorders among Chinese older adults [24]. Each item had a score of 0 (rarely or none of the time), 1 (some of the time), or 2 (most of the time), with the total score ranging from 0 to 18. By reversing the coding of the positive effect items, a higher score indicates a higher level of depressive symptoms. For the current study, on a 9-item scale, the total possible score is 18 (9 items multiplied by 2, the highest response). That total score is divided by 60 (the total possible score on the full 20-item CES-D), which equals 0.3 [25]. Then, the 0.3 is multiplied by 16, resulting in a standardized cut score of 4.8 for the 9-item form of the CES-D. In this study, the internal Cronbach’s alpha for the nine items was 0.75.

In the current study, the life negative events exposure was the experience of a life negative event reported by the subjects themselves in the past 12 months. The information of the seven life negative events, including serious diseases (self or family member), natural disaster/accident, the death of a family member (spouse, children, or relatives), were collected during the survey. Number of life negative events in past 12 months were counted and further categorized (“0”=0, “1”=1, “≥2”=2).

Socio-demographic characteristics included gender (male, female), age, marital status (married, widowed/divorced/unmarried), ethnicity (Han, others), residence (rural, urban), education level (junior high school and above, primary school, never attended school), and living arrangements (lives alone, lives with others). Ten-item version of the activities of daily living (ADL) was assessed for physical disability [26]. Chronic diseases, including any health problems: hypertension, diabetes, heart disease, renal disease, liver disease, stroke, tuberculosis, arthritis, respiratory and so on, were categorized into “yes” = 1, and “no” = 0.
Statistical analysis

Mean ± SD (standard deviation) was used for the description of continuous variables and percentage for categorical data. General linear regression was used to examine the association between depressive symptom score and number of life negative events in the past 12 months. Logistic regression analysis was used to estimate odds ratios (OR) and 95% confidence intervals (CI) of depression risk for each category with the lowest category as the reference group. Trends of the associations were assessed with ordinal scores assigned to categories of the number of life negative events in the past 12 months. Another analysis was done according to socio-demographical status, gender (male, female), residence (rural, urban) and living arrangements (lives alone, lives with others) to examine associations between the number of negative events in the past 12 months and depression risk under considering confounding variables. Statistical significance was declared with a two-sided p-value < 0.05. Statistical analyses were performed using SAS version 9.4 (SAS Institute Inc., Cary, NC, USA).

Results

Selected characteristics of subjects with/without depressive symptoms (DS) are summarized in Table 1. The overall average Center for Epidemiological Studies Depression Scale (CES-D) score was 4.56 (Standard Deviation: 3.56). The prevalence of DS was 43% among Chinese population aged over 60 years. In the current study, male subjects, urban residents, people living with others, and Han nationality accounted for the majority proportion among Chinese old population.

The associations of the number of negative events with DS risk in Table 2. The number of negative events showed statistical association with depression risk after adjustment for the confounding factors ($P_{\text{trend}} < 0.001$). Residual confounding by residence area, gender, and living arrangement might be potential concerns because these are positive risk factors for depression. We further analyzed the association of the number of negative events (Table 3) with depression stratified by selected covariates (i.e., residence area, gender, living arrangement, and physical disability). Increased risk of DS was noted in selected covariates. We found the elders who were living in urban
areas decreased 30% risk of DS compared with those lived in rural areas among the elders without any types of negative event. Among the highest category of number of life negative events in past 12 months, the elders who lived in urban areas was lower risk than those who lived in rural areas. The elders who lived alone increased 56% risk of DS than those who lived with others among the elders without any types of negative event. Old population without a spouse presented a higher risk of DS than those live with a spouse, and the difference became larger as they experienced more life negative events.

Discussion
Overall, the prevalence of depressive symptoms (DS) was 43% among Chinese old population. The result shows that the risk of depression is related to the number of life negative events experienced among Chinese older population.

