Geriatric Nursing 40 (2019) 457–462

Contents lists available at ScienceDirect

Geriatric Nursing

journal homepage: www.gnjournal.com

Feature Article

Predictors of self-neglect among community-dwelling older adults living alone in China

Mingming Yu[a], Libin Gu[b,*], Wenjuan Jiao[b], Haozhi Xia[a], Wenru Wang[c]

[a] School of Nursing, Peking University, Beijing, PR China
[b] School of Nursing, Nanjing University of Chinese Medicine, Nanjing, PR China
[c] Alice Lee Centre for Nursing Studies, Yong Loo Lin School of Medicine, National University of Singapore, Singapore

ARTICLE INFO

Article history:
Received 19 December 2018
Received in revised form 1 February 2019
Accepted 8 February 2019
Available online 7 March 2019

Keywords:
Self-neglect
Older adults
Cross-sectional study
Chinese

ABSTRACT

Little is known about the prevalence of self-neglect and its predictors among community-dwelling older adults living alone in China. The present study was conducted among 181 older adults living alone in Nanjing, China. Self-neglect was assessed using a self-neglect screening scale. Participants' sociodemographic data, social network, functional ability, cognitive function, and depression level were also collected through a set of questionnaires. The prevalence of self-neglect among this group of older adults was 23.2%, which is comparative to their counterparts in Korea and in the United States. Only depression ($\beta = 0.361$, $p < 0.001$) and monthly income ($\beta = -0.159$, $p = 0.025$) were identified as significant predictors of self-neglect, accounting for 27.1% of the variance. Understanding self-neglect and its predictive factors is essential to provide culturally relevant and tailored interventions to enhance the confidence and self-care abilities of older adults to maintain their health and well-being.

Introduction

According to the National Center on Elder Abuse, self-neglect refers to "an older adult's inability, due to physical or mental impairment or diminished capacity, to perform essential self-care tasks".[1] Self-neglect is becoming a significant public health issue among older population, considering the global rapid aging population.[2] Although research evidence is not abundant, previous studies have shown that an estimated one-fifth of older adults reported self-neglect. In the United States, self-neglect is the most frequently reported case as a category of elder abuse to the Adult Protective Service.[1] Based on a survey of 5519 older adults for the Chicago Health and Aging Project, 21.7% and 29.11% of the African- and Chinese-American community-dwelling older adults had self-neglect, respectively.[3] Lee and Kim also reported that the prevalence of self-neglect was 23% among Korean older adults living alone.[4]

Self-neglect can result in devastating outcomes in the older population. Previous research evidence has shown that older adults with self-neglect were more likely to experience lower levels of cognitive and physical function, poorer nutritional statuses, and impaired psychosocial functions.[5–7] Self-neglect was also found to be associated with multiple medical comorbidities, increased mortality and hospital readmission, and medication non-adherence.[8–10] In addition, self-neglect was identified as a significant predictor of subsequent elder abuse in a community-dwelling older population.[11] Adverse outcomes due to self-neglect may further increase the possibility of greater health care and social service utilization, trapping older adults in vicious cycles. Therefore, it is essential for healthcare professionals to understand self-neglect and its significant predictors to inform a tailored and culturally-relevant intervention to address this issue among community-dwelling older adults living alone.

Given the complex and diverse needs of the older population, studies of understanding the precipitating factors and root causes of self-neglect remain limited.[12] Factors associated with self-neglect identified in some cross-sectional research included gender,[13,14] older age,[13,15] education level,[4,14,15] lower economic income,[13,14,16] decreased physical or cognitive function,[14,17,18] lack of social support or social network,[4,6] and depression.[4,13,14] Although these findings may help to capture the relationships between risk factors and self-neglect, these are substantially not so consistent. For example, Lee and Kim reported that older adults with higher levels of education and lower cognitive abilities are more likely to have self-neglect, which contradicted the findings from other studies.[4,14–16] Therefore, research evidence is still in imperative need to deepen our understanding on this phenomenon.

According to a recent report by the State Council in China,[19] it is estimated that the number of older adults living alone in China will

The work was supported by the Jiangsu Planning Office of Philosophy and Social Science, China. [Grant No. 2016SJD840005, 2016].

