



## The mediation effect of health literacy between subjective social status and depressive symptoms in patients with heart failure



Huijing Zou, Master student, BM, Yuxia Chen, Master student, BM, Wenjie Fang, Master student, BM, Yanting Zhang, Master student, BSN, Xiuzhen Fan, PhD\*

School of Nursing, Shandong University, Jinan, Shandong Province, PR China

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### ABSTRACT

**Objectives:** Depressive symptoms are prevalent and cause adverse outcomes in heart failure. Previous studies have linked depressive symptoms with socioeconomic status. However, little is known about the mechanisms underlying this relationship. This study aimed to evaluate the association between socioeconomic status and depressive symptoms, and to examine whether access to healthcare, health literacy and social support mediated this relationship in patients with heart failure.

**Methods:** Cross-sectional design was used to study 321 patients with heart failure recruited from a general hospital. Demographics, clinical data, depressive symptoms, socioeconomic status (i.e., education, employment, income, and subjective social status), access to healthcare, health literacy, and social support were collected by patient interview, medical record review or questionnaires. A series of logistic regressions and linear regressions were conducted to examine mediation.

**Results:** The mean age of patients with heart failure was  $63.6 \pm 10.6$  years. Fifty-eight patients (18%) had depressive symptoms. Lower subjective social status ( $OR = 1.321, p = 0.012$ ) and lower health literacy ( $OR = 1.065, p < 0.001$ ) were separately associated with depressive symptoms. When subjective social status and health literacy were entered simultaneously, the relationship between subjective social status and depressive symptoms became non-significant ( $OR = 1.208, p = 0.113$ ), demonstrating mediation. Additionally, lower social support was associated with depressive symptoms ( $OR = 1.062, p = 0.007$ ).

**Conclusions:** In patients with heart failure, health literacy mediated the relationship between subjective social status and depressive symptoms. Lower social support was associated with depressive symptoms. Interventions should take these factors into account.

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### 1. Introduction

Depressive symptoms are common and are associated with poor health status and adverse outcomes in heart failure (HF) [1,2]. The reported prevalence of depressive symptoms among patients with HF ranges from 9% to 60%, which is significantly higher than that in general population [3]. Depressive symptoms have been found to contribute to increased mortality, frequent readmissions, reduced quality of life, and higher healthcare costs in patients with HF [2,4,5]. Moreover, family members caring for HF patients with depressive symptoms reported higher levels of caregiving burden and worse quality of life compared to those caring for HF patients without depressive symptoms [6].

Socioeconomic status (SES) is a complex, multidimensional concept that involves several determinants of health. Common indicators for SES include education, employment relations, income, subjective social

status, and housing characteristics [7]. SES is a powerful independent predictor of HF development and outcomes [7,8]. Patients with HF face significant socioeconomic burdens due to the huge financial expenditure caused by frequent admissions and worse prognosis [9]. Demakakos et al. [10] found that low SES was associated with higher prevalence of and more severe depressive symptoms. Although SES may be a predictor of depressive symptoms in patients with HF, studies on the pathways of this relationship are limited. One hypothesis is that access to healthcare, health literacy or social support may be the potential mediators explaining the association between SES and depressive symptoms in patients with HF.

There are significant disparities in access to healthcare in developed and developing countries [11,12]. In China, access to treatment of chronic conditions is restricted, and the largest contributors include income, education and occupation [12]. Lack of access to healthcare is more common among individuals with lower SES in comparison to those with higher SES [13]. Fang et al. [14] found significant disparities in access to healthcare among patients with hypertension—those with lower SES were more likely to report barriers in access to healthcare.

\* Corresponding author at: School of Nursing, Shandong University, 44 Wenhua Xi Road, Jinan, 250012, PR China.

E-mail address: fxuzhen@sdu.edu.cn (X. Fan).

In addition, access to healthcare has been shown to be critical to encourage patients with depressive symptoms to play an active role in management of their health [15]. Fulop et al. [16] studied 203 patients with HF and found that those with depressive symptoms used more healthcare resources than those without depressive symptoms. Thus, access to healthcare may be a mediator of the relationship between SES and depressive symptoms in patients with HF.

Health literacy is defined as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” [17]. This definition goes beyond the ability to read and understand a text provided by healthcare professionals. Low health literacy can result in poor understanding of the information about HF, and it is associated with poor self-care, increased risk of readmission and mortality, and reduced mental health and quality of life [18–20]. Low SES is associated with low health literacy in patients with HF [7]. Several studies reported that HF patients with low health literacy were less educated and unemployed, and had lower income and subjective social status than those with adequate health literacy [18,19,21]. There is a growing body of literature examining the impact of health literacy on depressive symptoms. One study showed that individuals with low health literacy had a higher risk of developing depressive symptoms, and the level of health literacy was inversely related to the severity of depressive symptoms [22]. Accordingly, health literacy may be one pathway through which SES may affect depressive symptoms; however, evidence is limited in patients with HF.

