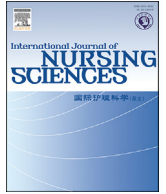


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Original Article

Differences in social isolation between young and old elderly in urban areas of Beijing, China: A cross-sectional study

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ABSTRACT

Objectives: To understand the differences in social isolation among older adults and to identify risks associated with social isolation.

Methods: Totally 485 participants aged 60 and older were recruited for this study. The Lubben Social Network Scale-6 and the Chinese version of the Medical Outcomes Study Social Support Survey were used to measure social isolation and the different types of social support that the participants experienced.

Results: The proportions of young elderly (60–74 years of age) and old elderly (greater than 74 years of age) that experienced social isolation in this study were 24.4% and 33.1%, respectively. For the young elderly, three types of social support were observed to be protective factors to help avoid social isolation, and the positive effect of social support obtained from friends and neighbors was slightly stronger than that of family members. Old elderly with only a senior high school education background were at high risk of being socially isolated. Only support from friends was observed to be a protective factor for the old elderly.

Conclusions: The study indicated that different ages of older adults experienced different aspects of social relationships. We propose that nursing interventions for the elderly should focus on individualized social support as a protective factor to help older adults avoid being socially isolated.

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What is known?

- Social isolation is a problem frequently encountered by older adults.
- Family caregivers are always the major caregivers for daily living support for older adults.

What is new?

- The prevalence of social isolation is different between young and old elderly.
- The young elderly benefit considerably from a wide range of social supports to avoid social isolation, while only friends' support is protective for the old elderly.

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1. Introduction

Social isolation is defined as the absence of a support system or having reduced social interactions or relationships with family and friends at an individual level, and with a general, low-level of social participation in community life [1,2]. The degree of social interaction is usually assessed by the number of confidants with whom the individual interacts and the frequency of contacts within the individual's social networks [2,3]. Other indicators of social isolation include living alone or lacking intimacy and attachments with other people [3]. Older adults are more vulnerable to social isolation compared to younger individuals. Life transitions, including retirement, loss of a spouse, and residential changes are capable of drastically altering an aging person's social network. In addition, older adults are at higher risk of suffering from acute or chronic diseases, which also could limit their ability to engage in social interactions [4].

Social isolation is a growing problem all over the world because of the exponential growth of the aging population [2]. Previous studies have demonstrated that the range of older

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adults who were socially isolated in Western countries was between 10% and 35% [5–8]. The aging population in China has increased since the early 21st century. Based on the most recent national elderly survey in 2017 in China, the population of older adults (aged 60 and above) now stands 17% [9]. Current research demonstrated that the percentage of socially isolated older adults had reached 21.4% in urban areas of China [10]. Developing countries, including China, are facing the challenges of changes and integration of the elderly, economically, culturally, and in government policy. Thus, older adults are more likely to be socially isolated in this current era of social change. With the average life expectancy increasing in China, the prevalence rate of social isolation also is expected to increase. In addition, older adults aged 60 and above are not as healthy as younger individuals. Therefore, it is possible that differences in social isolation could exist between young and old elderly.

It has been suggested that social isolation could lead to increases in the negative outcomes of physical and psychological health among older adults [11]. Gaudier-Diaz and colleagues reported that social isolation led to greater microglial responses and worsened outcomes of cerebrovascular diseases [12]. Another previous study demonstrated that older adults with subjective social isolation from both family and friends exhibited increased reports of depressive symptoms. Moreover, subjective social isolation from friends is likely to cause higher levels of psychological distress [13]. People who were at risk of social isolation did not appear to make full use of available medical services or to seek help from others [3]. Thus, a vicious circle has been created between social isolation and adverse health outcomes. Studies showed that socially isolated individuals had two to four times the risk from all causes of mortality [14,15]. Hence, social isolation has become an important indicator of public health.

