

Prevalence and related factors of successful aging among Chinese rural elders living in nursing homes

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Abstract Few studies focus on the prevalence and related factors of successful aging (SA) among Chinese rural elders living in nursing homes. This study aims to make an operational definition of successful aging, estimate the prevalence of SA, and identify factors related to SA among Chinese rural elders living in nursing homes. Data for this cross-sectional study were collected by face-to-face interviews in five rural public nursing homes. A total of 205 elders aged 60 years and above were asked to answer a series of questions. Descriptive analysis, independent sample *t* tests, χ^2 tests, and multivariate logistic regression were used to show the prevalence and related factors of SA. The prevalence of SA in this population is 17.6% based on a multidimensional construct composed of: few chronic diseases, good cognitive and physical functioning, good mental health, and active social engagement. The logistic regression results indicate that successful agers are more likely to be younger, married, resilient, and better off economically, whereas gender, education, and social support are not related to SA independently. This model accounts for 45.8% of the variance in SA. These results

suggest some tentative recommendations for elders, relevant decision-makers or employees in nursing homes, and administrative bodies. More rigorous longitudinal design is necessary to investigate the causality of the related factors and SA.

Keywords Successful aging · The Chinese rural elders · Nursing homes · Related factors

Introduction

Population aging is a global phenomenon, which may impact health care and economy (Weir et al. 2010). China had 212 million aged people at the end of 2014, the largest aged population in a single country in the world (China 2015). China is also the fastest-aging society. The United Nations predicted that China would have a population of 358 million citizens aged 60 years or older, representing more than 25.3% of the national population by 2030 (United Nations 2015).

In Chinese rural areas, the percentage of the aging population is increasing faster than that in urban areas due to the declining fertility rates (Cai 2012) and the exodus of the young (Wang 2015). Compared with elders in urban areas, the rural population is characterized by older age, lower literacy, and lower income (Yu et al. 2012). With poorer living conditions, rural elders have less access to affordable health care (Qu et al. 2012). They are faced with poorer health status, lower levels of quality of life, and more common and serious mental health problems (Dong and Simon 2010; Tian et al. 2015). However, the studies on aging in China are largely based on urban areas, and studies about rural aging are less represented. This study will focus on the Chinese rural elders.

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In rural China, the traditional system of family support for elders is weakening because of the declining family size with typical 4-2-1 structure (four grandparents, two parents, and one child) as a result of the one-child policy from 1979 (Qu et al. 2012; Zhang and Goza 2006). Furthermore, rapid industrialization and urbanization attract an increasing number of the young to urban areas for job opportunities and higher income (Wu et al. 2008). A growing number of elders, frail and with no relative to provide care, have to enter nursing homes (Gan et al. 2015). In consideration of affordability for living and care, most rural elders choose to live in state-run welfare nursing homes where the government provides subsidy for the sustenance of elders. These nursing homes provide elders with five basic necessities: food, housing, clothing, medical care, and funeral service (Wu et al. 2008). Studies on residents in nursing homes revealed more common psychological problems, like depression and a sense of loneliness, because of the lack of family support (Underwood et al. 2013; Gan et al. 2015). Therefore, the population of Chinese rural elders living in nursing homes is vulnerable. To the best of our knowledge, however, there has been no study specifically on the aging process of and relevant care mechanism for this population. Thus, we will focus on the Chinese rural elders in nursing homes in order to optimize their aging process and improve their well-being.

Influenced by the development of positive psychology in gerontology, researchers put forward a notion of “successful aging (SA),” a concept that emphasizes elders’ potentials and strengths, instead of their diseases and debilities, to cope with the challenge of aging. SA is universally considered as a highly desirable process and is related to life satisfaction, quality of life (Cheung and Wu 2012), and reducing depressive symptoms (Evans 2009). Gerontologists and other researchers interested in eldercare services pay more attention to SA because it considers not only longevity, or no debility, in addition to various states of well-being with multiple determinants (Jeste et al. 2013; Moore et al. 2015). A study on SA is an ideal choice for researchers to learn about the characteristics of aging among Chinese rural elders living in nursing homes.