* Corresponding author at: Nanjing University of Chinese Medicine, 138# Xianlin Avenue, Qixia District, Nanjing, PR China.
E-mail address: libingu0405@126.com (L. Gu).

https://doi.org/10.1016/j.gerinurse.2019.02.002
0197-4572/$ – see front matter © 2019 Elsevier Inc. All rights reserved.

be 118 million in the year of 2020. Literature has shown that older adults living alone are more vulnerable as they are socially isolated, suffer from poorer health outcomes, and are less likely to adopt health-promoting behaviors.[20] Considering the prevalence of self-neglect reported overseas, as well as the large number of such vulnerable older adults in China, self-neglect among the Chinese older population living alone should be a great concern. However, to the best of our knowledge, there are few studies conducted in China that investigated the prevalence of self-neglect and identified its predictors among older adults living alone. Thus, the current study will fill the knowledge gap in understanding the prevalence of self-neglect and the associated significant factors among this population in China. We hypothesized that lower education level, lower income, decreased physical or cognitive function, lack of social network and depression would predict higher level of self-neglect among Chinese older adults living alone.

Methods

Design, setting, and sample

A cross-sectional descriptive correlational design was adopted. The study was conducted in three communities of a district of Nanjing, China from September 2017 to April 2018. Participants were recruited through convenience sampling. The inclusion criteria were older adults who were: (1) living by himself/herself, (2) aged 60 years and above, and (3) able to communicate in Chinese mandarin or Nanjing dialect. Older adults who had impaired bilateral hearing or vision, and had severe cognitive impairment with Short Portable Mental Status Questionnaire (SPMSQ)[21] score below 2 were excluded from this study.

The sample size was determined on a power analysis by using a multiple linear regression analysis. Based on the literature, a total of eight potential factors, including gender, age, education level, economic status, physical function, cognitive function, social support, and depression, were associated with self-neglect, and these were proposed to be exploratory independent variables in the regression model. Based on Cohen,[22] to achieve a medium effect size at a power of 80% and a significant level of 0.05 (two-sided), a minimum of 107 participants would be needed. A total of 181 participants were finally included in the data analysis of this study.

Research instruments

Subscale of the screening scale for elder abuse (SSEA)

The self-neglect was assessed using one of the subscales of SSEA, which was originally developed to screen elder abuse among older adults by researchers in Korea.[4] The SSEA has six subscales, of which self-neglect is one of the subscales to assess the self-neglect of older adults. The subscale of self-neglect consists of five items, and older adults are required to answer how often they experience the described situations during the past one year from 1 (never), to 4 (always). For example, one of the items is “suffering from malnutrition due to intentionally eating inadequate food”. A higher score indicates a higher frequency of self-neglect. According to Lee and Kim,[4] older adults living alone were regarded to have self-neglect if they reported that they often or always experienced at least one item described in the scale during the past one year. With the permission of the original researchers, we translated the self-neglect subscale, which had been published in English, into a Chinese version of the subscale, using the forward and backward procedure, as recommended by Brislin.[23] We conducted a preliminary assessment of the Chinese version of the self-neglect subscale on its content validity and internal consistency. The content validity index was 0.84 and the Cronbach's alpha value was 0.65 in our study.

Geriatric depression scale-short form (GDS-SF)

The GDS-SF was used to measure the depressive symptoms of the participants. The GDS-SF consists of 15 items using a dichotomous response of ‘yes’ or ‘no’ (0 = no, 1 = yes).[24,25] The total score ranges from 0 to 15, with a higher score indicating a higher level of depression. The Chinese version has good reliability and validity with a Cronbach's alpha value of 0.826.[20]

The short portable mental status questionnaire (SPMSQ)

The SPMSQ was used to assess the cognitive function of older adults living alone.[21] It consists of 10 items measuring orientation, working memory, and calculation. One point was given to each correct answer, and zero was given to each wrong answer. The total score ranges from 0 to 10. The Chinese version of SPMSQ has a good internal consistency with a Cronbach's alpha value of 0.77 and satisfied test-retest reliability with an intraclass correlation coefficient of 0.94.[26]