Most previous research on social isolation among older adults has focused on Western populations. Evidence from these studies suggested that age, gender, and economic status appeared to affect an individual's degree of social isolation [6,8,10,16]. Also, a prior study reported a positive correlation between social support and social participation [17]. These results suggest that social support is an important protective factor in preventing people from being socially isolated. Compared with Western countries, China is now facing the challenge of social and demographic transitions [18,19]. The increasing migration of whole family members from countryside to urban areas and the impact of previous birth policies have led to a high incidence of “empty nesting,” and changes also have occurred in the available social networks for older adults [20]. However, the problem of social isolation among older adults has received little attention in China. In addition, the increase in life expectancy prompts us to pay attention to the social isolation of older adults at different ages.

At the end of the 20th century, the World Health Organization (WHO) reported a new standard of age classification after assessment of the global human quality of life and average life expectancy [21]. People aged 60 to 74 are considered as young elderly, and individuals 75–89 years old are considered to be old elderly. Social development and life events have different effects on the elderly in these two stages of life. For this reason, it is important to identify the characteristics of these two groups of older adults. Therefore, this study analyzed the differences in social isolation among young elderly and old elderly and explored a number of important factors that affected their social isolation. The goal of this study was to provide new opportunities in the future to improve the health of the elderly with respect to reducing the adverse effects of social isolation.

2. Methods

2.1. Participants

The study participants included adults aged 60 years old and over from four central districts in Beijing, China (Dongcheng District, Xicheng District, Fengtai District, and Shijingshan District). People who had a terminal illness or severe cognitive dysfunction or disability were excluded from the study. Data for this study came from a healthy aging survey conducted in 2017 [22]. A total of 500 older adults from the four districts were recruited to participate in this study. Fifteen participants did not finish the self-reporting questionnaires and survey instruments that were included in the study. Therefore, a final total of 485 eligible subjects with completed forms were included in this study. All participants were given detailed written and oral information concerning the aim of the study. All participants signed an informed consent form and were assured that all data would be treated confidentially.

2.2. Measures

2.2.1. Social-demographic characteristics

A number of social-demographic variables were analyzed, including age, gender, education, personal income, living arrangements, and health conditions. The study investigators designed the questionnaire that was used to collect these.

2.2.2. Social isolation

The Lubben Social Network Scale-6 (LSNS-6) was used to assess social isolation. This scale primarily is used to evaluate kinship ties and non-kinship ties of the older adults who are being assessed [23]. The scale is constructed based on a set of three questions, including the number of relatives the individual has seen or heard from at least once a month, the number of relatives that the individual feels comfortable to call for help, and the number of relatives that the individual feels at ease to discuss private matters. Another set of three comparable questions are applied to assess non-kinship ties by replacing the word “relatives” with the word “friends.” Each item is scored based on a range of 0–5; 0 (none), 1 (one person), 2 (two persons), 3 (three or four persons), 4 (five to eight persons), 5 (nine persons or more). The total score for the scale is obtained as an equally weighted sum of the six questions, which can range from 0 to 30. Cronbach's α is a measure of scale reliability and is used to indicate the level of internal consistency in a study, or in other words, how closely related items are in a group. In this study, the Cronbach's α of subscales varied from 0.76 to 0.89, and the Cronbach's α of the total scale was 0.89. Lubben and his colleague identified individuals with a score of less than 12 as experiencing social isolation [23].

2.2.3. Social support

Social support from three different social relationships (family, friends, and neighbors) was measured by the Chinese version of the Medical Outcomes Study Social Support Survey (MOSSS-C). The original instrument was developed by Shebourne and Stewart [24]. It consists of 19 items along with 4 subscales: emotional informational support, tangible support, positive social interaction, and affectionate support. The participants were asked to indicate on a 5-point scale rated from 1 (none of the time) to 5 (all of the time). Total scores ranged from 19 to 95, with higher scores indicating better social support. A previous study reported acceptable reliability (all $\alpha > 0.91$) and validity [24] for the MOSSS scale. In this study, the Cronbach's α for the total MOSSS-C scale ranged from 0.95 to 0.97.