In China, a large number of studies concerning DS in older adults have emerged [12,27]. However, the results of prevalence of DS among older adults varied from 6.4% [28] to 60.3% [29], which is due to the inconsistent criteria of the measuring tools used and differences in sample sizes and sociocultural contexts. Our prevalence was similar to an observational study [30]. A previous meta-analysis had estimated the prevalence of depressive symptoms (23.6%) in Chinese older adult population [12]. It suggested that the prevalence of DS in Chinese older adults has been increasing significantly in the past two decades, indicating time changes might be a major factor that influences the increasing prevalence of DS among Chinese old population [12].

Among the elderly who reported have experienced family-related negative events during the past 12 months, only those who experienced one, more than one family-related negative event were more likely to experience DS. Our finding supports the knowledge that adults are exposed to at least one negative event might experience trauma-related mental health conditions [31]. The present study examined the effect modifications of socioeconomic factors on the association between negative events and depression risk. Previous studies suggested that the associations between demographic factors and depression among older adults were based on gender and marital status [32-34]. The finding of the current study also indicates that the same characteristics are significantly associated
with depression. Elderly female adults were 1.6 times more likely to have depression than males with the highest category of life negative events. This was in line with the other findings in developing countries[32, 35-37]. The reasons of females were more affected by depression than males might be multifactorial, biological or environmental factors [12, 38, 39].

Marital status and living arrangement were regarded as very influential factors for depression among Chinese older adults with the number of negative events experienced under consideration. Older adults without a spouse (i.e., widowed, divorced, or unmarried) had a higher risk of depression than those with a spouse, which was consistent with other findings. Widowed, divorced or separated older adults have experienced more stressful life events and have a relatively higher level of loneliness, which is one of the manifestations of depression [12, 40, 41]. Moreover, family member’s support was a significant indicator of DS of older adults [12]. A spouse or other family members can take care of his or her partner, talk to his or her partner who is experiencing stressful/negative events or receive emotional and spiritual support from his or her partner, which may reduce depression [12].

Our study has many strengths, including a large sample size, a population-based design, and adjustment for a wide range of socioeconomic characteristics. Another noticeable strength is that the measure of all physical illnesses took place prior to the CES-D measurement, minimizing the risk of reverse causation. However, our study also has several limitations, which should be a consideration for further researchers. Firstly, the cross-sectional design of the baseline of the CLASS does not provide direct evidence of causality. We will be able to extend the current study to determine causality when longitudinal data are available. Moreover, due to data limitations, only the past 12 months’ negative events and types of negative events were collected in this study. We could not assess the frequency, length, or intensity of negative events during lifetime, which should be cautioned in future studies. The CLASS was also lack of information on other mental disorders except for depressive symptoms, which should be cautioned in future studies. Additionally, depressive symptoms were different from diagnosis of depressive disorder, that should be noticed for researchers. Lastly, the CLASS does not provide sufficient information on lifestyle factors (i.e., weight, height, smoking, alcohol drinking, and so on), which were suggested as risk factors of depression.
Conclusions
In conclusion, in this large population-based study among Chinese older population, we found that 43% of the elders are experiencing depression. Family-related negative events exposure were associated with depression risk and presented dose-response associations. Moreover, characteristics presented the marginally modified association with depression in the current study. In future studies, qualitative approaches would be quite valuable in further elucidating the nature of depression among elderly, and whether these are tied to perceived changes in life negative events exposure, socioeconomic status, or cultural standing in relation to modernization. Findings of our study are valuable for the development of prevention programs in identifying elderly individuals, who were exposed to life negative events, and early intervention.

Abbreviations
CLASS: the China Longitudinal Ageing Social Survey; CES-D: Center for Epidemiological Studies Depression Scale.

Declarations
Ethics approval and consent to participate
All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The surveys were conducted within the legal framework governed by statistical law in China. This article does not contain any studies with animals performed by any of the authors.

Consent for publication
Not applicable.

