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Social support network, social support, self-efficacy, health-promoting behavior and healthy aging among older adults: A pathway analysis

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ABSTRACT

Aims: To determine the pattern of relationships among social support network, social support, self-efficacy, health-promoting behavior and healthy aging in older adults.
Methods: Totally, 485 community-dwelling participants aged 60 years and older were recruited from four districts of Beijing, China. Data were obtained from July to November, 2017 using a questionnaire containing general information items, the Lubben Social Network Scale-18, the Medical Outcomes Study Social Support Survey-Chinese version, the Self-rated Abilities for Health Practices Scale, the Health-Promoting Lifestyle Profile II and a Healthy Aging Instrument. Path analysis was applied to examine the pattern of relationships between one's social support network and healthy aging.
Results: The influence of a neighbor network on healthy aging was stronger than that of a family and friend network. Friend network had greater impact than family network on health-promoting behavior and self-efficacy. However, support from family members had a stronger effect than friend support and neighbor support on health-promoting behavior, self-efficacy and healthy aging. Furthermore, the finding revealed that self-efficacy had the stronger effect on healthy aging than that of health-promoting behavior.
Conclusion: These findings demonstrate that one's social support network plays an important role in promoting healthy aging. In China, medical and human resources for community healthcare systems are often limited. We propose that community nurses, as the "gatekeepers" to the healthcare system, should actively collaborate with older adults' social network resources to promote healthy aging. Moreover, nurses should develop efficient programs which focus on the ways of improving self-efficacy.

1. Introduction

Facilitating healthy aging might be an important strategy to address issues arising in the aging population, and has received much attention since the 1990s. The concept of healthy aging was interpreted by the World Health Organization (WHO) in 2015, emphasizing the importance of developing and maintaining high standards of health for older individuals, and building a public health service system involving elder-centered medical care as a part of the structure of the medical environment (World Health Organization, 2016). Social support networks, as one part of the social environment, refers to a web of close social relationships that surround an individual and the characteristics of those ties. Interaction with a social support network has been associated with a wide range of health outcomes in older people (Hunter et al., 2013).

The study of social support networks originated in the field of anthropology. The foundation of the research on one's social ties and their health was formed by Casel and Cobb (Tsai, 2015). In recent years, research examining the relationships between one's social support network and their health has become popular (Perkins, Subramanian, & Christakis, 2015; Perrya & Pescosolido, 2015; Tsai, 2015). Studies found that the characteristics of one's social support network (size, closeness and frequency of contacts) and its function (social support) could affect physical, cognitive, and mental health outcomes, as well as the overall social function and engagement of older adults (Ashida & Heaney, 2008; Cornwell & Laumann, 2015). Researchers also begin to discuss whether quantity (characteristics) and quality (social support) of social support networks could influence health differently (Windsor, Rioseco, Fiori, Curtis, & Booth, 2016; Xing, Zhang, & Cheng, 2017). However, one's characteristics of social support network (quantity) and

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social support (quality) are largely affected by culture (Litwin, 2006). Different types of social support networks also affected different aspects of health depending on one's cultural background (Mendoza-n, Gonz, & Correa-muñoz, 2017; Park, Kang, & Chadiha, 2018). It was reported that support from partners and friends was most associated with well-being in older adults from Canada, whereas in Latin America, support from family was associated with better emotional and physical health (Bélanger et al., 2016). The findings of Li and her colleague (Li & Zhang, 2015) demonstrated that friend networks were more beneficial than the family networks in promoting physical health, but not mental health.

Berkman (Berkman, Glass, Brissette, & Seeman, 2000) proposed a conceptual model of how social support networks impact health. This model posited a cascading causal process, in which social structural conditions in a macro context influenced changes in health. Social relationships were affected by culture, socioeconomic factors and politics. Then, individuals could get social support from their social network, which impacted health through health behavioral pathways and/or psychological pathways. Health behaviors and self-efficacy were considered as important mediators between social ties and health. This relationship is the basis of the theoretical framework of current study.