2.3. Ethical considerations

This research was approved by the Institutional Review Board of the School of Nursing, Peking Union Medical College (20160902). The researcher explained the aim and procedures of the study to all participants. All the participants signed a written informed consent form. This study also followed the ethical principles outlined in the Code of Ethics of the World Medical Association (Declaration of Helsinki) for all experiments involving humans <http://www.wma.net/en/30publications/10policies/b3/>. Participants could withdraw from the study at any time without any explanation.

2.4. Data analysis

All statistical analyses were performed using SPSS statistical software, version 23.0. First, differences between young and old elderly were compared by univariate analysis using the Student's *t*-test for continuous variables and the χ^2 test for categorical variables. Data were described by frequency, percentage, and *Mean*±*SD*. Second, a logistic regression analysis was applied to examine the social isolation of the two groups with independent variables, including gender, educational level, personal income, living arrangements, disease conditions, family support, friend support, and neighbor support. A probability value of less than 0.05 was considered statistically significant. The reported *P*-values were two-tailed in all calculations.

3. Results

3.1. Characteristics differences between young and old elderly

The differences in characteristics between these two groups are reported in Table 1. When considering the overall sample, the age of the young elderly (340 subjects) ranged from 60 to 74 years, and 143 subjects were older than 74 years old (old elderly). There was no significant difference in gender distribution observed between the two groups in this study. Older adults who had higher levels of education also had higher personal incomes. Young elderly were primarily living with their children or spouses. However, a large

proportion of old elderly lived with their children or non-related individuals. The proportion of old elderly presenting with illnesses was greater than that of the young elderly. The proportion of young elderly and old elderly living in a state of social isolation were 24.4% and 33.1%, respectively, which indicated that social isolation increased with age ($\chi^2 = 3.90, P = 0.048$). With respect to social support, both groups had the highest score in family support, followed by the score for friends' support.

3.2. Risk of social isolation in young and old elderly

Table 2 reports regression coefficients (β), odds ratio (*OR*), and 95% confidence intervals (95% *CI*) for the logistic regression analysis. For the young elderly, social support had a protective effect on their degree of social isolation. The positive effect of social support from friends and neighbors was slightly stronger than that of family members (*OR*: 0.93, 95% *CI*: 0.90–0.95; *OR*: 0.95, 95% *CI*: 0.93–0.98; *OR*: 0.96, 95% *CI*: 0.93–0.99, respectively). Old elderly with only a senior high school education level were 7.59 times more likely to be socially isolated compared to those who attained a college education or higher. Living with a spouse was protective against social isolation among old elderly (*OR*: 0.11, 95% *CI*: 0.01–0.85). Only friend support had a positive influence on social isolation of old elderly (*OR*: 0.87, 95% *CI*: 0.82–0.92).

4. Discussion

This present study provides evidence for the influence of socio-demographic variables and three different kinds of social support on the risk of social isolation in two groups of older adults. Regarding the social-demographic characteristics, our findings showed that most of the old elderly had a higher level of education, which also correlated with the level of their personal incomes. Based on traditional Chinese culture, the offspring of older adults are expected to support their elderly parents as they age. Moreover, most of the young elderly had to help their children raise their grandchildren. Therefore, a large proportion of the young elderly lived with their immediate family members. However, most of the old elderly were at high risk of age-related diseases, especially

Table 1
Socio-demographic characteristics of the study population (*n* = 485).