In spite of the adequate literature on SA, a consistent definition of the concept has not been established. An early study conducted by Havighurst considered SA as an issue of subjective quality of life (Havighurst 1958). Rowe and Kahn (1997) developed a multidimensional concept which consisted of a low probability of disease and disease-related disability, maintenance or strengthening of cognitive and physical functioning, and active engagement with life. Pruchno et al. (2010) proposed a conceptual two-factor model of SA including objective and subjective

components. In a comprehensive review, Depp and Jeste (2006) identified 28 studies with 29 different definitions. The reported prevalence of SA ranged widely from 0.4 to 95% due to the different definitions, sampling, and measurement (Depp and Jeste 2006). There is no consensus about which components are necessary for SA or whether SA should be measured objectively by researchers or subjectively by elders. The concept of SA as defined by Rowe and Kahn has been frequently used (Depp and Jeste 2006; Feng et al. 2015a, b), such as studies among older Malaysians (Hamid et al. 2012), Canadians (Meng and D’Arcy 2014), and Chinese (Feng et al. 2015a, b; Zhang and Li 2015).

However, there are some criticisms of Rowe and Kahn’s model (Martinson and Berridge 2015). Firstly, the criterion “no disability or disease” is too narrow to be used. It overly addresses the physiological aspects of aging, which cause ageism against elders with illness (Calasanti 2015). This model also emphasizes the individual’s ability to age successfully, ignoring the influence of economy, culture, and larger social structural constraints on developmental trajectories (Riley 1998), like the health disparity due to socioeconomic differences (Ferraro and Shippee 2009). As the basic service provision in rural China is inadequate, access to health care is limited for elders. Therefore, it is unrealistic to encourage the nursing home residents in rural China to achieve the “no disability or disease” criterion of SA.

Secondly, the subjective definition from elders is neglected. Some studies reported the significant difference between older adults’ understanding of SA and Rowe and Kahn’s model (Phelan et al. 2004; Strawbridge et al. 2002). Moreover, older adults perceived SA as a multidimensional concept composed of physical, functional, psychological, and social health (Phelan et al. 2004). Influenced by the Taoism whose essential philosophy is complementarity, balance, and harmony, Chinese people think highly of the simultaneous development of physical and psychological health. We therefore added mental health into the primary model which made the definition of SA more accordant with the bio-psycho-social model (Engel 1977) and the elders’ own definition of SA.

When research on SA is carried out in China, oriental social and cultural contexts have to be taken into consideration and more adjustments to Rowe and Kahn’s model should be made. As such, this study operationalized SA as a multidimensional construct composed of (a) few chronic diseases, (b) good cognitive and physical functioning, (c) good mental health, and (d) active social engagement. We hope this definition could be applicable to more Chinese rural elders living in nursing homes.

How to promote SA has become an issue of national concern, and a large number of studies examine the predictors or correlates of SA. Previous studies have demonstrated that some sociodemographic characteristics were significantly related to SA; however, specific results varied across studies in different populations. It was generally reported that older age was related to lower SA (Depp and Jeste 2006; Hamid et al. 2012; Han and Yun 2015; Meng and D'Arcy 2014; Ng et al. 2009; Roos and Havens 1991). Some Western studies showed women and married elders were more likely to age successfully (Cheung and Wu 2012; Tovel and Carmel 2014). Conversely, others demonstrated that neither gender nor marital status was linked to SA (Hamid et al. 2012; Hodge et al. 2013). The studies among Chinese elders in Hong Kong (Cheung and Wu 2012; Chou and Chi 2002) and Shanghai (Li et al. 2006) have identified age, gender, marital status, education, and financial condition as key predictors of SA. Therefore, the relationship between sociodemographic variables and SA among Chinese elders living in nursing homes needs to be further elaborated. This study supposed that age, gender, marital status, education, and economic status were related to SA.