Previous research (Thanakwang, 2011) analyzed how family members and friends could promote healthy aging in older adults based on the conceptual model of Berkman. They investigated the relationships comprising the paths to health-promoting behaviors. Their results showed that family networks and friend networks could provide people with good social support which played a direct or indirect role in promoting their health-related behaviors, and ultimately affected healthy aging. However, since older people themselves have core roles in promoting healthy aging, their subjective initiative should not be ignored. Self-efficacy is one of the most important factors in a person's subjective initiative (Bandura, 1977). It related to one's beliefs in their capability of taking actions to produce positive health outcomes (Sheeran, Maki, Montanaro, & Avishai, 2016). Mao, You, Gu, and Huang, (2007)) found a positive correlation between the health behaviors of older people, their self-efficacy, and health promotion (Theoretical framework is displayed in Fig. 1).

Despite strong empirical evidence verifying the importance of the relationship between social support networks and health, less is known about the pathways by which different social support networks affect healthy aging. Social support networks among older adults might change a lot over time because of the social transition and life events. What' more, as an important part of community health care, community nurses undertake disease prevention, disease management and health promotion outside hospitals. However, the provision of services is far from meeting the health needs because of the increasing aging population and the shortage of nursing professionals in community (Shen et al., 2009). According to a number of surveys, the ratio of community nurses to service population is 1:3393-26826.4, which is far exceeding the WHO standard of 1:2600 (Yang, Ma, Chen, & Li, 2015). Therefore, it is necessary to explore social support network and natural resources of older adults to help with promoting healthy aging. In this study, we distinguished a person's relationships based on whether they are with family members, friends or neighbors when considering types of their social support networks. We aimed to provide evidence for the direct or indirect pathways from different types of social support networks to different types of social support, self-efficacy, health-promoting behavior, and healthy aging.

1.1. Design and setting

A cross-sectional, descriptive study design was used. Four districts were considered as central city areas which had the largest percentage of the elderly population in Beijing. Data were collected based on health care centers of these districts. The survey was conducted from July to November 2017. It was approved by the Institutional Review Board of X (20160902).

1.2. Participants and sampling strategy

We used a cross-sectional sample size estimation formula and assumed 20% of questionnaires might be removed from analysis to determine an effective sample size must comprise at least 480 participants (120 participants in each districts) (Manasatchakun et al., 2016). A convenience sampling method was applied. The participants who met inclusion criteria were selected. The inclusion criteria were (a) 60 years or older and retired at home; (b) had resided in the community for at least 1 year; (c) had not been diagnosed with a severe disability or severe dementia; (d) was able to understand; and (d) was willing to participate in the study. All participants signed informed consent documents and were told they could withdraw at any time without any explanation. A total of 500 community-dwelling participants aged 60 years and older from four districts were finally recruited to participate in this study.

1.3. Measurement instruments

Self-report questionnaires were used to collect socio-demographic data which included age, gender, marital status, education, personal income, major source of income, living arrangement and disease condition.

Social support networks were assessed by the revised Lubben Social Network Scale-18 (LSNS-18). The scale was used primarily to measure size, closeness and frequency of contacts of respondents' social network (Lubben et al., 2006). The expanded version (LSNS-18) can better specify and distinguish the nature of family, friendship, and neighborhood social networks. The Chinese version of LSNS-18 is available from the official website (Lubben, 2019) The instrument contains 18 items in 3 subscales (family network, friend network and neighbor network). Each item was scored to a range of 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 is an equally weighted sum of the 18 items, with scores ranging from 0 to 90. Subscales are constructed from the 6 items that ask about family members, friends and neighbors respectively. Higher scores indicate better social relations. In this study, the Cronbach's α of subscales ranged from 0.74 and 0.89, and the Cronbach's α of total scale was 0.86.

The Chinese version of Medical Outcomes Study Social Support Survey (MOSSS-C) was used for measuring social support from the three different types of social relationships separately (family, friendship and neighborhood). The original instrument was developed by Sherbourne & Stewart (Sherbourne et al., 1991). It is comprised of 20 items in 4

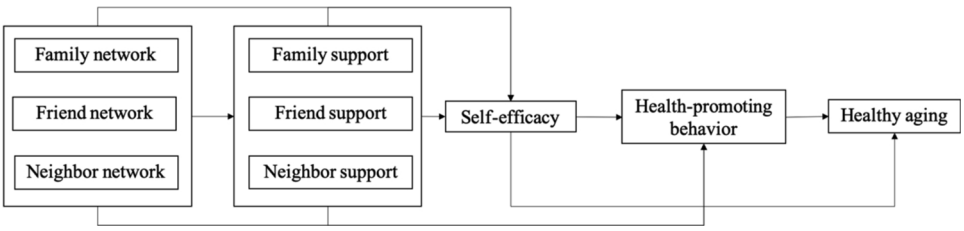

Fig. 1. The hypothesized relationship between social support network and healthy aging.

subscales: emotional informational support, tangible support, positive social interaction, affectionate support. The first item is a subjective question to measures the size of the participant's support network and was excluded from analysis in this study. The participants were asked to respond to items along a 5-point scale rated from 1(none of the time)to 5 (all of the time). Total score for this scale ranges from 19 and 95, with higher scores indicating better social support.