The activities of daily living (ADL) scale

The ADL scale was used to measure the functional ability of the participants. It consists of 14 items, grouped into two domains: the physical self-maintenance (PSM) scale (6 items) and the instrumental activities of daily living (IADL) scale (8 items). The PSM scale assesses the participants’ basic physical functioning: bathing, feeding, dressing, grooming, toileting, and transferring. The IADL scale assesses more complicated skills: using the telephone, using public transportation, shopping, doing housework, taking medication, handing one's own money, washing clothes, and cooking. Each item is rated on a 4-point Likert scale. The ADL scale has been widely used to evaluate the functional abilities of the older adults. The scale has been translated into Chinese and validated among a Chinese population. The Chinese version of the ADL scale has good reliability with a Cronbach's alpha value of 0.85.[26]

The Lubben social network scale (LSNS-6)

The LSNS-6 was used to assess the social network of the participants. It consists of six items that evaluate kinship ties and nonkin ties from family (3 items) and from friends (3 items). Each item is rated on a 6-point Likert scale with regard to the number of contact with relatives and friends whom the older adults felt close to or asked for support (0 = none, 1 = one, 2 = two, 3 = three to four, 4 = five to eight, and 5 = nine and above).[27] The scale was translated by our research team into Chinese according to Brislin's model[23] and its Cronbach's alpha value was 0.78 for our study.

Data collection procedure

Ethical approval was obtained from the research ethical board of Nanjing University of Chinese Medicine. Permission was also obtained from the community committees of the study setting. Apart from distributing flyers at public areas of the communities, door-to-door home visits were also conducted to recruit participants. A staff of the community center was invited to assist with the participants’ recruitment. The staff is very familiar with the living status of the residents in the community. He/She accompanied the researcher to approach the older adults either at their homes or the community center. The researcher evaluated the eligibility of potential participant, and those who met the inclusion criteria were invited to participate in the study. The researcher then provided the detailed information about the aims and procedure of the study to each participant, and the written consent was also obtained. The questionnaires were then administered to these older adults. These questionnaires were completed principally by the older adults themselves, but assistance was provided when necessary. Besides the questionnaires mentioned above, the older adults’ sociodemographic data including age, gender, educational level, marriage status, economic status, number

of children, number of chronic diseases they had, and supports they received from governments/agencies/communities were also collected. Each participant took approximately 30 minutes to complete the questionnaires. After all questionnaires were completed, a gift (about 2 USD) was provided to each participant as a token of appreciation.

Statistical analysis

All data were entered and analyzed using the Statistical Package for Social Sciences version 24.0 software. Descriptive statistics, such as mean, standard deviation (SD), frequency (%), and median (interquartile range), were used to summarize sociodemographic data and the study variables assessed using the questionnaires. As the data of self-neglect did not follow a normal distribution, non-parametric tests such as the Mann-Whitney U test or the Kruskal-Wallis test were used to examine the differences of self-neglect among different demographic characteristics. All variables with $p < 0.2$ based on the univariate analyses and social network, functional ability, cognitive function, and depression were selected as independent variables to be entered into the multiple linear regression model to further determine the significant predictors of self-neglect.[28] All statistical tests were two-sided and a p-value below 0.05 was considered statistically significant.

Results

Sociodemographic characteristics of the participants

One hundred and ninety-five older adults living alone were approached, of which 182 agreed to be involved in the study (response rate: 93.3%). However, one participant missed some of the items of the self-neglect scale and was finally excluded from the study. A total of 181 participants were included in the final analysis and no participants had SPMSQ score below 2. The mean age of the study sample was 75.3 ± 6.78 years old. More than half (64.1%) of the participants were female and the majority (84.5%) were widowed. Regarding educational level, 65.2% of the participants were illiterate or at the primary school level. In terms of monthly income, 23.2% of the participants had a monthly income of below 500 yuan (approximately 74 USD). Only 11.0% of the older adults had no chronic disease, and 10.5% had more than six chronic diseases. More than half of the participants ($n = 93$, 51.4%) reported that they had no supports from the government, agencies, or communities. The participants' sociodemographic characteristics are presented in Table 1.

Table 1
Sociodemographic characteristics of the participants ($n = 181$).