Variables	60–74 years		74–89 years	
		<i>n</i> (%)		<i>n</i> (%)
Gender	Male	120 (35.3)	50 (34.5)	
	Female	220 (64.7)	95 (65.5)	
Education	Illiterate	3 (0.9)	16 (11.0)	
	Elementary school	20 (5.9)	29 (20.0)	
	Junior high school	121 (35.6)	28 (19.3)	
	Senior high school	120 (35.3)	33 (22.8)	
	College and above	76 (22.4)	39 (26.9)	
Monthly income (CNY)	500 or below	13 (3.8)	6 (4.1)	
	500–1999	12 (3.5)	5 (3.4)	
	2000–3999	176 (51.8)	30 (20.7)	
	4000–5999	111 (32.6)	72 (49.7)	
	6000 or more	28 (8.2)	32 (22.1)	
Living arrangement	Living alone	35 (10.3)	31 (21.4)	
	With children	116 (34.1)	54 (37.2)	
	With spouse	95 (27.9)	24 (16.6)	
	Others	94 (27.6)	36 (24.8)	
Disease conditions	Healthy	60 (17.6)	12 (8.3)	
	Presence of illness	280 (82.4)	133 (91.7)	
Social isolation	Yes	83 (24.4)	48 (33.1)	
	No	257 (75.6)	97 (66.9)	
Family support, <i>Mean</i> ± <i>SD</i>		72.19 ± 13.90	74.96 ± 13.49	
Friend support, <i>Mean</i> ± <i>SD</i>		52.92 ± 17.85	48.10 ± 18.93	
Neighbor support, <i>Mean</i> ± <i>SD</i>		44.81 ± 18.15	43.97 ± 17.86	

Table 2
Logistic regression analysis testing socio-demographic variables and social support on the risk of social isolation ($n = 485$).

Variables	60–74 years ($n = 340$)			74–89 years ($n = 145$)		
	Model 1			Model 2		
	β	<i>P</i> -value	OR (95% CI)	β	<i>P</i> -value	OR (95% CI)
Gender						
Male	0.24	0.526	1.27 (0.61, 2.67)	−1.03	0.173	0.36 (0.08, 1.55)
Female (reference group)			1			1
Education		0.313			0.032	
Illiterate	2.32	0.128	10.14 (0.50, 206.08)	−1.60	0.225	0.20 (0.01, 2.84)
Elementary school	1.61	0.071	4.98 (0.89, 27.77)	0.50	0.633	1.65 (0.22, 12.38)
Junior high school	0.70	0.194	2.01 (0.71, 5.68)	1.52	0.124	4.59 (0.67, 31.32)
Senior high school college or university (reference group)	0.63	0.222	1.87 (0.69, 5.12)	2.03	0.015	7.59 (1.47, 39.27)
college or university (reference group)			1			1
Income (CNY)		0.521			0.981	
500 or below	0.52	0.665	1.68 (0.16, 17.93)	−0.30	0.852	0.74 (0.03, 16.11)
500–1,999	−1.44	0.221	0.24 (0.02, 2.38)	−20.17	0.988	–
2,000–3,999	−0.33	0.668	0.72 (0.16, 3.24)	−0.67	0.531	0.51 (0.06, 4.05)
4,000–5,999	−0.61	0.410	0.54 (0.12, 2.36)	−0.37	0.632	0.69 (1.53, 3.10)
6,000 or above (reference group)			1			1
Living arrangement		0.751			0.043	
Living alone	−0.07	0.922	0.93 (0.23, 3.68)	−0.40	0.627	0.67 (0.13, 3.52)
With children	0.43	0.343	1.54 (0.63, 3.73)	0.81	0.301	2.24 (0.48, 10.39)
With spouse	0.23	0.626	1.25 (0.50, 3.16)	−2.22	0.034	0.11 (0.01, 0.85)
Other (reference group)			1			1
Disease						
Healthy	0.39	0.431	1.47 (0.56, 3.83)	−0.90	0.401	0.41 (0.05, 3.36)
Presence of illness (reference group)			1			1
Family support	−0.04	0.002	0.96 (0.93, 0.99)	−0.04	0.113	0.97 (0.92, 1.01)
Friend support	−0.08	<0.001	0.93 (0.90, 0.95)	−0.14	0.000	0.87 (0.82, 0.92)
Neighbor support	−0.05	<0.001	0.95 (0.93, 0.98)	−0.02	0.361	0.98 (0.94, 1.02)
Constant	6.67	<0.001	–	9.46	<0.001	–