Availability of data and material
The datasets generated and/or analysed during the current study are available in the China Longitudinal Aging Social Survey (CLASS) repository, http://class.ruc.edu.cn/index.php?r=index/index&hl=en.
Competing interests

Non-financial competing interests

Funding

This study was supported by Economic & Social Research Council (ESRC) (No. ES/P011055/1).

Authors' contributions

Z W initiated the study, analyzed data and wrote the original article. H Y provided advice on analyzing data and writing the article. P Z, S G, B L, Z G and S H provided advice on writing the article. All authors contributed to and have approved the final manuscript.

Acknowledgments

We would like to thank the Institute of Gerontology and National Survey Research Center at Renmin University of China for providing the CLASS data.

References

1. Whiteford H A, Ferrari A J, Degenhardt L, Feigin V, Vos T. Global Burden of Mental, Neurological, and Substance Use Disorders: An Analysis from the Global Burden of Disease Study 2010. PLoS One. 2015;10:e0116820.

2. Dalton S O, Laursen T M, Ross L, Mortensen P B, Johansen C. Risk for hospitalization with depression after a cancer diagnosis: a nationwide, population-based study of cancer patients in Denmark from 1973 to 2003. J Clin Oncol. 2009;27:1440–1445.

3. Hsu Y T, Liao C C, Chang S N, Yang Y W, Tsai C H, Chen T L, et al. Increased Risk of Depression in Patients with Parkinson Disease: A Nationwide Cohort Study. Am J Geriatr Psychiatry. 2015;23:934–940.

4. Ayerbe L, Ayis S, Wolfe C D, Rudd A G. Natural history, Predictors and outcomes of
depression after stroke: systematic review and meta-analysis. Br J Psychiatry. 2013;202:14–21.

5. Cuijpers P, Vogelzangs N, Twisk J, Kleiboer A, Li J, Penninx B W. Comprehensive meta-analysis of excess mortality in depression in the general community versus patients with specific illnesses. Am J Psychiatry. 2014;171:453-462.

6. World Health Organization. Depression—a global public health concern. 2012, http://hesp-org/2012/10/05/depression-a-globalpublic-health-concern/ [accessed: 2018-11-29].

7. Walker E R, McGee R E, Druss B G. Mortality in mental disorders and global disease burden implications: a systematic review and meta-analysis. JAMA Psychiatry. 2015;72:334-341.

8. Wilhelm K, Mitchell P, Slade T, Brownhill S, Andrews G. Prevalence and correlates of DSM-IV major depression in an Australian national survey. J Affect Disord. 2003;75:155-162.

9. Waraich P, Goldner E M, Somers J M, Hsu L. Prevalence and incidence studies of mood disorders: a systematic review of the literature. Can J Psychiatry. 2004;49:124-138.

10. Djernes J K. Prevalence and predictors of depression in populations of elderly: a review. Acta Psychiatr Scand. 2006;113:372-387.

11. Chen R, Copeland J R, Wei L. A meta-analysis of epidemiological studies in depression of older people in the People’s Republic of China. Int J Geriatr Psychiatry. 1999;14:821-830.

12. Li D, Zhang D J, Shao J J, Qi X D, Tian L. A meta-analysis of the prevalence of depressive symptoms in Chinese older adults. Arch Gerontol Geriatr. 2014;58:1-9.

13. Zhang L, Xu Y, Nie H, Zhang Y, Wu Y. The prevalence of depressive symptoms among the older in China: a meta-analysis. Int J Geriatr Psychiatry. 2012;27:900-906.
14. Gao S, Jin Y, Unverzag F W, Liang C, Hall K S, Ma F, et al. Correlates of depressive symptoms in rural elderly Chinese. Int J Geriatr Psychiatry. 2009;24:1358–1366.

15. Kessler R C, Birnbaum H G, Shahly V, Bromet E, Hwang I, McLaughlin K A, et al. Age differences in the prevalence and co-morbidity of DSM-IV major depressive episodes: results from the WHO World Mental Health Survey Initiative. Depress Anxiety. 2010;27:351-364.