Variables		n	%
Age	60 - 69	34	18.8
	70 - 79	103	56.9
	≥ 80	44	24.3
Gender	Male	65	35.9
	Female	116	64.1
Educational level	Illiterate	48	26.5
	Primary school	70	38.7
	Middle school	34	18.8
	High school or above	29	16.0
Marital status	Widowed	153	84.5
	Divorced	11	6.1
	Separated	13	7.2
	Unmarried	4	2.2
Monthly income (RMB)	≤500	42	23.2
	501 – 1499	61	33.7
	1500 – 2499	38	21.0
	2500 – 3499	21	11.6
	3500 - 4499	8	4.4
	≥4500	11	6.1
Number of children	0	6	3.3
	1 – 2	78	43.1
	3 – 4	79	43.6
	≥5	18	9.9
Number of chronic diseases	0	20	11.0
	1 – 2	87	48.1
	3 – 5	55	30.4
	≥6	19	10.5
Support from government /agencies/communities	Yes	88	48.6
	No	93	51.4

Note: 1RMB=0.1485USD.

Self-neglect of the participants

The median of self-neglect of the participants was 6 (IQR 5 – 8). The prevalence of self-neglect in our sample was 23.2%. Table 2 represents the percentages of the participants' responses in each item of the scale. Among all forms of self-neglect listed in the scale, the most frequent item reported as often or always experienced by the participants (14.9%) was "Presence of substance or alcoholic abuse that is causing significant harm to their health", followed by the items of "Failing to maintain a minimum level of hygiene and sanitation" (6.1%) and "Refusing to ask for any kind of assistance although they were exposed to unsafe environments" (6.1%). Only one female participant reported that she often thought of committing suicide.

Differences of self-neglect among various demographic characteristics

The medians of self-neglect were compared among different demographic characteristics and the results are presented in Table 3. Older adults living alone with more comorbidity of chronic diseases had significant higher level of self-neglect ($X^2 = 8.957$, $p = 0.03$). No significant differences of the medians of self-neglect were found in any other social-demographic characteristics

Predictors of self-neglect

Multiple linear regression was used to identify the predictors that may contribute to the self-neglect of older adults living alone. Eight factors were selected as independent variables to be included in the regression model. These included gender, marital status, monthly income, number of chronic diseases, social network, functional ability, cognitive function, and depression. Out of these eight factors, only depression ($\beta = 0.361$, $p < 0.001$) and monthly income ($\beta = -0.194$, $p = 0.025$) were identified as significant predictors of self-neglect, accounting for 27.1% of the variance (Table 4).

Discussion

Older adults living alone are a vulnerable population and they need to be cared for in all aspects of their lives. In China, many older adults who are influenced deeply by traditional Chinese culture concern more about their children and grandchildren than themselves. Besides, family structures and generation relationships have transformed in the context of the socio-economic changes in China. An increasing number of older adults live with their spouses only (so called "empty nester" in China) or by themselves. Taking all these factors into consideration, we believe that self-neglect is becoming a major concern among this group of older adults. The study findings are an important reference for social workers, health professionals, public health officials, and community organizations to make policies and develop interventions for this vulnerable population.

The prevalence of self-neglect among Chinese older adults living alone is 23.2%, which is very similar to that in Korea.[4] The comparative prevalence of self-neglect in China and Korea may be due to the same instrument used to assess self-neglect and the mutual Asian

Table 2
Distribution of the participants' responses in each item.

Item	Never n (%)	Rarely n (%)	Often n (%)	Always n (%)
Suffering from malnutrition due to intentionally eating inadequate food	157 (86.7)	22 (12.2)	1 (0.6)	1 (0.6)
Failing to maintain a minimum level of hygiene and sanitation	121 (66.9)	49 (27.1)	8 (4.4)	3 (1.7)
Refusing to ask for any kind of assistance although they were exposed to unsafe environments	109 (60.2)	61 (33.7)	6 (3.3)	5 (2.8)
Presence of substance or alcoholic abuse that is causing significant harm to their health	128 (70.7)	26 (14.4)	19 (10.5)	8 (4.4)
Thinking of committing suicide	168 (92.8)	12 (6.6)	1(0.6)	0 (0)

Table 3
Self-neglect comparisons among different demographic characteristics.