Note: Model 1: Goodness of fit $\chi^2 = 148.53$, $df = 16$, $P < 0.001$; model 2: Goodness of fit $\chi^2 = 96.22$, $df = 16$, $P < 0.001$. OR, odds ratio; CI, confidence interval.

chronic diseases. The old elderly needed help in their daily living due to physical or cognitive impairments. Hence, they needed to live with their children or with other individuals, such as a housemaid. Previous research has suggested that changes in living arrangements among older adults may be related to mortality [19]. Therefore, our study indicated that the socio-demographic characteristics of older adults at different ages need to be taken into consideration.

Social isolation is prevalent in community-dwelling older people. Previous research showed that approximately 20% of the elderly were considered to be socially isolated [10]. In our sample, the proportion of social isolation in young and old elderly was approximately the same as that reported by the prior study. In both Western countries and China, the negative effects of deteriorating health and changes in social networks' characteristics in the process of aging were similar, which may lead to social isolation. We observed that the percentage of social isolation in older adults was significantly higher than that of the young elderly, which was in line with previous findings [5,6,13]. Also, old elderly are more likely to experience the problem of losing a spouse, and interactions with friends might be more limited due to illness or disability as their age increases [25]. The results of this study indicated that the proportion of social isolation in the two different age groups was significantly different. Hence, corresponding nursing practices should focus more on the old elderly compared to the young elderly.

Our findings suggested that aging adults tended to seek support from their family members. Support from friends and neighbors ranked in second and third place, respectively. However, regression analysis showed that support from friends was of great benefit with respect to the prevention of social isolation compared to support from neighbors and family members among the young elderly.

Previous research showed that the family network did not always facilitate the elderly in keeping healthy, and a lack of social support from family members in late life may promote the improvement of health under certain circumstances [26]. In recent years, the young elderly have indicated that they prefer to live independently from their children due to different viewpoints, lifestyles, as well as other factors [27], which allowed them to spend more time with friends and neighbors to avoid being socially isolated after retirement [28]. However, only friendship support for the old elderly could help them avoid social isolation. Some research has suggested that friendship contributed more to older adults regarding psychological comfort and information-sharing [29,30]. Friendships with peers for all elderly seemed to be the most important factor to help them avoid being social isolated [31]. As social networks in late life decrease due to the death of friends and relatives, the significance of core relationships is likely to increase over time. Choi and Ha found that the spouses of married older adults are likely to become or expected to become a more important core source of social support as other sources of support shrink [32]. Thus, spouses could help relieve the risk of social isolation for the old elderly.

5. Limitations and considerations for future work

Our study has some limitations. First, the cross-sectional design of the study only allowed for the description of the relationships of social isolation and several factors, but a causal conclusion could not be drawn. A longitudinal study would be more effective in that respect. Second, this study only recruited older adults from urban areas from just one city. Thus, it was not possible for this study to accurately represent the elderly from the whole of China. Therefore, we recommend that multi-center research should be conducted in the future.

6. Conclusions

This study offers important information that is relevant to community nursing practices. Older adults of different ages have different characteristics, and we must pay attention to the dynamic features of their social interactions. Therefore, in addition to the role of examining physical and psychological health problems in the elderly, community nurses also need to assess the social demographic characteristics and especially the status of social isolation in older adults. As social networks gradually shrink with aging, proactive measures should be taken to prevent social isolation. For the young elderly, they should maintain good communication and interactions with their family members, friends, and neighbors. However, for the old elderly, new, non-relative relationships should be cultivated or expanded to counterbalance the adverse effects of social network loss.