Health promotion behaviors were measured by the Health-Promoting Lifestyle Profile II (HPLP-II CR). The original scale was developed by Susan Noble Walker (Sousa, Gaspar, Vaz, Gonzaga, & Dixe, 2015). Cao and colleagues (Cao, Guo, & Ping, 2016) introduced the scale in China and did the cultural adaptation and translation. The 40-item summated behavior rating scale employs a 4-point response format to measure the frequency of self-reported health-promoting behaviors in the domains of health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations and stress management. Its total score ranges from 40 to 160. The HPLP-II CR has been used in numerous studies and demonstrated high reliability in this study (Cronbach's α: 0.82).

The Self-rated Abilities for Health Practices Scale (SRAHP) was designed by Heather Becker in 1993 (Becker, Stuifbergen, Oh, & Hall, 1993). The Chinese version of the instrument was obtained based on the translation, adaptation and validation of the scales in cross-cultural health care research (V. D. Sousa & Rojjanasrirat, 2011). The S-CVI (S-CVI/UA, universal agreement) and S-CVI (S-CVI/Ave) were used to assess the content validity of the scale, with values of 0.82 and 0.96, respectively, indicating good validity. The Cronbach's α of this scale was 0.84, and the Cronbach's α of the subscales ranged from 0.83 to 0.93 in this study. Participants responded to the 28-items using a 5-point scale to assess their self-perceived ability to implement health-promoting behaviors. It contains four subscales: Exercise, Nutrition, Responsible Health Practice, and Psychological Well Being. Items are rated from 0 (not at all) to 4 (completely). Total scores vary from 0 to 112 and higher scores indicate greater self-efficacy for health practices.

Participants' healthy aging was assessed by the Healthy Aging Instrument (HAI) (Thiamwong, Maneesriwongul, Malathum, & Jitapunkul, 2010). Permission to translate it from English to Chinese was granted by the author of the original scale. The HAI was translated by using a back-translation technique (Sousa & Rojjanasrirat, 2011). The original instrument was forward translated to the target language by two independent translators. Two different independent translators did the back-translation. The final Chinese version of Healthy Aging Instrument was formed after comparison and discussion, and used in a pilot study. Five experts were selected to assess the content validity. The multidimensional concept of Healthy Aging is composed of nine components: Being self-sufficient and Living Simply, Managing Stress, Having Social Relationships and Support, Making Merit and Good Deeds, Practicing Self-care and Self-awareness, Staying Physically Active, Staying Cognitively Active, Having Social Participation, and Accepting Aging. It has 35 questions and is responded to on a 5-point scale. Total scores range from 35 to 175. Higher score represents greater healthy aging level. The Cronbach's α for the total scale was 0.92. The Chinese version of Healthy Aging Instrument has good reliability and validity in the older community residents.

1.4. Statistical analysis

All statistical analysis was performed using SPSS statistical software and AMOS, version 20.0. Descriptive statistics were used to display social-demographic characteristics of the sample. Path analysis was applied to examine the pattern of relationships according to the hypothesized model. Multiple fit indices were examined to evaluate the adequacy of the model. Absolute fit indices included chi-square statistic ($P > 0.05$), the Root Mean Square Error of Approximation (RMSEA < 0.08), Goodness-of-Fit Index (GFI > 0.9), and Adjusted Goodness-of-Fit Index (AGFI > 0.9). Incremental fit indices contain Normed Fit Index (NFI > 0.9), Relative Fit Index (RFI > 0.9), Incremental Fit Index (IFI > 0.9), Tacker-Lewis Index (TLI > 0.9) and Comparative Fit Index (CFI > 0.9). Parsimonious fit indices included normed chi-square ($\chi^2/df < 2$) (Wu, 2009).