Variables		Self-neglect (Median, IQR)	X^2/Z	p
Age	60 – 69	6 (5 – 7)	1.234	0.540
	70 – 79	6 (5 – 8)		
	≥80	7 (5 – 8)		
Gender*	Male	7 (5 – 8)	−1.888	0.059
	Female	6 (5 – 8)		
Educational level	Illiterate	7 (5 – 8)	3.781	0.286
	Primary school	6 (5 - 8)		
	Middle school	6 (5 – 7)		
	High school or above	6 (5 – 8)		
Marital status	Widowed	6 (5 – 8)	5.871	0.118
	Divorced	6 (5 – 7)		
	Separated	5 (5 - 7)		
	Unmarried	7 (6.25 – 10)		
Monthly income (RMB)	≤500	7 (5 – 8.25)	9.769	0.082
	501 – 1499	6 (5.5 - 8)		
	1500 – 2499	6.5 (5 - 8)		
	2500 – 3499	6 (5 – 7)		
	3500 – 4499	5 (5 – 6.5)		
	≥4500	5 (5 - 6)		
Number of children	0	6.5 (5.75 – 8)	4.220	0.239
	1 – 2	6 (5 – 8)		
	3 – 4	6 (5 – 7)		
	≥5	7 (5 – 8)		
Number of chronic diseases	0	6 (5.25 – 7)	8.957	*0.030*
	1 – 2	6 (5 – 7)		
	3–5	7 (5 – 8)		
	≥6	7 (5 – 9)		
Support from government /agencies/communities	Yes	6 (5 – 8)	−0.230	0.818
	No	6 (5 - 8)		

* Mann–Whitney U test, all other comparisons were made using the Kruskal–Wallis test.

culture. Surprisingly, "Presence of substance or alcoholic abuse that is causing significant harm to their health" was the most frequently item reported as often or always experienced by our sample (14.9%). Substance abuse is believed to be an uncommon issue among Chinese older adults because of the strict drug supervision and control of the government. Compared with those who live with their family members, older adults living alone normally receive less attention and recourses from the public or their relatives.[29] They are a special vulnerable group, with deficient spiritual consolation.[30] Consequently, alcohol or smoking might be relied on to relieve the loneliness they are experiencing. However, alcohol and cigarette consumption can lead to further damage to their health, which older adults living alone have to confront and suffer by themselves. Just as an old Chinese saying goes, "Cut running water with a sword, it will faster flow; drink wine to drown your sorrow, it will heavier grow."

On the other hand, alcohol use is advocated to a certain extent in some occasions of Chinese culture such as friends' gatherings or special festivals. However, such alcohol use is not regular and occasional consumption will not cause significant health damage. We proposed that drinking alone will make them even more lonely, in turn they will drink much more to kill the feeling of loneliness. Alcohol use among older adults living alone is substantially the heath self-neglect. Hence, self-neglect is a pervasive and rising problem among older adults living alone in China. We suggest for more resources and interventional programs to be allocated to older adults living alone to lower their self-neglect and to enhance their self-care confidence and ability.

The study identified depression to be a significant predictor of self-neglect in older adults living alone. The more severe depression of older adults living alone, the higher levels of self-neglect they have. The result is in line with previous studies in which depression always appeared to be an independent predictor of self-neglect of older adults.[4,13,31] Depression is one of the common mental health issues among older adults, which can result in the executive dysfunction.[31] In turn, the executive dysfunction is believed to be at the root of many cases of self-neglect, as illustrated in the model of self-neglect developed by Dyer.[31] According to Dyer et al.,[31] executive dysfunction can lead to impaired physical function and a lack of capacity for self-care and self-protection. When coupled with a lack of access to social or medical services, self-neglect ensues among the population. Hence, tailored professional interventions to screen and decrease the depression levels of older adults could be effective strategies against self-neglect.[4]

In our study, income was another significant predictor of self-neglect among older adults living alone, with lower monthly income predicting higher levels of self-neglect. Older adults with higher monthly income may enjoy relatively adequate medical care and engage in more social activities compared to those with lower monthly income.[32] Adequate medical care can decrease self-neglect levels to a certain degree.[33] In addition, it is believed that older adults

Table 4
Predictive factors of self-neglect according to the multiple linear regression.