16. Pan A, Franco O H, Wang Y F, Yu Z J, Ye X W, Lin X. Prevalence and geographic disparity of depressive symptoms among middle-aged and elderly in China. J Affect Disord. 2008;105:167-175.

17. Yunming L, Changsheng C, Haibo T, Wenjun C, Shanhong F, Yan M, et al. Prevalence and risk factors for depression in older people in Xi’an China: a community-based study. Int J Geriatr Psychiatry. 2012;27:31-39.

18. Lorant V, Croux C, Weich S, Deliège D, Mackenbach J, Ansseau M. Depression and socio-economic risk factors: 7-year longitudinal population study. Br J Psychiatry. 2007;190:293-298.

19. Van d V, Bracke P, Levecque K. Gender differences in depression in 23 European countries. Cross-national variation in the gender gap in depression. Soc Sci Med. 2010;71:305-313.

20. Zhou X, Bi B, Zheng L, Li Z, Yang H, Song H, et al. The prevalence and risk factors for depression symptoms in a rural Chinese sample population. PLoS One. 2014;9:e99692.

21. van der Wurff F B, Beekman A T, Dijkshoorn H, Spijker J A, Smits C H, Stek M L, et al. Prevalence and risk-factors for depression in elderly Turkish and Moroccan migrants in the Netherlands. J Affect Disord. 2004;83:33-41.

22. Beals J, Belcourt-Dittloff A, Garrouette E M, Croy C, Jervis L L, Whitesell N R, Manson S
M, et al. Trauma and conditional risk of posttraumatic stress disorder in two American Indian reservation communities. Social Psychiatry and Psychiatric Epidemiology. 2013;48(6):895-905.

23. Roh S, Brown-Rice K A, Lee K H, Lee Y-S, Lawler M J, Martin J I. Stressors, coping resources, and depressive symptoms among rural American Indian older adults. Social Work in Public Health. 2015a;30(4):345-359.

24. Silverstein, Merril, Cong, Zhen Li, Shuzhuo. Intergenerational transfers and living arrangements of older people in rural China: consequences for psychological wellbeing. J. Gerontol. 2006;61:S256-S266.

25. Kohout F J, Berkman L F, Evans D A, Cornoni-Huntley J. Two shorter forms of the CES-D depression symptoms index. Journal of Aging and Health. 1993;5(2):179-193.

26. Feng Q, Zhen Z, Gu D, Wu B, Duncan P W, Purser J L. Trends in ADL and IADL disability in community-dwelling older adults in Shanghai, China, 1998-2008. J. Gerontol. 2013;68: 476-485.

27. Zhang L, Xu Y, Nie H W. Prevalence of depression among Chinese elderly people in 2000-2010: A mate analysis. Chinese Journal of Gerontology. 2011;31(17):3349-3352.

28. Chen J, Zhang L M, Gao L. Depressive symptom and its influence factor in urban old adults in Wuhan. Chinese Journal of Gerontology. 2007;27(3):275-276.

29. Jia L N, Zhuang H L, Wang X Y, Liu F F, Chen B Y, Lin Y J. Depression status of the elderly and its relationship with quality of life in community of Fuzhou city. Chinese Journal of Geriatrics. 2011;30(11):970-973.

30. Yu J, Li J, Cuijpers P, Wu S, Wu Z. Prevalence and correlates of depressive symptoms in Chinese older adults: A population-based study. International Journal of Geriatric Psychiatry. 2012;27(3):305-312.
31. Bonanno G A. Resilience in the face of loss and potential trauma. Current Directions in Psychological Science. 2005;14(3):135–138.

32. Assil S, Zeidan Z. Prevalence of depression and associated factors among elderly Sudanese: a household survey in Khartoum State/Prévalence de la dépression et des acteurs associés chez des Soudanais âgés: enquête auprès des ménages dans l'État de Khartoum. East Mediterr Health J. 2013;19(5):435.