2. Results

2.1. Description of the sample

From the 500 questionnaires that were distributed, 15 participants didn't finish the self-report questionnaires and the following instruments. Hence, a total of 485 eligible subjects with completed forms were included in this study. The response rate was 97%. The mean age was 70.13 (SD = 7.66) years. The majority of the participants were female (64.90%). More than 50% of participants have a high school education or above. A total of 92.6% of the participants reported personal income more than 2000 CNY per month, which is identified as middle to high levels of income. The ratio of empty nesters (who lived alone or with only their spouse) was 38.1%, and the proportion of people living with children and living with other people (other relatives or a nursing assistant) were 35.10% and 26.80%, respectively. Most older adults (85.20%) had at least one chronic disease. More details can be found in Table 1.

2.2. Correlations among study variables

The correlations among the study variables were analyzed by using partial correlation coefficient. Socio-demographic characters were as the control variables. Several significant moderate to strong level of positive correlations were found among individuals' social networks, social support, health-promoting behaviors, self-efficacy of health practices and healthy aging status (Table 2).

Table 1
Socio-demographic characteristics of participants; N = 485.

Variables		n(%)/Mean ± SD[95%CI]
Age		70.13 ± 7.66[69.63, 71.00]
Gender	Male	170(31.5)
	Female	315(64.9)
Education	Illiterate	19(3.9)
	Elementary school	49(10.1)
	Junior high school	149(30.7)
	Senior high school	153(31.5)
	College and above	115(23.7)
Marital status	Married	377(77.7)
	No spouse	103(21.2)
	Divorce	3(0.6)
	Remarriage	2(0.4)
Personal income# (monthly)	500 CNY or below	19(3.9)
	500 ~ 1999 CNY	17(3.5)
	2000 ~ 3999 CNY	206(42.5)
	4000 ~ 5999 CNY	183(37.7)
	6000 CNY or more	60(12.4)
Major source of Income	Retirement pension	437(90.1)
	offspring	11(2.3)
	Lowest living security	5(1.0)
	Old-age pension	23(4.7)
	Others	9(1.9)
Living arrangements	Living alone	66(13.6)
	With children	170(35.1)
	With spouse	119(24.5)
	Others	130(26.8)
Disease condition	No disease	72(14.8)
	hypertension	293(60.4)
	Diabetes mellitus	152(31.3)
	Heart disease	134(27.6)
	Cancer	22(4.5)
	Stroke	32(6.6)

Note: # the average minimum wage is 2000 CNY in China in 2017. Exchange rate in US Dollars: 1 Dollar ≈ 6.78 CNY.

Table 2
Zero-order correlations among study variables; N = 485.

Variables	1	2	3	4	5	6	7	8
1 FLUB								
2 NLUB	0.26*							
3 PLUB	0.29*	0.39*						
4 FSP	0.43*	0.21*	0.13*					
5 NSP	0.20*	0.64*	0.32*	0.27*				
6 PSP	0.20*	0.33*	0.71*	0.21*	0.53*			
7 HPB	0.23*	0.17*	0.21*	0.27*	0.15*	0.20*		
8 SRAHP	0.21*	0.20*	0.15*	0.32*	0.15*	0.18*	0.74*	
9 HA	0.27*	0.30*	0.22*	0.33*	0.18*	0.21*	0.62*	0.72*

Note: *P < 0.001. HA = Healthy aging, HPB = Health-promoting behavior, SRAHP = Self-efficacy, FSP = Family support, NSP = Neighbor support, PSP = Friend support, FLUB = Family network, NLUB = Neighbor network, PLUB = Friend network.

2.3. Effect of social support networks on healthy aging

Fit indices revealed the path model obtained a satisfactory fit to the data. $\chi^2 = 19.52$ ($P = 0.11$), $\chi^2/df = 1.50$. RMSEA = 0.03, GFI = 0.99, AGFI = 0.97. Four incremental fit indices' values were between 0.92 and 0.99.

Results showed that neighbor network (β = 0.22, p < 0.05), friend network (β = 0.13, p < 0.05) and family network (β = 0.20, p < 0.05) positively affected healthy aging. Family support (β = 0.17, p < 0.05), neighbor support (β = 0.06, p < 0.05) and friend support (β = 0.06, p < 0.05) indirectly affected healthy aging. Self-efficacy promoted healthy aging directly (β = 0.56, p < 0.05), and also indirectly through the mediation of health-promoting behavior (β = 0.14, p < 0.05). The output path diagram was reached in Fig. 2 and path coefficients, written above of each path, were calculated. Total, direct, and indirect effect of variables in Healthy Aging Causal Model were presented in Table 3.