Variables	B	β	t	*p*-value	95% CI
Gender[a]	−0.412	−0.117	−1.707	0.090	−0.889 0.065
Marital status1[b]	−0.024	−0.003	−0.051	0.959	−0.961 0.912
Marital status2[c]	−0.356	−0.054	−0.798	0.426	−1.236 0.524
Marital status3[d]	0.670	0.058	0.858	0.392	−0.871 2.211
Monthly income	−0.194	−0.159	−2.254	*0.025*	−0.364 −0.024
Number of chronic diseases	0.255	0.123	1.721	0.087	−0.037 0.548
Social network	0.006	0.018	0.250	0.803	−0.041 0.053
Depression	0.181	0.361	4.904	*0.000*	0.108 0.253
Cognitive function	−0.007	−0.006	−0.079	0.937	−0.173 0.160
Functional ability	0.025	0.079	1.037	0.301	−0.022 0.071

Note: $R^2 = 0.271$, $F = 6.333$, $p < 0.001$.
[a] 0 = male, 1 = female.
[b] 0 = windowed, separated, or unmarried, 1 = divorced.
[c] 0 = windowed, divorced, or unmarried, 1 = separated.
[d] 0 = windowed, divorced, or separated, 1 = unmarried. CI: Confidence Interval.

with more social activities have less self-neglect.[34,35] Therefore, older adults living alone with limited medical care and less social activities are more susceptible to self-neglect.[20]

Our study, nevertheless, did not find cognitive function and functional ability were associated with self-neglect. Cognitive function impairment indicates impaired frontal lobe which makes the older adults living alone unable to provide appropriate level of care instead of neglect themselves intentionally. The deficiency of self-care abilities is believed to be correlated with self-neglect of older adults though it is not deliberate. Moreover, functional ability can result in inadequate self-care behaviors which lead to unintentional self-neglect as well.[1] However, our study finding showed that no associations were found between cognition level, functional ability and self-neglect of older adults living alone. The possible explanation may be that we excluded those older adults with severe cognitive impairment and our variable is lack of variance. Further studies are necessary to provide more evidence on the findings.

Inconsistent with the results reported by some previous studies,[4,14,15] our study did not find any significant associations between some sociodemographic characteristics, such as gender, age, educational level, and self-neglect. Besides, social network is not the predictor of self-neglect among Chinese older adults living alone. Such a research discrepancy may be due to the heterogeneity of the study design, the older population, and instruments used to measure self-neglect. More research evidence is needed to further understand self-neglect among older adults living alone in the future.

There are some study limitations that must be noted in the study. The convenience sample was recruited only from three communities of a district in Nanjing, China, which cannot represent the various ethnic and racial populations in China. Therefore, the findings cannot be generalized to other older populations living alone, especially those living in rural areas of China. Secondly, we applied a cross-sectional study design, which cannot establish the causal relationships between potential risk factors and self-neglect. Longitudinal studies in diverse populations with adequate sample sizes are needed to verify the relationships between these risk factors and self-neglect.[36]

Conclusion

To conclude, self-neglect is a pervasive and rising problem among Chinese older adults living alone, given the grand number of older adults in China. Higher depression levels and lower monthly income significantly predict higher levels of self-neglect among this population. Understanding self-neglect and its associated factors is essential to providing tailored interventions to enhance the confidence and self-care abilities of older adults in maintaining their health and well-being.