33. Chui P, Chan M. Prevalence of depressive symptoms and associated factors in patients attending a geriatric day hospital. Asian J Gerontol Geriatr. 2006;1(2):73–7.

34. Rashid A, Manan A, Rohana S. Depression among the elderly Malays living in rural Malaysia. Internet J Public Health. 2011;1(2):128–36.

35. Goud A A, Nikhade N S. Prevalence of depression in older adults living in old age home. International Archives of Integrated Medicine. 2015;2(11):1-5.40.

36. Najim H, Omer A A. Sociodemographic and clinical features of patients with depressive disorder in Khartoum. Sudan Psychiatr Danub. 2015;27(1):S240–2.

37. Cole M G, Dendukuri N. Risk factors for depression among elderly community subjects: a systematic review and meta-analysis. Am J Psychiatry. 2003;160(6):1147–56.

38. Bartels M, et al. Exploring the association between well-being and psychopathology in adolescents. Behav Genet. 2013;43:177-90.

39. McEwen B S, Milner T A. Understanding the broad influence of sex hormones and sex differences in the brain. J Neurosci Res. 2017;95:24–39.

40. Chen Y, Hicks A, While A E. Depression and related factors in older people in China: A systematic review. Reviews in Clinical Gerontology. 2012;1(1):1-16.

41. Chong M Y, Tsang H Y, Chen C S, Tang T C, Chen C C, Yeh T L, et al. Community study of depression in old age in Taiwan: Prevalence, life events and socio-demographic
correlates. The British Journal of Psychiatry. 2001;178(1):29–35.

Tables

Table 1 Characteristics distribution among elder population in China

| Variables                        | Sample size | Depressive symptoms with depressive symptoms | Depressive symptoms without depressive symptoms |
|----------------------------------|-------------|-----------------------------------------------|-------------------------------------------------|
|                                  | (n=8177)    |                                              |                                                 |
| Age (years), mean (sd)           | 69.07 (7.47)| 69.53 (7.67)                                  | 68.73 (7.33)                                   |
| Education level                  |             |                                              |                                                 |
| Junior High school and above     | 1670        | 931 (26.29%)                                 | 739 (15.94%)                                   |
| Primary school                   | 2948        | 1408 (39.75%)                                | 1540 (33.23%)                                  |
| Never attended school            | 3559        | 1203 (33.96%)                                | 2356 (50.83%)                                  |
| Gender (%)                       |             |                                              |                                                 |
| Male                             | 4378        | 1800 (50.82%)                                | 2578 (55.62%)                                  |
| Female                           | 3799        | 1742 (49.18%)                                | 2057 (44.38%)                                  |
| Marital status (%)               |             |                                              |                                                 |
| Married                          | 5810        | 2258 (63.75%)                                | 3552 (76.63%)                                  |
| Widowed/divorced/unmarried       | 2367        | 1284 (36.25%)                                | 1083 (23.37%)                                  |
| Ethnicity                        |             |                                              |                                                 |
| Han                              | 7659        | 3291 (92.91%)                                | 4368 (94.24%)                                  |
| Others                           | 518         | 251 (7.09%)                                  | 267 (5.76%)                                    |
| Residence                        |             |                                              |                                                 |
| Rural                            | 2801        | 1487 (41.98%)                                | 1314 (28.35%)                                  |
| Urban                            | 5376        | 2055 (58.02%)                                | 3321 (71.65%)                                  |
| Living arrangement (%)           |             |                                              |                                                 |
| Live with others                 | 7200        | 2972 (83.91%)                                | 4228 (91.22%)                                  |
| Live alone                       | 977         | 570 (16.09%)                                 | 407 (8.78%)                                    |
| Physical disability              |             |                                              |                                                 |
| No function problems             | 7080        | 2799 (79.02%)                                | 4281 (92.36%)                                  |
| One and more functioning         | 1097        | 743 (20.98%)                                 | 354 (7.64%)                                    |
| Chronic diseases (%)             |             |                                              |                                                 |
| Yes                              | 5933        | 2909 (82.13%)                                | 3024 (65.24%)                                  |
| No                               | 2244        | 633 (17.87%)                                 | 1611 (34.76%)                                  |
| Number of life negative events in past 12 months | | | |
| 0                                | 5945        | 2328 (65.73%)                                | 3617 (78.04%)                                  |
| 1                                | 1792        | 925 (26.11%)                                 | 867 (18.70%)                                   |
| ≥2                               | 440         | 289 (8.16%)                                  | 151 (3.26%)                                    |