Psychological factors were also identified as related factors of SA, such as resilience and social support. Resilience is defined as the capacity to spring back from stressful and traumatic events (Campbell-Sills and Stein 2007; Resnick et al. 2015; Scali et al. 2012). Resilient elders have a lower likelihood to succumb to illness and tend to maintain more stable levels of physical, cognitive, and psychological functioning when exposed to negative events (including poverty, death of family member, disability, and chronic diseases) (Fontes and Neri 2015; Resnick et al. 2015). Social support, as the material and psychological resources provided by family and others (Blumenthal et al. 1987), may reduce mental distress and enhance emotional function by promoting more effective coping strategies and by reducing feelings of loneliness and isolation (Brown et al. 2009; Moonesar et al. 2016). Western studies have documented that resilience and social support are associated with SA (Jeste et al. 2013; Moore et al. 2015; Romo et al. 2013; Tovel and Carmel 2014), while the association is unclear among Chinese older adults because of inadequate research. Therefore, it is of great interest to explore whether resilience and social support are related to SA among Chinese rural elders living in nursing homes. We considered that both resilience and social support were associated with SA.

To summarize, the objectives of this article were (1) to make an operational definition of SA, (2) to estimate the prevalence of SA, and (3) to identify factors independently related to SA among Chinese rural elders living in nursing homes.

Methods

Participates and procedures

A sample was collected in July 2015 in Xintai County, a rural area of northern China, for this cross-sectional study. Xintai is a medium-sized county, and its economy is at the medium in China. The characteristics of Xintai County could largely reflect the general situation of rural China. During our study, not all the public nursing homes agreed to accept our interviews. Considering our human and material resources, a convenience sample of five nursing homes, which accounted for more than 60% of the total number of public nursing homes in Xintai County, was selected. A total of 218 older adults, aged 60 years and above, from these local public nursing homes were asked to participate in our study. All the eligible elders in these five institutions were approached. Discounting those who refused the interview ($n = 12$) and those who did not complete the interview ($n = 1$), 205 elders were enrolled. This research was approved by the Human Research Protections Program of Shandong University. Each participant signed an informed consent before the face-to-face interviews. The data collection was performed in quiet and private surrounding by trained investigators who mastered all the scales and communication skills.

Dependent variables

This study operationalized successful aging as a multidimensional construct based on Rowe and Kahn's model and the particular circumstances within the public nursing homes in rural China:

Few chronic diseases

In this institutional sample, the morbidity of chronic disease reached up to 92.2%. We broadened the range of this criterion and classified elders with no more than two chronic diseases as successful elders meeting the first criterion. Chronic diseases considered in this operational definition included chronic lung disease, diabetes, chronic liver disease, chronic gastritis, coronary heart disease, hypertension, stroke, arthritis, osteoporosis, and prostate hyperplasia. All the information was from registers of the nursing homes.

Good cognitive and physical functioning

The Chinese version of the Mini Mental State Examination (MMSE) (Katzman et al. 1988) and Activities of Daily Living (ADL) (Chen et al. 1995) were used to evaluate participants' cognitive and physical function, respectively.

The total scores of MMSE range from 0 to 30, with higher scores indicating greater cognitive function. Various cutoff points have been advocated in different populations. MMSE < 24 was used commonly to indicate cognitive impairment in the aged (Woodford and George 2007). The Chinese version of MMSE has good validity and reliability (Katzman et al. 1988), and Cronbach's α was 0.75 in this study. The ADL scale is composed of a Physical Activities of Daily Living Scale (PADL) and an Instrumental Activities of Daily Living Scale (IADL). The former includes six items to evaluate whether the respondent needs help in performing daily activities including bathing, dressing, indoor transferring, toileting, eating, and continence. The latter was used to measure the abilities of visiting neighbors, shopping, cooking, doing laundry, walking 1 km, lifting five kilograms, and using public transportation. Choices for each item were graded "1 = can do it myself," "2 = have some difficulty doing," "3 = need help to do it," and "4 = cannot do it at all." For each item, a score of 1 or 2 was classified as "independent" functioning in the activity of daily living. Cronbach's α of ADL was 0.94 in this study.

The condition that MMSE was measured at ≥ 24 and the score for each item of ADL at ≤ 2 was considered as good cognitive and physical functioning. Participants in the SA group should have good cognitive and physical function.

