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Frailty and life satisfaction in Shanghai older adults: The roles of age and social vulnerability

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ABSTRACT

Purpose: This study aims to examine the relationship between frailty and life satisfaction and the roles of age and social vulnerability underlying the links in Chinese older adults.
Material and methods: Using a cross-sectional sample of 1970 adults aged 65 and older in 2013 in Shanghai, we employed regression analyses to investigate the interaction between frailty and age on life satisfaction in the whole sample and in different social vulnerability groups. Life satisfaction was measured using a sum score of satisfaction with thirteen domains. Using a cumulative deficit approach, frailty was constructed from fifty-two variables and social vulnerability was derived from thirty-five variables.
Results: Frailty was negatively associated with life satisfaction. The interaction between frailty and age was significant for life satisfaction, such that the negative association between frailty and life satisfaction was stronger among the young-old aged 65–79 than among the old-old aged 80+. Moreover, frailty's stronger association with life satisfaction in the young-old than in the old-old was only found among those in the 2nd and 3rd tertiles of social vulnerability, but not for those in the 1st tertile of social vulnerability.
Conclusions: Relation between frailty and life satisfaction likely weakens with age. A higher level of social vulnerability enlarges the negative impact of frailty on life satisfaction with a greater extent in the young-old.

1. Introduction

1.1. Frailty and life satisfaction

Life satisfaction represents a global evaluation of one's life, and is a very important component of subjective well-being (Diener, Suh, Lucas, & Smith, 1999). Previous research has shown that health factors (e.g., self-rated health and physical health) play a significant role in life satisfaction and subjective well-being in older adults (Cho, Martin, Margrett, Macdonald, & Poon, 2011; Gana et al., 2013; Jonker, Comijs, Knipscheer, & Deeg, 2009). Different from individual health indicators, frailty is a physiological state characterized by decreased physical reserve in multiple systems, which could lead to physiological dysregulation and increased vulnerability to adverse outcomes (Fried et al., 2001; Kulminski et al., 2006; Mitnitski et al., 2001). Among the diverse operationalizations for frailty, frailty index based on the deficit accumulation approach is widely used in the literature (Rockwood & Mitnitski, 2007; Searle, Mitnitski, Gahbauer, Gill, & Rockwood 2008). Research shows that frailty index, incorporating a broader range of psychological, physiological, and functional variables, could serve as a good proxy for biological aging, and significantly predicts a variety of outcomes, such as falls, hospitalization, and mortality (Gu et al., 2009; Kulminski et al., 2006; Rockwood & Mitnitski, 2007; Searle et al., 2008; Shi et al., 2011). However, much less is known about the relationship between frailty and life satisfaction in older adults.

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1.2. Role of age in the relationship between frailty and life satisfaction

Gerontological research suggests that the older adult population is not a homogeneous group, instead there are two phases with differing qualities in late adulthood, namely the third and the fourth ages (Baltes, 1999; Baltes & Smith, 2003; Laslett, 1991). Individuals in their third age (65–79), often referred to as the young-old, are in the post-employment stage, mostly physically and cognitively well functioning and are socially engaged in many activities. However, individuals in their fourth age (80+), or the old-old, often experience chronic conditions and health restrictions, and face increasing limitations to their independence. Despite the heterogeneity in each age group, limitations on activities of daily living (ADL) and instrumental activities of daily living (IADL; Krause & Hayward, 2012), cognitive decline (Salthouse, 2009), and frailty (Gu et al., 2009) increase with age in general. These findings imply that health restrictions or frailty might be more of a normative phenomenon for the old-old than the young-old (Jopp & Rott, 2006).

Even though the old-old experience more health constraints than the young-old in general, the physical/health problems may not necessarily impose a greater threat to their subjective perceptions of life. Research shows that indicators of subjective well-being remain relatively stable with age, despite increasing physical and cognitive functioning decline in late adulthood (Diener et al., 1999). There is plenty of evidence showing that the old-old likely have a better strategy to adapt themselves to the health restrictions than the young-old, thus reducing frailty's negative impact on subjective well-being (e.g., Jopp & Rott, 2006). In addition, as frailty increases with age, it seems to be more acceptable as an "on time" event among the old-old than the young-old, and be less stressful than "off time" frailty that occurs in the young-old (Wrosch & Heckhausen, 2005).