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Conflicts of interest

The authors have no potential conflicts of interest, financial or otherwise, to disclose.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijnss.2019.11.003>.

References

- Jang Y, Park NS, Chiriboga DA, Yoon H, Ko J, Lee J, et al. Risk factors for social isolation in older Korean Americans. *J Aging Health* 2016;28(1):3–18. <https://doi.org/10.1177/0898264315584578>.
- Grenade L, Boldy D. Social isolation and loneliness among older people: issues and future challenges in community and residential settings. *Aust Health Rev* 2008;32(3):468–78. <https://doi.org/10.1071/AH080468>.
- Hemingway A, Jack E. Reducing social isolation and promoting well being in older people. *Qual Ageing Older Adults* 2013;14(1):25–35. <https://doi.org/10.1108/1471779131111085>.
- Klinenberg E. Social isolation, loneliness, and living alone: identifying the risks for public health. *Am J Public Health* 2016;106(5):786–7. <https://doi.org/10.2105/AJPH.2016.303166>.
- Smith TF, Hirdes JP. Predicting social isolation among geriatric psychiatry patients. *Int Psychogeriatr* 2008;21(1):50–9. <https://doi.org/10.1017/S1041610208007850>.
- Giuli C, Spazzafumo L, Sirolla C, Abbatecola AM, Lattanzio F, Postacchini D. Social isolation risk factors in older hospitalized individuals. *Arch Gerontol Geriatr* 2012;55(3):580–5. <https://doi.org/10.1016/j.archger.2012.01.011>.
- Nicholson NR, Shellman J. Decreasing social isolation in older adults: effects of an empowerment intervention offered through the CARELINK program. *Res Gerontol Nurs* 2013;6(2):89–97. <https://doi.org/10.3928/19404921-20130110-01>.
- Iliffe S, Kharicha K, Harari D, Swift C, Gillmann G, Stuck AE. Health risk appraisal in older people 2: the implications for clinicians and commissioners of social isolation risk in older people. *Br J Gen Pract* 2007;57(537):277–82. [https://doi.org/10.1016/S0212-6567\(07\)70882-X](https://doi.org/10.1016/S0212-6567(07)70882-X).
- National data 2017[Internet]. cited 2019 May 15]. Available from: <http://www.stats.gov.cn>; 2019.
- Zhang S, Chen G. Prevalence and risk factors of social isolation of Chinese elderly. *Popul J* 2015;37(4):66–76.
- Smith KJ, Victor C. Typologies of loneliness, living alone and social isolation, and their associations with physical and mental health. *Ageing Soc* 2018;39(8):1709–30. <https://doi.org/10.1017/S0144686X18000132>.
- Gaudier-Diaz MM, Haines AH, Zhang N, DeVries AC. Social influences on microglial reactivity and neuronal damage after cardiac arrest/cardiopulmonary resuscitation. *Physiol Behav* 2018;194:437–49. <https://doi.org/10.1016/j.physbeh.2018.06.012>.
- Taylor HO, Taylor R, Nguyen AW, Chatters LM. Social isolation, depression, and psychological distress among older adults. *J Aging Health* 2018;30(2):229–46. <https://doi.org/10.1177/0898264316673511>.
- Stephote A, Shankar A, Demakakos P, Wardle J. Social isolation, loneliness, and all-cause mortality in older men and women. *Proc Natl Acad Sci U S A* 2013;110(15):5797–801. <https://doi.org/10.1073/pnas.1219686110>.
- Eng PM, Rimm EB, Fitzmaurice G, Kawachi I. Social ties and change in social ties in relation to subsequent total and cause-specific mortality and coronary heart disease incidence in men. *Am J Epidemiol* 2002;155(8):700–9. <https://doi.org/10.1093/aje/155.8.700>.