Good mental health

The presence of psychological disorder was first measured by the question "Do you have a diagnosed mental problem?" A formal scale was also used to assess the mental health of elders. We chose Hospital Anxiety and Depression Scale (HADS) (Leung et al. 1993) to investigate the mental state of the participants due to the special institutional circumstance and the high morbidity. Prior studies found that HADS had moderate to high inner consistency and good test–retest reliability in older adult populations (Da Canhota and Piterman 2001), and its Cronbach's α was 0.891 in this study. The HADS is a 14-item scale with seven items measuring anxiety (HADS-A) and seven measuring depression (HADS-D). Examples of items are: "I get a sort of frightened feeling as if something awful is about to happen," "I feel restless as I have to be on the move," and "I have lost interest in my appearance." Each question is scored on a four-point Likert scale, ranging from 0 to 3. For the HADS-A or the HADS-D, a score between 0 and 7 does not indicate the presence of relevant anxiety or depression (Barczak et al. 1988). Therefore, respondents who reported no diagnosed mental problem and no anxiety and depression showed good mental health.

Active social engagement

The older adults were asked to report their social activities during the last months. Possible answers included voluntary service, family parties, gathering with friends, collective activities organized by the nursing home, playing chess or cards, and going to the school for the aged. The number of social activities was used to assess whether the participation was active in social engagement. Those who reported less than two activities were regarded as not satisfying the fourth criteria for SA.

The participants with few chronic diseases, good cognitive and physical functioning, good mental health, and active social engagement were classified as successful elders.

Independent variables

Independent variables in this study included sociodemographic factors (age, gender, marital status, education, and economic status) and psychological factors (perceived social support and resilience). Among sociodemographic factors, economic status was measured by the question "Compared with the other residents in your nursing home, how do you feel about your financial status?" Responses were recorded ranging from 1 (good) to 3 (bad). Elders in this study do not have a certain monthly income, so it is unrealistic to assess their economic status by objective amount of money. In rural China, the education was extremely limited and most rural elders were not educated. Considering this particular national condition, the participants were asked "Have you been educated?" and divided into illiterate and literate groups.

The 12-item Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet et al. 1990) was used to evaluate participants' satisfaction with the quantity and quality of support from their family (e.g., "My family really tries to help me"), friends (e.g., "I can count on my friends when things go wrong"), and significant others (e.g., "There is a special person in my life who cares about my feelings"). This scale is a seven-point Likert scale, ranging from 12 to 84. Higher scores indicate higher support. In this study, the Cronbach's α was 0.88.

Connor–Davidson Resilience Scale-10 item (CD-RISC-10) (Campbell-Sills and Stein 2007) was used to measure the resilience of elders, namely their capacity to spring back from negative events. Item's examples were as follows: "Able to adapt to change," "Tend to bounce back after illness or hardship," and "Can stay focused under pressure." This scale is a five-point Likert scale (0 = never, 1 = rarely, 2 = sometimes, 3 = usually, and 4 = always), and the total score ranges from 0 to 40. Higher scores are reflective of higher resilience. The CD-RISC-10 showed high internal consistency in this study (Cronbach's $\alpha = 0.97$).

Data analysis

All analyses were carried out using SPSS 17.0. Descriptive analysis was used to represent characteristics of participants and the prevalence of SA. Continuous variables (age, resilience, and perceived social support) were expressed as mean \pm standard deviation (SD), and categorical variables (gender, marital status, education, and subjective economic status) were expressed with number and percentage. Then independent sample *t* tests and χ^2 tests were conducted to explore factors related to SA. Finally, the hierarchical logistic regression was used to identify factors which predicted SA. In the first step, sociodemographic variables were included in the model. In order to provide the correlation of age and SA, we also conducted an additional logistic regression for the percentage of variance explained by age alone, as age is usually a strong predictor of SA. In the second step, the psychological factors were included. All the continuous variables were standardized before regression. Results were indicated by beta-coefficients, odds ratio (OR), and 95% confidence interval (CI). Nagelkerke R^2 , an approximation of explained variance, was also shown. In order to identify the interrelation of variables, a series of logistic regression analyses were used. The level of statistical significance tests was set at $P < 0.05$.

Results

Characteristics of participants

In this study, the average age of the 205 elders was 77.31 ± 7.86 . Most participants were women, unmarried, uneducated, and fair in subjective economic status. The average scores of MSPSS and CD-RISC-10 were 50.69 ± 11.56 and 26.40 ± 9.74 , respectively. These characteristics are shown in Table 1.