Table 2. Odds ratio (95% confidence interval) of depressive symptoms risk according to number of life negative events

| Number of life negative events in past 12 months | With DS/ Without DS | DS score, mean (sd) | OR (95% CI)\(^a\) | OR (95% CI)\(^b\) | \(P\text{\_trend}\) |
|-------------------------------------------------|---------------------|---------------------|-------------------|-------------------|------------------|
| 0                                               | 2328/3617           | 4.19 (3.36)         | 1 (reference)     | 1 (reference)     | <0.001           |
| 1                                               | 925/867             | 5.27 (3.74)         | 1.54 (1.38-1.71)  | 1.35 (1.21-1.52)  | <0.001           |
| ≥2                                              | 289/151             | 6.62 (4.16)         | 2.57 (2.08-3.16)  | 2.05 (1.65-2.54)  | <0.001           |

Abbreviations: DS= depressive symptoms; CI = confidence interval; OR = odds ratio.

\(^a\) Adjusted for age, gender, residence area, education level, marital status, ethnicity and living arrangement.
Further adjusted for physical disability and chronic diseases.

Table 3. Odds ratio (95% confidence interval) of depressive symptoms risk according to number of life negative events stratified by selected covariates *

|                          | Number of life negative events in past 12 months | $P_{\text{trend}}$ |
|--------------------------|-------------------------------------------------|---------------------|
|                          | 0                                 | 1                          | $\geq 2$                          |
| Residence area a         |                                                  |                      |                                  |
| Rural                    | 1.00 (reference)                        | 1.22 (1.02-1.46)        | 1.97 (1.46-2.66)                  | <0.001                          |
| Urban                    | 0.70 (0.62-0.79)                       | 1.01 (0.86-1.19)        | 1.46 (1.06-2.01)                  | <0.001                          |
| Gender b                 |                                                  |                      |                                  |
| Male                     | 1.00 (reference)                        | 1.32 (1.14-1.54)        | 1.65 (1.25-2.17)                  | <0.001                          |
| Female                   | 0.96 (0.85-1.07)                       | 1.33 (1.12-1.57)        | 2.71 (1.91-3.85)                  | <0.001                          |
| Marital status c         |                                                  |                      |                                  |
| Married                  | 1.00 (reference)                        | 1.42 (1.24-1.62)        | 1.91 (1.50-2.44)                  | <0.001                          |
| Widowed/divorced/unmarried| 1.46 (1.27-1.67)                       | 1.77 (1.45-2.17)        | 3.84 (2.42-6.11)                  | <0.001                          |
| Living arrangement d     |                                                  |                      |                                  |
| Live with others         | 1.00 (reference)                        | 1.35 (1.19-1.52)        | 2.06 (1.64-2.59)                  | <0.001                          |
| Live alone               | 1.56 (1.30-1.88)                       | 2.21 (1.64-2.98)        | 3.01 (1.62-5.59)                  | 0.008                           |

Abbreviations: CI = confidence interval; OR = odds ratio.

* Adjusted for age, gender, residence area, education level, marital status, ethnicity, living arrangement, physical disability and chronic diseases.

a Models did not include residence area.

b Models did not include gender.

c Models did not include marital status.

d Models did not include living arrangement.