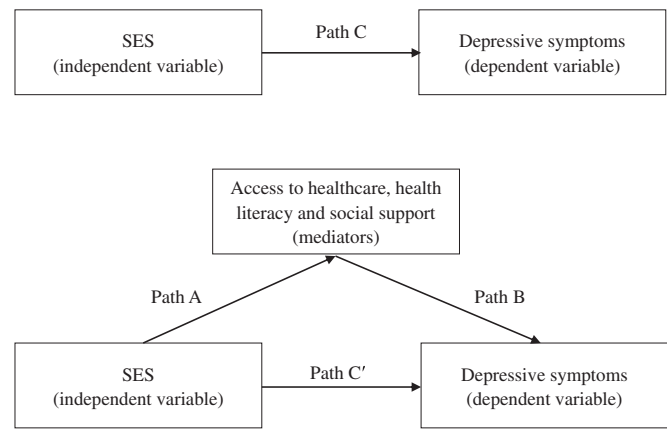
Social support positively impacts coping behaviours and influences overall psychological well-being and quality of life [23]. Lanford et al. [24] described four types of social support, including emotional, instrumental, informational and appraisal support. It can also be described as actual or perceived support [24]. A previous study suggested that social support was generally unequally distributed among socioeconomic classes [25]. Specifically, individuals with lower SES reported lower social support in comparison to those with higher SES [25]. Furthermore, social support has been found to have a positive influence on depressive symptoms in patients with HF [26]. An integrative review of current empirical literature showed that social support had the potential to prevent or reduce depressive symptoms in patients with HF [23]. Therefore, social support may be a contributing factor in explaining the relationship between SES and depressive symptoms in patients with HF.

In order to reduce depressive symptoms in patients with HF, especially among patients with low SES, it is important to understand the underlying factors that may mediate the association between SES and depressive symptoms. It is well known that SES is related to access to healthcare, health literacy and social support; and, in turn, access to healthcare, health literacy and social support are linked with depressive symptoms. Thus, we hypothesised that the association between SES and depressive symptoms may be explained by access to healthcare, health literacy and social support (Fig. 1). The aims of this study were to explore the association between SES and depressive symptoms, and to examine whether this relationship can be explained by the mediation effects of access to healthcare, health literacy and social support in patients with HF.

## 2. Methods

### 2.1. Setting and sample

This is a secondary analysis of a cross-sectional study aimed to identify factors affecting self-care behaviours in patients with HF. All of the patients from the parent study were used in this secondary analysis. Patients were recruited at three cardiovascular units of a large, general university hospital in Shandong, China, from November 2015 to April 2016. Eligible patients were  $\geq 18$  years old with a confirmed diagnosis of HF, and with New York Heart Association (NYHA) class II–IV. Patients were excluded if they were diagnosed with acute HF (i.e., rapid onset or worsening of symptoms and/or signs of HF), had mental or cognitive



**Fig. 1.** Hypothetic mediation model of the relationship between socioeconomic status and depressive symptoms. SES = socioeconomic status. Path A: Test of whether SES is a significant predictor of potential mediators. Path B: Test of whether potential mediators are significant predictors of depressive symptoms. Path C: Test of whether SES is a significant predictor of depressive symptoms. Path C': Test of whether SES and potential mediators together are significant predictors of depressive symptoms.

impairments, had major hearing or visual impairments, or had serious or life-threatening conditions (e.g., greatly advanced HF, renal failure, or malignancy).

### 2.2. Procedures

The study was approved by Medical Ethics Committee of Shandong University. Potential patients were referred by their physicians and nurses. Patient eligibility was assessed by a trained research assistant, who then approached each patient and explained the study. After signing written informed consent, patients completed questionnaires. Meanwhile, demographics (i.e., age, gender, education, income, marital status, residence, and employment) and clinical characteristics (i.e., NYHA class, height, weight, and left ventricular ejection fraction [LVEF]) were collected by patient interview or medical record review. Of 326 eligible patients agreed to participate, 321 completed data for final analysis, and the left 5 were excluded due to missing data on health literacy and depressive symptoms.

### 2.3. Measures

#### 2.3.1. Dependent variable

Depressive symptoms were assessed using the Chinese version of Depression Subscale of Hospital Anxiety and Depression Scale (HADS-D) [27] in patients with HF. The HADS-D consists of seven items and each item is rated on a four-point scale (0–3). The total scores for HADS-D range from 0 to 21, with higher scores indicating higher levels of depressive symptoms. Consistent with previous literature [28], patients who scored  $\geq 8$  were categorised as having depressive symptoms in our study. The HADS-D has good validity and is widely used in patients with HF [29], and the Cronbach's  $\alpha$  varied from 0.67 to 0.90 (mean 0.82) [28]. In this study, the Cronbach's  $\alpha$  was 0.73.

#### 2.3.2. Independent variables

Information on education, employment, and income were collected as objective SES indicators during patient interview, and subjective social status was measured by the Chinese version of MacArthur Scale of Subjective Social Status [30]. It is a pictorial format that uses a symbolic “social ladder” with 10 numbered rungs, and asks respondents to rank themselves within the social hierarchy of their society. Higher scores represent greater subjective social status. The validity and reliability of this instrument has been reported previously, with the Cronbach's  $\alpha$  of 0.81 [31]. In this study, the Cronbach's  $\alpha$  was 0.81.

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