Prevalence of successful aging

As presented in Table 2, 59.5% of the respondents had fewer than three chronic diseases, and 28.8% of them functioned well both cognitively and physically. 71.2% of elders had good mental health. More than half (59.0%) of the participants were active in social engagement. According to our operational definition, 36(17.6%) respondents were successful in aging.

Factors related to successful aging

Table 3 summarizes the results of all possible correlations between the independent variables and SA. Significant

differences in successful aging were found for age ($t = -4.939$, $P < 0.001$), perceived social support ($t = 6.077$, $P < 0.001$), and resilience ($t = 6.919$, $P < 0.001$). Furthermore, the married respondents were more likely to experience successful aging than the unmarried (36.1 vs. 9.7%). A difference was also observed in the uneducated elders compared to the educated ($\chi^2 = 4.296$, $P = 0.049$). Good subjective economic status was also a significant factor associated with successful aging ($\chi^2 = 12.246$, $P = 0.002$). However, we did not find a gender difference in this study ($\chi^2 = 1.838$, $P = 0.200$).

Hierarchical logistic regression model for successful aging

The final hierarchical logistic regression model for SA among these participants is shown in Table 4. In the first step, age, marital status, and subjective economic status accounted for about 36.4% of the variance in SA. Our additional regression for SA showed that the percentage

Table 1 Characteristics of participants ($N = 205$)

Variables (theoretical ranges)	<i>n</i> / <i>M</i>	%/ <i>SD</i>
Age (60–94)	77.31	7.86
<i>Gender</i>		
Male	95	46.3
Female	110	53.7
<i>Marital status</i>		
Married	61	29.8
Unmarried	144	70.2
<i>Education</i>		
Illiterate	158	77.1
Literate	47	22.9
<i>Subjective economic status</i>		
Good	71	34.6
Fair	85	41.5
Poor	49	23.9
Perceived social support (12–84)	50.69	11.56
Resilience (0–40)	26.40	9.74

M mean, *SD* standard deviation

Table 2 Percentage of participants meeting the criteria of successful aging

Criteria	<i>n</i>	%
Few chronic diseases	122	59.5
Good cognitive and physical functioning	59	28.8
Good mental health	146	71.2
Active social engagement	121	59.0
Successful aging	36	17.6

Table 3 Factors related to successful aging

Variables	<i>n</i> (%) or <i>M</i> ± <i>SD</i>		<i>t</i> / χ^2	<i>P</i>
	NSA	SA		
Age	78.50 ± 7.42	71.75 ± 7.58	−4.939	<0.001
<i>Gender</i>			1.838	0.200
Male	82 (86.3%)	13 (13.7%)		
Female	87 (79.1%)	23 (20.9%)		
<i>Marital status</i>			20.540	<0.001
Married	39 (63.9%)	22 (36.1%)		
Unmarried	130 (90.3%)	14 (9.7%)		
<i>Education</i>			4.296	0.049
Literate	34 (72.3%)	13 (27.7%)		
Illiterate	135 (85.4%)	23(14.6%)		
<i>Subjective economic status</i>			12.246	0.002
Good	58 (81.7%)	13 (18.3%)		
Fair	63 (74.1%)	22 (25.9%)		
Poor	48 (98.0%)	1 (2.0%)		
Perceived social support	49.30 ± 12.05	57.19 ± 5.46	6.077	<0.001
Resilience	24.98 ± 9.88	33.06 ± 5.32	6.919	<0.001

NSA unsuccessful aging, SA successful aging, *M* mean, *SD* standard deviation

Table 4 Hierarchical logistic regression model for successful aging

Variables	Step 1			Step 2		
	β	OR	95% CI for OR	β	OR	95% CI for OR
Age	−0.978***	0.376***	[0.232, 0.609]	−0.865**	0.421**	[0.254, 0.698]
<i>Marital status (ref. married)</i>						
Unmarried	−1.143*	0.319*	[0.125,0.816]	−1.095*	0.335*	[0.124, 0.903]
<i>Education (ref. illiterate)</i>						
Literate	0.806	2.239	[0.888, 5.648]	0.567	1.764	[0.661, 4.704]
<i>Economic status (ref. poor)</i>						
Fair	2.122	8.346	[0.864, 80.632]	1.223	3.396	[0.320, 36.032]
Good	2.761*	15.815*	[1.864, 135.467]	2.269*	9.666*	[1.046, 89.311]
Perceived social support				0.676	1.967	[0.816, 4.739]
Resilience				0.944*	2.570*	[1.224, 5.394]
Nagelkerke R^2	0.364			0.458		