- Zhang WJ, Liu RP. Determinants of social isolation of the Chinese elderly. *Popul Res* 2016;40(5):75–91.
- Amirkhosravi N, Adib-Hajbaghery M, Lotfi MS, Hosseini M. The correlation of social support and social participation of older adults in Bandar Abbas, Iran. *J Gerontol Nurs* 2015;41(6):39–47. <https://doi.org/10.3928/00989134-20150325-02>.
- Lu R, Liu Y, Yang X. A study on the size of social network for the elderly under urbanization. *Soc Sci J Univ Shangxi* 2014;26(5):7–10.
- Feng ZX, Falkingham J, Liu XT, Vlachantoni A. Changes in living arrangements and mortality among older people in China. *SSM - Popul Heal* 2017;3:9–19. <https://doi.org/10.1016/j.ssmph.2016.11.009>.
- Wang XM. Subjective well-being associated with size of social network and social support of elderly. *J Health Psychol* 2016;21(6):1037–42. <https://doi.org/10.1177/1359105314544136>.
- Ahmad OB, Boschi-Pinto C, Lopez Christopher AD, Murray JL, Lozano R, Inoue M. Age standardisation of reports: a new WHO standard. *World Health Organization*; 2001. 31):1–14. Retrieved from, <https://www.who.int/healthinfo/paper31.pdf>.
- Wu F, Sheng Yu. Social support network, social support, self-efficacy, health-promoting behavior and healthy aging among older adults: a pathway analysis. *Arch Gerontol Geriatr* 2019;85:103934. <https://doi.org/10.1016/j.archger.2019.103934>.
- Lubben J, Blozik E, Gillmann G, Iliffe S, von Renteln Kruse W, Beck JC, et al. Performance of an abbreviated version of the Lubben Social Network Scale among three European community-dwelling older adult populations. *Gerontol* 2006;46(4):503–13. <https://doi.org/10.1093/geront/46.4.503>.
- Sherbourne C, Steward A. The MOS social support survey. *Soc Sci Med* 1991;32(6):705–14. [https://doi.org/10.1016/0277-9536\(91\)90150-B](https://doi.org/10.1016/0277-9536(91)90150-B).
- Cornwell B. Social disadvantage and network turnover. *J Gerontol Ser B Psychol Sci Soc Sci* 2015;70(1):132–42. <https://doi.org/10.1093/geronb/gbu078>.
- Litwin H, Stoeckel KJ. Social network and mobility improvement among older Europeans: the ambiguous role of family ties. *Eur J Ageing* 2013;10(3):159–69. <https://doi.org/10.1007/s10433-013-0269-5>.
- Chen W, Duan Y. Empty-nest life expectancy of the Chinese elderly: a multi-state life table analysis. *Popul Res* 2017;41(5):3–15.
- Huxhold O, Miche M, Schuz B. Benefits of having friends in older ages: differential effects of informal social activities on well-being in middle-aged and older adults. *J Gerontol Ser B Psychol Sci Soc Sci* 2014;69(3):366–75. <https://doi.org/10.1093/geronb/gbt029>.
- van der Horst M, Hilde C. How friendship network characteristics influence subjective well-being. *Soc Indic Res* 2012;107(3):509–29. <https://doi.org/10.1007/s11205-011-9861-2>.
- Watt RG, Heilmann A, Sabbah W, Newton T, Chandola T, Aida J, et al. Social relationships and health related behaviors among older US adults. *BMC Public Health* 2014;14(1):533. <https://doi.org/10.1186/1471-2458-14-533>.
- Hemingway A, Jack E. Reducing social isolation and promoting well being in older people. *Qual Ageing Policy Pract Res* 2013;14(1):25–35. <https://doi.org/10.1108/1471779131111085>.
- Nihtiälä E, Martikainen P. Why older people living with a spouse are less likely to be institutionalized: the role of socioeconomic factors and health characteristics. *Scand J Public Health* 2008;36(1):35–43. <https://doi.org/10.1177/1403494807086421>.