References

1. Teaster PB, Dugar TA, Mendiondo MS, Abner EL, Cecil KA. The 2004 survey of state adult protective services: abuse of adults 60 years of age and older. *Natl Center Elder Abuse* 2006; [cited on November 9, 2018]. Available from; https://ncea.acl.gov/resources/docs/archive/APS-Adults-60plus-Survey-2006.pdf. Accessed November 9, 2018.
2. Dong X, Simon M. Prevalence of elder self-neglect in a Chicago Chinese population: the role of cognitive physical and mental health. *Geriatr Gerontol Int*. 2016;16(9):1051–1062. https://doi.org/10.1111/ggi.12598.
3. Dong X. Self-neglect in an elderly community-dwelling U.S. Chinese population: findings from the Population Study of Chinese Elderly in Chicago study. *J Am Geriatr Soc*. 2014;62(12):2391–2397. http://doi.org/10.1111/jgs.13140.
4. Lee M, Kim K. Prevalence and risk factors for self-neglect among older adults living alone in South Korea. *Int J Aging Hum Dev*. 2014;78(2):115–131. https://doi.org/10.2190/AG.78.2.b.
5. Dong X, Mendes de Leon CF, Evans DA. Is greater self-neglect severity associated with lower levels of physical function? *J Aging Health*. 2009;21(4):596–610. https://doi.org/10.1177/0898264309333323.
6. Dong XQ, Simon M, Evans D. Cross-sectional study of the characteristics of reported elder self-neglect in a community-dwelling population: findings from a population-based cohort. *Gerontol*. 2010;56(3):325–334. https://doi.org/10.1159/000243164.
7. Li J, Zhao D, Dong B, et al. Frailty index and its associations with self-neglect, social support and sociodemographic characteristics among older adults in rural China. *Geriatr Gerontol Int*. 2018;18(7):987–996. https://doi.org/10.1111/ggi.13280.
8. Dong X, Simon MA. Elder self-neglect is associated with an increased rate of 30-day hospital readmission: findings from the Chicago Health and Aging Project. *Gerontol*. 2015;61(1):41–50. https://doi.org/10.1159/000360698.
9. Reyes-Ortiz CA, Burnett J, Flores DV, Halphen JM, Dyer CB. Medical implications of elder abuse: self-neglect. *Clin Geriatr Med*. 2014;30(4):807–823. https://doi.org/10.1016/j.cger.2014.08.008.
10. Turner A, Hochschild A, Burnett J, Zulfiqar A, Dyer CB. High prevalence of medication non-adherence in a sample of community-dwelling older adults with adult protective services-validated self-neglect. *Drug Aging*. 2012;29(9):741–749. https://doi.org/10.1007/s40266-012-0007-2.
11. Dong X, Simon M, Evans D. Elder self-neglect is associated with increased risk for elder abuse in a community-dwelling population: findings from the Chicago Health and Aging Project. *J Aging Health*. 2013;25(1):80–96. https://doi.org/10.1177/0898264312467373.
12. Dyer CB, Franzini L, Watson M, et al. Future research: a prospective longitudinal study of elder self-neglect. *J Am Geriatr Soc*. 2008;56(Suppl 2):S261–S265. https://doi.org/10.1111/j.1532-5415.2008.01978.x.
13. Abrams RC, Lachs M, McAvay G, Keohane DJ, Bruce ML. Predictors of self-neglect in community-dwelling elders. *Am J Psychiat*. 2002;159(10):1724–1730. http://doi.org/10.1176/appi.ajp.159.10.1724.
14. Zhao Y, Hu C, Feng F, Gong F, Lu S, Qian Z, Sun Y. Associations of self-neglect with quality of life in older people in rural China: a cross-sectional study. *Int Psychogeriatr*. 2017;29(6):1015–1026. https://doi.org/10.1017/S1041610217000229.
15. Dong X. Sociodemographic and socioeconomic characteristics of elder self-neglect in an US Chinese aging population. *Arch Gerontol Geriatr*. 2016;64:82–89. http://doi.org/10.1016/j.archger.2016.01.007.
16. Dong X, Simon MA, Evans DA. Prevalence of self-neglect across gender, race, and socioeconomic status: findings from the Chicago Health and Aging Project. *Gerontol*. 2012;58(3):258–268. https://doi.org/10.1159/000334256.
17. Dong X, Simon M, Fulmer T, Mendes de Leon CF, Rajan B, Evans DA. Physical function decline and the risk of elder self-neglect in a community-dwelling population. *Gerontologist*. 2010;50(3):316–326. https://doi.org/10.1093/geront/gnp164.
18. Dong X, Simon MA, Wilson RS, Mendes de Leon CF, Rajan KB, Evans DA. Decline in cognitive function and risk of elder self-neglect: finding from the Chicago Health Aging Project. *J Am Geriatr Soc*. 2010;58(12):2292–2299. https://doi.org/10.1111/j.1532-5415.2010.03156.x.
19. The State Council, P.R. China. "13th five-year" plan for the development of national aging and pension system in China. [cited on November 13, 2018]. Available from: http://www.moe.gov.cn/jyb_sy/sy_gwywj/201703/t20170307_298431.html.
20. Zhao Y. Assessing self-neglect on elderly, exploring its impact factors and the impact on their quality of life in rural China. *Anhui Med Univ* 2017; Available from: http://www.wanfangdata.com.cn/details/detail.do?_type=degree&id=D01240000.
21. Pfeiffer E. A short portable mental status questionnaire for the assessment of organic brain deficit in elderly patients. *J Am Geriatr Soc*. 1975;23(10):433–441. http://dx.doi.org/10.1111/j.1532-5415.1975.tb00927.x.
22. Cohen J. A power primer. *Psychol Bull*. 1992;112(1):155–159. http://dx.doi.org/10.1037/0033-2909.112.1.155.
23. Brislin RW. The wording and translation of research instrument. In: Lonner WJ, Berry JW, eds. *Field Methods in Cross-Cultural Research*. Beverly Hills: Sage Publications; 1986:137–164.
24. Boey KW. Reliability and Validity of GDS and GHQ short form for the aged. *Chin J Psychiatr*. 1999;32(1):41–43. http://doi.org/10.3760/j:issn:1006-7884.1999.01.013.
25. Boey KW. The use of GDS-15 among the older adults in Beijing. Clin Gerontol. 2000;21:49–60. https://doi.org/10.1300/J018v21n02_05.
26. Chen Q. Investigation and analysis of activities of daily living, social activity, cognition and complication among the bedridden elderly. *Sichuan Univ* 2007; Available from; http://www.wanfangdata.com.cn/details/detail.do?_type=degree&id=Y1212054.