Table 3
Total, direct, and indirect effect of variables in Healthy Aging Causal Model; N = 485.

Independent variable/ Dependent variable	Direct effect	Indirect effect	Total effect
NLUB/NSP	0.61		0.61
NLUB/PSP	0.21	0.28	0.07
NLUB/FSP		0.11	0.11
NLUB/SRAHP	0.08	0.04	0.12
NLUB/HPB		0.09	0.09
NLUB/HA	0.14	0.08	0.22
PLUB/NSP	0.10		0.10
PLUB/PSP	0.65	0.05	0.70
PLUB/FSP		0.02	0.02
PLUB/SRAHP	0.11	0.06	0.17
PLUB/HPB	0.08	0.12	0.20
PLUB/HA		0.13	0.13
FLUB/FSP	0.42		0.42
FLUB/SRAHP	0.06	0.10	0.16
FLUB/HPB	0.04	0.13	0.17
FLUB/HA	0.08	0.12	0.20
NSP/PSP	0.46		0.46
NSP/FSP	0.18		0.18
NSP/SRAHP		0.08	0.08
NSP/HPB		0.06	0.06
NSP/HA		0.06	0.06
PSP/SRAHP	0.08		0.08
PSP/HPB		0.06	0.06
PSP/HA		0.06	0.06
FSP/SRAHP	0.25		0.25
FSP/HPB	0.01	0.18	0.19
FSP/HA		0.17	0.17
SRAHP/HPB	0.74		0.74
SRAHP/HA	0.56	0.14	0.70
HPB/HA	0.19		0.19

Note: HA = Healthy aging, HPB = Health-promoting behavior, SRAHP = Self-efficacy, FSP = Family support, NSP = Neighbor support, PSP = Friend support.
FLUB = Family network, NLUB = Neighbor network, PLUB = Friend network.

3. Discussion

Prior studies have documented the correlation between the social support networks and health of older people. This study is based on Berkman's conceptual model to analyze cascading causal process beginning in the social support networks of older adults, mediating by social support, self-efficacy, health-promoting behavior, and ultimately impacting healthy aging. We distinguish between relationships among family members, friends and neighbors to determine their direct or indirect effects on healthy aging in Chinese older adults. Characteristics of participants presented in this study were similar to the demographic characteristics of Beijing, China (Beijing Municipal Civil Affairs Bureau, 2017). Beijing is the capital city of China, and older adults who lived in

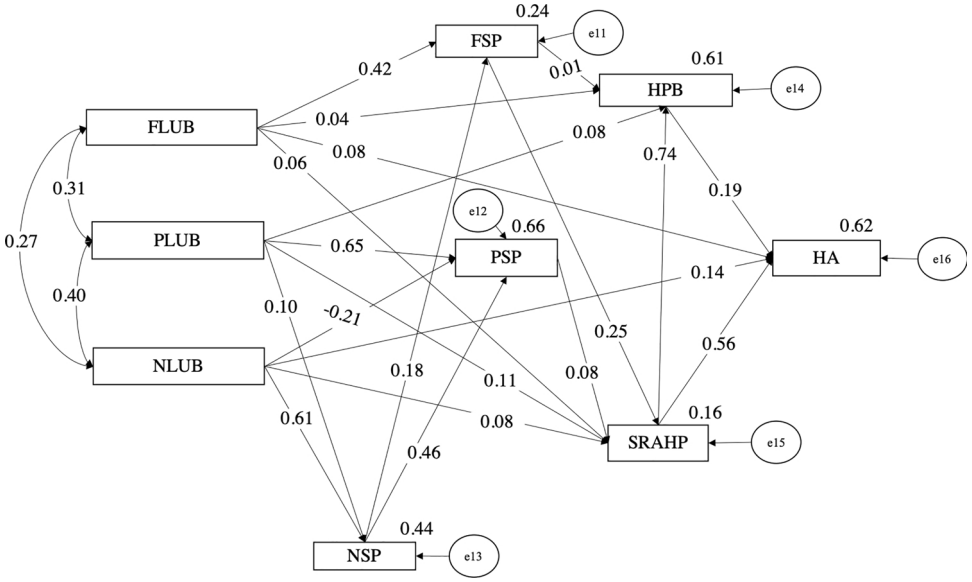

Fig. 2. Pathway analysis of social support network and healthy aging; N = 485.

the four districts studied had relatively higher levels of education and had experienced more social development.