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$

of variance explained by age alone was 17.2%. The Nagelkerke R^2 rose to 0.458 after perceived social support and resilience were included in the second step. According to the final model, the likelihood of successful aging declined with age (OR = 0.421, $P = 0.001$). The married elders were more likely to be successful than the unmarried persons (OR = 0.335, $P = 0.031$). The respondents with good subjective economic status experienced a significantly higher likelihood of SA than those with poor subjective economic status (OR = 9.666, $P = 0.046$). Resilience was a protective factor of SA (OR = 2.570, $P = 0.013$). Unexpectedly, education and

social support were not independent factors associated with SA in this study.

The results showed that social support was not associated with SA in the multivariable model; however, it did show a bivariate association. Thus, a series of logistic regressions, starting from the bivariate model of social support and SA, were conducted to identify the confounding effects of other independent variables by adding them, respectively. The results showed that the OR and P value changed when resilience was added. Thus, resilience was the confounding variable which contributed to the association of social support and SA.

Discussion

According to our four-dimensional model, the prevalence of SA among Chinese rural elders living in nursing homes was 17.6%. However, it is inappropriate to compare the prevalence in this study with that in other studies, because of the cross-cultural differences. The differences in sampling, measurement and cutoffs also resulted in diverse estimates. Li and his colleagues found that 46% of Shanghai elders were successful agers who had no physical disabilities, minimal impairments in ADLs, good cognitive functioning, and good mood self-evaluation (Li et al. 2006). In a Malaysian sample, 14% of the elders were classified as successful agers on the basis of no physical functioning difficulty, absence of major chronic diseases, and maintenance of good psychocognitive functioning (Hamid et al. 2012). It was therefore hard to know how low or high the prevalence of 17.6% in this study is as compared to those in other studies.

The prevalence of 17.6% indicated that less than one-fifth of rural elders living in nursing homes were aging successfully. One of the possible reasons that the prevalence of SA was low might be related to the features of rural circumstances. In rural areas, the slower economic development and poor access to medical facilities and services exert a negative influence on the efficient communication of health information and the effective use of medical resources (Feng et al. 2015a, b). Apart from these objective disadvantages, a considerable proportion of rural residents have unhealthy habits such as sharing cutlery and drinking unboiled water. In addition, Chinese rural elders are so traditional that they may feel ashamed to be ill, especially when their treatment poses a financial burden to their caregivers and/or their family (Li et al. 2015). There is a well-known Chinese idiom “*hui ji ji yi*,” which means patients are reluctant to acknowledge illness or to accept treatments since illness is commonly regarded as a cultural taboo. As a result, people may have avoided medical examination or concealed their illness for fear of criticism, painful treatment, and death. In most cases, this caused the aggravation of the problem, the decline of physical functioning, and even death (Jing et al. 2014). To avoid an overestimation of the proportion of SA caused by the reluctance to acknowledge illness, our information on chronic diseases was derived from nursing home records.

Our multivariate logistic regression analysis showed that those who were younger, married, and having a higher subjective economic status were more likely to be successful agers. There is a consensus that the likelihood of successful aging declined with age (Dahany et al. 2014; Hodge et al. 2013; Meng and D’Arcy 2014). The explanation is that older adults tend to decline in health and

function and to suffer the increasing burden of disease. Better financial status, as one of the relevant factors of SA, was also reported in another study, indicating that it enabled the elders to have better access to medical facilities and services (Feng et al. 2015a, b; Hamid et al. 2012). Good perceived economic status was also related to freedom from economic stress which was significantly associated with health (Thoits 2010; Yeung and Xu 2012). Furthermore, having a good economic status may boost the elders’ self-esteem (Xie et al. 2011), which in turn may positively influence SA as a psychological factor (Dahany et al. 2014; de Moraes and de Azevedo E Souza 2005). In this study, being married was also related to SA, which was in line with a prior study showing that elders who were currently married reported higher SA scores (Bowling and Iliffe 2006). The previous literature also indicated that widowed elders may have lower satisfaction with their aging (Ng et al. 2009; Pruchno et al. 2010).

