



Research paper

Education as a moderator in the effect of diabetes on depressive symptoms in Chinese middle-aged and older adults: A population-based longitudinal study



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ABSTRACT

Background: Co-morbid diabetes and depression is common; however, little evidence was regarding the effect of education on this association. This study aimed to investigate the role of education in the effect of diabetes on depressive symptoms in China.

Methods: We used data from the China Health and Retirement Longitudinal Study, including 6,921 participants free from depressive symptoms in three waves of cohort study from 2011. We assessed the depressive symptoms based on Center for Epidemiological Studies–Depression scale. We fitted Cox proportional hazards regression models to examine the effect of baseline diabetes on the subsequent depressive symptoms.

Results: Participants with diagnosed diabetes were more likely than their nondiabetic peers to develop depressive symptoms only in 45–64 years group, with a hazard ratio of 1.30 (95% CI: 1.05, 1.61). In addition, the effect of diagnosed diabetes on depressive symptoms only occurred in participants with a diploma of primary school or below.

Limitations: Information was unavailable may offer additional explanatory power.

Conclusion: Our findings suggested that diagnosed diabetes was a chronic stressor in developing depressive symptoms, and that response to this stressor varied by individuals' educational attainment. Action to prevent and treat diabetes may contribute to the fight against depressive symptoms, especially in the lower-education population.

1. Introduction

Depression is the most common mental disorder in middle-aged and older adults (Sun and Liao, 2016). Currently, there were an estimated 350 million people suffering from depression worldwide (Jordan, 2012), and up to 15% of the world's population suffered a major depressive episode during their lifetime (Moussavi et al., 2007). A national survey in the United States reported that the lifetime prevalence of a major depression was 3.6% for adults aged 45–64 years and 1.7% for those aged 65 years and above (Mojtabai and

Olfson, 2004). In China, the lifetime prevalence of a major depression was 3.5% (Lee et al., 2007). By 2020, depression is expected to be the second leading cause of disability; and by 2030, depression will be the leading contributor to the world's disease burden (World Health Organization, 2008). Depression is associated with damaged psychosocial health, impaired everyday functioning and reduced life quality, imposing a high burden on middle-aged and older adults (Sun and Liao, 2016).

Between 9.3% and 23.0% of people with chronic physical diseases also suffered from comorbid depression, with diabetics reporting one of