1.3. Role of social vulnerability in frailty * age and life satisfaction

In addition to frailty, numerous social factors also play a significant role in older adults' subjective well-being, such as socioeconomic status, social support, social engagement, and social capital (e.g., Andrew & Keefe, 2014). Different from individual social factor, social vulnerability, referring to the degree to which individuals' overall social circumstances leave them susceptible to adverse outcomes, would offer insights into understanding the complex social situations older adults live in and their health and well-being (Andrew & Keefe, 2014; Armstrong et al., 2015). Social vulnerability could be constructed using a deficit accumulation approach and combining a variety of social factor into a single measure (Andrew & Rockwood, 2010). Research shows that social vulnerability could predict cognitive decline (Andrew & Rockwood, 2010) and mortality (Andrew, Mitnitski, & Rockwood, 2008) in older adults. Moreover, a lower level of social vulnerability, or better social circumstances could enable individuals to better deal with stress (Andrew & Keefe, 2014), like frailty, thus to reduce the negative consequences of frailty.

1.4. The present study

We focused on the older adults in Shanghai in this study. Population aging is a worldwide social phenomenon and China represents the largest elderly population in the world. According to China National Bureau of Statistics, the population aged 65 and above accounts for 10.1% of the total population by 2014 (National Bureau of Statistics, China, 2015). Among the cities, Shanghai has the nation's largest proportion of older adults, and the percentage of its elderly population (65+) has reached 18.8% by 2014 (Shanghai Research Center on Aging, 2015), which is almost twice higher than that of the whole nation. In this sense, Shanghai becomes an ideal place to examine older adults' life satisfaction and its correlates.

Despite that frailty is a prevalent phenomenon in older adults, it is largely unknown about the relationship between frailty and life satisfaction and whether such a relationship remains consistent across different age groups and social vulnerability groups. To address the gap in the literature, we aim to examine the relationship between frailty and life satisfaction, and to explore the role of age and social vulnerability underlying the relationship in a representative sample of older adults in Shanghai, China.

2. Material and methods

2.1. Participants

We used the 2013 Survey of the Shanghai Elderly Life and Opinion, which was conducted by the Shanghai Research Center on Aging (SRCA). The survey utilized a stratified, multistage random sampling design to reflect the age, gender, and rural/urban structure of the local elderly population (see Feng et al., 2013; for detailed information about the survey). Five districts in the urban areas (e.g., Huangpu District) and five districts in the suburban and rural areas (e.g., Minhang District) were randomly selected first. Then four representative street residential committees in each selected urban district and three street residential/rural residential committees in each selected suburban or rural area were selected, with a total of 35 street residential/rural residential committees included in the survey. Based on the roster of the residents by age and gender of each selected site provided by the local residential committee, a stratified random sample was selected. One hundred people in each selected street residential/rural residential committees were randomly selected and 3500 participants participated in the survey. The eligible participants for the survey were those aged 50 or older with local household registrations at the time of the interview. Respondents were reached via the stress residential/rural committees with informed consent. The final valid sample size was 3418 with a response rate of 98%. All information was obtained via in-home interviews using questionnaires by trained research assistants. Our current study focused on respondents aged 65 and above with a sample of $N = 1970$.

2.2. Measures

2.2.1. Life satisfaction

The life satisfaction was assessed by 13 items on participants' subjective ratings. Sample items included "How satisfied are you with your health status?" and "How satisfied are you with your family relationships?" Each item was rated on a 5-point Likert scale ranging from 1 = *extremely satisfied* to 5 = *extremely unsatisfied*. Each item was reversely coded and then all the items were added up, such that the composite scores, ranging from 13 to 65, represent participants' life satisfaction, with higher score denoting a higher level of life satisfaction. The reliability of the scale in this study was Cronbach's $\alpha = 0.88$, which is above the threshold of 0.70 for group comparisons and close to the threshold of 0.9 for individual comparison as suggested by previous studies (Nunnally, 1994).

2.2.2. Frailty index

Previous studies often use multiple variables in various dimensions to capture one's cumulative health deficits (Gu et al., 2009; Rockwood, Andrew, & Mitnitski, 2007; Searle et al., 2008). Research using this approach does not necessarily include