In terms of psychological correlates, we found that good resilience was a protective factor of SA among the rural elders living in nursing homes. Defined as the ability to rehabilitate from challenges in life, resilience helped some older adults to cope with the decline in health and negative events in their lives. It was included in many models of well-being among the elders and its impact on the relationship between health and SA had been supported by earlier evidence (Moore et al. 2015; Tovel and Carmel 2014). In this paper, resilience of the elders was at low intermediate level in comparison with a previous research (Jeste et al. 2013). It also contributed to the undesirable prevalence of SA among Chinese rural elders living in nursing homes.

Although the present study indicated some factors related to SA, it showed no evidence that gender and education were associated with SA. The findings on the relationship between gender and SA are consistent (Li et al. 2006; Chou and Chi 2002; Ng et al. 2009). The result in this paper was consistent with previous studies (Feng et al. 2015a, b; Meng and D’Arcy 2014), showing no gender differences in SA. The present result about the absence of association between education and SA was in line with some previous studies (Depp and Jeste 2006; Hodge et al. 2013; Meng and D’Arcy 2014), but not with those which reported educational level was linked to SA (Chou and Chi 2002; Hamid et al. 2012). Further research is needed to expound on the relationship between sex, education, and SA in cross-cultural contexts.

The absence of an association between social support and SA in the present study was contrary to the results of other studies which indicated social support had a positive impact on SA (Evans 2009; Han and Yun 2015; Tovel and Carmel 2014). The differing results might be caused

by differences between cultures and populations. In Asia, support from family played an important role, but it was less significant in Western cultures (Dahany et al. 2014). Compared to the elders in communities, the Chinese elders living in rural nursing homes received less support from their adult children due to the absence of traditional coresidence with them (Karasawa et al. 2011). In addition, further statistical analysis showed that resilience influenced the association of social support and SA. Therefore, after accounting for the confounding effect of resilience, social support was not independently associated with SA.

SA is a challenge for the elders involved, nursing homes, and relevant administrative bodies. Based on these results, we propose several measures to improve SA among Chinese elders living in nursing homes. For the elders, it is essential to maintain good cognitive and physical functioning by preventing and managing age-related diseases. In this study, the proportion of elders with one or more chronic diseases (92.2%) and the proportion of elders with good cognitive and physical functioning (28.8%) are undesirable. For nursing homes, it is necessary to pay close attention to the elders' physical needs and their psychological health as well. Health education should be improved to increase the elders' knowledge of care and to strengthen their awareness of self-care (Qu et al. 2012). Based on the finding that resilience (a modifiable factor) is independently related to SA, fostering resilience may be an effective measure to enhance SA. Finally, the relevant administrative bodies should take a leading role in promoting SA. Effective policies should be initiated such as increasing the funding for eldercare services and assigning medical staff to rural nursing homes. These aforementioned measures are tentative recommendations and need to be examined by further longitudinal studies.

This study has firstly provided a profile of SA among Chinese rural elders living in nursing homes; however, several limitations must be noted. (1) This study has a cross-sectional design, and no causality can be inferred. (2) The study used a small sample from Xintai County. Different rural regions may show different factors related to SA (Lin et al. 2016). So results in this study, if generalized to cover all the Chinese rural elders living in nursing homes, should be treated with caution, and further studies should include random sampling and more eligible participants. (3) Economic status was not measured objectively, which may be different from actual financial resources. (4) This study uses specific cutoffs among our particular sample, which causes some difficulty for researchers to compare the prevalence of SA in other studies. Nevertheless, this is a general problem in the literature on SA.

Conclusions

This study provides the first profile on successful aging among Chinese rural elders living in nursing homes. The prevalence of SA in this population is 17.6% based on a multidimensional construct composed of (a) few chronic diseases, (b) good cognitive and physical functioning, (c) good mental health, and (d) active social engagement. The logistic regression results indicate that successful agers are more likely to be younger, married, resilient, and better off economically, whereas gender, education, and social support are not independently related to SA. This model accounts for 45.8% of the variance in SA. These results suggest some tentative recommendations for the elders, nursing homes, and the administrative bodies. More rigorous longitudinal design is necessary to investigate the causality of the related factors and SA.

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