The results confirmed findings of previous study by indicating that different types of social support networks contributed to healthy aging through different pathways (Wang, 2016). But the finding was unexpected, suggesting that neighbor network had a greater impact on healthy aging compared to the effect of family network and friend network. Within our sample, 64.9% of participants lived independently from their offspring. Neighbors may be particularly important for older adults, who are geographically closer to each other in daily life and spend much time in the community because of retirement and empty nesting (Bilger & Carrieri, 2013). In addition, friendship networks played a more important role than family networks and neighbor networks in promoting health practices and self-efficacy. It may be that older adults have substantial social trust in their friends because they share similar customs, habits, interests, and values (van der Horst & Coffé, 2012). Although the overall effect sizes for all these relationships were small, the findings could indicate that in the present context of culture and society, family network was no longer the central role to promote health of older adults. Community nurses should pay attention to the characteristics of neighbor and friend network, which could be an efficient recourse to help nurse improve healthy aging in urban community.

In addition, our data suggested that support provided by family members had relatively stronger influence than friend support and neighbor support on health-promotion behaviors, self-efficacy and healthy aging. The finding was in lined with the previous research which observed greater influence of family support on elderly well-being (Kim & Sok, 2012). Family support is considered as a core resource to meet the needs of older adults within the cultural norms. When big issues arise, older adults are more inclined to seek help from their family members (Wang, 2016). Another substantial finding was that neighbor support had positive effect on friend support and family support, then it indirectly impacted the self-efficacy and healthy aging of older adults. It suggested that neighbors may play a significant and potential role in either providing support to older adults or encourage their family members and friends to do so. Hence, community nurses should take the advantage of family support, and nursing interventions should be taken to strengthen neighbor support as well.

Finally, results from this study provided evidence that self-efficacy had significant influence on health-promotion behaviors, which is consistent with previous findings (Mao et al., 2007; Sheeran et al., 2016). In other research, health-promotion behaviors played an important role in achieving healthy aging, without considering self-efficacy (Thanakwang, 2011). This study suggested that the influence of self-efficacy on healthy aging was stronger than the influence of health-promotion behaviors. It appears that self-efficacy play an even more important role on healthy aging both directly and indirectly through health-promotion behaviors. Self-efficacy affects an individual's decision and subsequent action for enhancing health (Larson, Covey, Kapella, Alex, & McAuley, 2014). It might be meaningful for community nurses to improve the level of self-efficacy among older adults through interactions within their social support networks.

4. Clinical and research implications

Based on the findings of this research, it is possible to indicate some implications for future clinical practice and research. First, since the influence of neighbor network was slightly stronger than that of friend network and family network on promoting healthy aging among older adults, and friend network had relatively stronger effect on mediate factors of healthy aging than the other two networks. It suggests the need and importance for nurses in the community to focus on the assessment of characteristics of neighbor network and friend network, and taking the advantages of these networks. Second, family support and neighbor support played key roles in promoting healthy aging, strategies should be taken to enhance collaborations within formal support of nurses and informal support of family and neighbors. Finally, since the finding showed that self-efficacy were prominently associated with healthy aging, nurses should develop efficient programs which focus on the ways of improving self-efficacy.

We presented an in-depth examination of the relationships between social support networks and healthy aging within Chinese participants. However, several limitations must be mentioned. First of all, although the results did reveal differences between effect strength for the different types of social support (family, friend, and neighbor), the overall effect sizes for these relationships were small. A more complete model is needed to capture all the important variance related to healthy aging. Secondly, the study was carried out in four districts in Beijing. Due to the uneven development of cities in China (Wang, Sun, & Li, 2013), the representativeness of the sample needs to be improved in future studies. Finally, a cross-sectional study design is not a proper way to validate causal relationships. Therefore, longitudinal research can be conducted to confirm the causal role social support network plays in healthy aging.

Author contributions

Conceptualization, methodology, project administration, resources, supervision, validation, writing-review & editing (Y.S.)

Conceptualization, data curation, formal analysis, investigation, methodology, software, validation, writing-original draft, writing-review & editing (F.W.)

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Declaration of Competing Interest

None.

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