27. Lubben J, Blozik E, Gillmann G, et al. Performance of an abbreviated version of the lubben social network scale among three european community-dwelling older adult populations. *Gerontologist*. 2006;46(4):503–513. https://doi.org/10.1093/geront/46.4.503.
28. Mickey RM, Greenland S. The impact of confounder selection criteria on effect estimation. *Am J Epidemiol*. 1989;129(1):125–137. http://dx.doi.org/10.1093/oxfordjournals.aje.a115101.
29. Huang JC. Older adults living alone in China: a research review. *Chin J Gerontol*. 2015;35(23):6954–6956. https://doi.org/10.3969/j.issn.1005-9202.2015.23.142.
30. Tan YH, Yu HS, Shi JY. Older adults living alone have no spiritual consolation in rural areas of China. *Chin J Gerontol*. 2015;35(23):6959–6961. https://doi.org/10.3969/j.issn.1005-9202.2015.23.144.
31. Dyer CB, Goodwin JS, Pickens-Pace S, Burnett J, Kelly PA. Self-neglect among the elderly: a model based on more than 500 patients seen by a geriatric medicine team. *Am J Public Health*. 2007;97(9):1671–1676. https://doi.org/10.2105/AJPH.2006.097113.
32. Gao XY, Hu J, Lu ZJ, Xiao W. Comparisons of psychological status of older adults living alone in rural and urban areas of China. *Chin J Gerontol*. 2014;34(20):5841–5843. https://doi.org/10.3969/j.issn.1005-9202.2014.20.103.
33. Franzini L, Dyer CB. Healthcare costs and utilization of vulnerable elderly people reported to adult protective services for self-neglect. *J Am Geriatr Soc*. 2008;56(4):667–676. http://dx.doi.org/10.1111/j.1532-5415.2007.01629.x.
34. Gibbons SW. Theory synthesis for self-neglect: a health and social phenomenon. *Nurs Res*. 2009;58(3):194–200. http://dx.doi.org/10.1097/NNR.0b013e3181a3092c.
35. MacLeod MZK, Douthit KZ. Etiology and management of elder self-neglect. *Adultspan J*. 2015;14(1):11–23. http://dx.doi.org/10.1097/NNR.0b013e3181a3092c.
36. Dong X. Elder self-neglect: research and practice. *Clin Interv Aging*. 2017;12:949–954. https://doi.org/10.2147/CIA.S103359.