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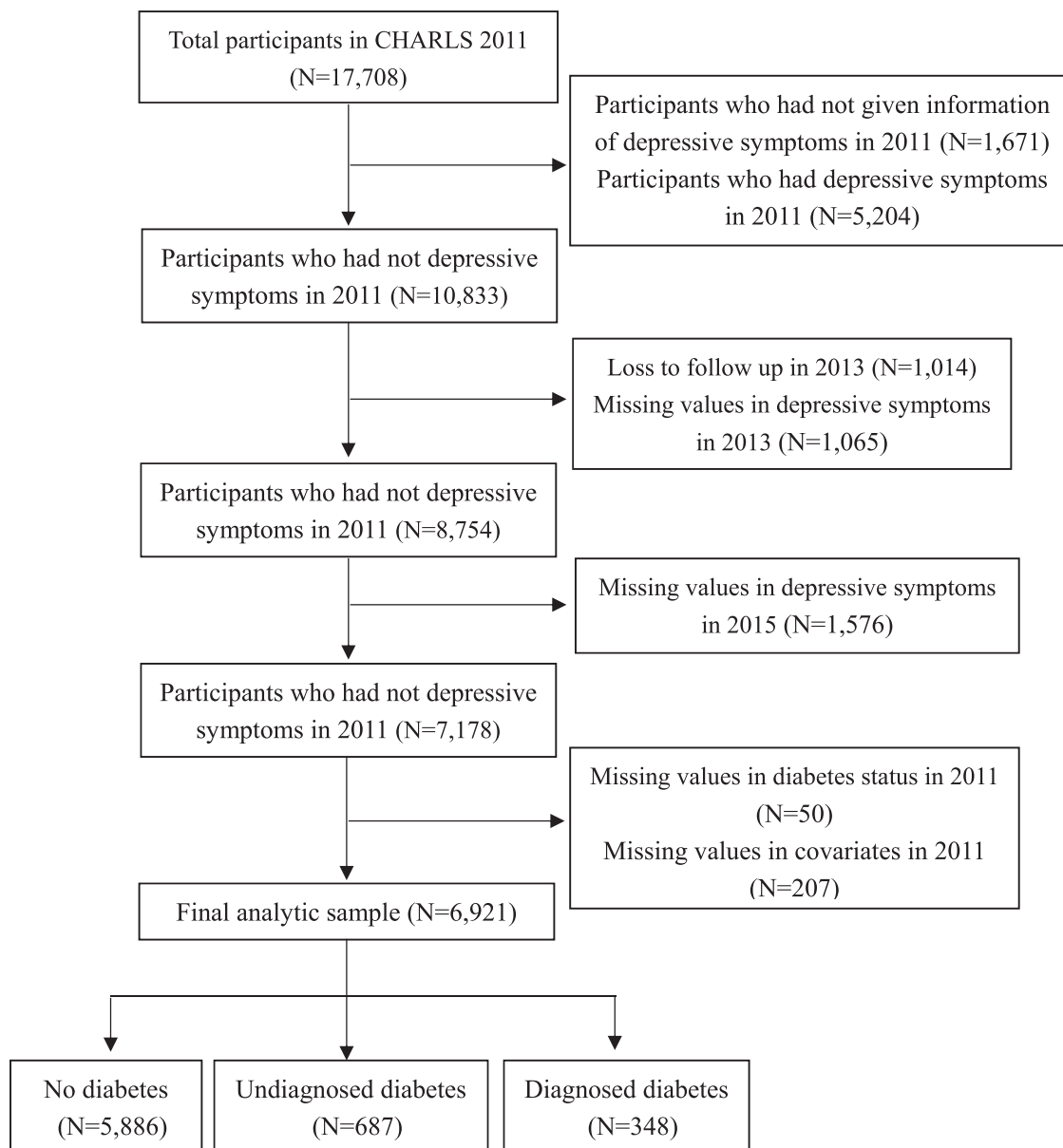


Fig. 1. Flowchart of the study sample of Chinese middle aged and older adults: CHARLS, 2011–2015.

greatest decrements in health linked with comorbidity of depression (Moussavi et al., 2007). Both diabetes and depression are serious chronic conditions and two leading global causes of mortality in middle-aged and older adults (Camus et al., 2004). Diabetes and depression share common psychosocial processes and genetic determinants, including hypothalamic-pituitary-adrenal axis dysregulation, activation of inflammatory responses and effects on functional impairments (Camus et al., 2004; Mezuk et al., 2008). The psychological burden of a chronic condition, stress-related hormonal changes and the role of inflammation have been suggested as mechanism linking diabetes and depression (Golden, 2007). Previous research found that diabetics were almost twice as likely to have depression than those without diabetes (Anderson et al., 2001) and one third of diabetes patients suffered from depression (Lloyd et al., 2010).

Socioeconomic status (SES) moderates the relationship between diabetes and depression (Leone et al., 2012). Lower SES was associated with increased prevalence of comorbid depression in diabetes patients (Kilzieh et al., 2008), with those from less wealthy households or households with fewer assets more likely to suffer depression (Leone et al., 2012). As the common proxy for SES, education allows

individuals' greater knowledge about diseases, understanding of health treatments and coping mechanisms for ill health (Galobardes et al., 2007). Previous evidence has indicated that education played a key role in the association between diabetes and depression (Mezuk et al., 2008; Tellez-Zenteno and Cardiel, 2002), with diabetes patients with lower educational attainment more likely to have depression than those with higher education (Tellez-Zenteno and Cardiel, 2002).

However, previous studies on the association between diabetes and depressive symptoms in China have several limitations. First, a majority of studies were cross-sectional (Wang et al., 2017; Zhang et al., 2015), or used regional data (Zhang et al., 2017). Second, there is little evidence regarding whether education modified the effect of diabetes on depressive symptoms. Therefore, using nationally representative longitudinal data, we investigate whether diabetes had an effect on the development of depressive symptoms and education was a moderator in this effect. This study addresses the limitations in previous Chinese studies on diabetes and depression and contributes to the extant literature on diabetes and depression in developing countries.

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