



Social engagement and subjective health among older adults in South Korea: Evidence from the Korean Longitudinal Study of Aging (2006–2018)

Bo Zhao^{a,b}, Ji Eon Kim^{a,b}, Jiyoung Moon^c, Eun Woo Nam^{a,b,*}

^a Department of Health Administration, Graduate School, Yonsei University, 1 Yonseidae-gil, Wonju, Gangwon-do, South Korea

^b Yonsei Global Health Center, Yonsei University, 1 Yonseidae-gil, Wonju, Gangwon-do, South Korea

^c Department of Preventive Medicine, Kangwon National University Hospital, Chuncheon, Gangwon-do, South Korea

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ABSTRACT

Background: Social engagement serves as the foundation for social connections by providing a sense of belonging, social identity, and fulfillment. Previous studies have mainly focused on the one-way relationship between social engagement and subjective health among older individuals, and little attention has been paid to their mutual relationship. Therefore, this study aimed to examine the mutual association relationship between social engagement and their subjective health in older Koreans.

Methods: Seven waves of data samples (aged ≥ 60 years) from 2006 to 2018 from the Korean Longitudinal Study of Aging (KLoSA) was used in this study. Descriptive analysis, chi-squared tests, 2-year lagged Generalized estimating equation (GEE) model, and cross-lagged panel model were performed to investigate the mutual association between social engagement and subjective health among six survey periods.

Results: Results of the GEE model revealed when controlling for other variables, older Koreans who reported good subjective health only had a higher OR (1.678 vs. 1.650, $p < 0.001$) of participating in social engagement than those who had bad subjective health in 2006–2008 period; the occurrence rate of more social engagement was significantly higher among older adults with good subjective health than among those with bad subjective health (five out six survey periods). Cross-lagged analysis showed similar results that coefficients of social engagement on subjective were relatively larger in three survey periods; coefficients of subjective health on social engagement were relatively larger in the other three survey periods. The impact of social engagement on subjective health might be greater than that of subjective health on social engagement.

Conclusion: All-around participation and engagement of older people in society have become a consensus among the international community. In view of the single social engagement activities and less relevant participation channels in Korea, government departments should consider not only regional but also local characteristics to create more social participation opportunities for older individuals.

1. Introduction

The world continues to witness unprecedented, sustained changes in the age structure of the global population. People live longer, and the overall population size has increased rapidly, with a greater proportion of older people. According to the WHO estimation, the percentage of people over 60 globally would increase from 12% to 22% between 2015 and 2022 (LeBlanc et al., 2020). By 2050, this proportion will have increased to 1 in 5 people (World Health Organization, 2020). For example, in Europe, 25% of the population is already aged 60 years or over, which is projected to reach 35% in 2050; and China will have more

than 0.4 billion older persons (Chen et al., 2022). For the first time in the world's lowest total fertility rate, South Korea (hereafter Korea) reported more deaths than births in 2020 (Lee et al., 2020). The number of people aged over 60 years in Korea was 11.8 million (around 22%) in 2020 (KOSIS, 2022). Thus, Korea's aging population has become a serious concern.

Social engagement, also known as social participation or social involvement, is the foundation of social connections or community participation, and it offers a sense of belonging, social identity, and fulfillment (Luo et al., 2020). Given the increasing number of older adults and the realization of the need to respond to rapid aging in the

Abbreviations: GEE, Generalized estimating equation; KLoSA, Korean Longitudinal Study of Aging; WHO, World Health Organization.

* Corresponding author. Department of Health Administration, Graduate School, Yonsei University, 1 Yonseidae-gil, Wonju, Gangwon-do, South Korea.

E-mail address: ewnam@yonsei.ac.kr (E.W. Nam).

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21st century, the all-around engagement of older adults in society has become a consensus for their health among the international community (World Health Organization, 2002; Croezen et al., 2009). It is also regarded as a critical component of active and successful aging (de Leon & Carlos, 2005). Therefore, it is of great significance to study the relationship between social engagement and the health of the elderly for the realization of active and healthy aging (Zaidi et al., 2017).

Subjective health as measured by self-reported evaluations of general or physical health, is an important indicator in evaluating the health status of older adults (Kaplan et al., 1988). Subjective health has been accepted by respondents and widely attracted the attention of scholars (Kaplan et al., 1988; Farmer & Ferraro, 1997), which could provide a valid and relatively stable measure of perceived health status (Bennett, 2005; Luo et al., 2020). Older adults who self-rated better health may be more active, willing to interact with others and participate in social activities. (Jiehua et al., 2017). Driven by decreasing levels of fertility and increasing life expectancy in Korea, social isolation entailed decreased social participation during the prolonged post-retirement period, which have adverse effects on physical and mental health and increase medical and welfare cost (Chung et al., 2019; Takashima et al., 2020). In other words, more social engagement of older people, better physical and mental health, and less cost for their medical and welfare.

In Korea, to active older adults' leisure and improve their subjective health status, many policies and programs (e.g.: community care) among multiple government ministries are developed (Korean Ministry of Health and Welfare, 2018; Weon, 2020). Aging Society and Population Master Plans of Korea have been established every 5 years since 2006 (Hues & Cities, 2022). Related social engagement and activities have been promoted through public-private partnerships (Kim and Kim, 2022). Although some scholars have conducted similar research about the relationship between social engagement and subjective health, either the data sources are old or the samples are small. Few articles consider comparisons in the impact of social engagement on subjective health (subjective health on social engagement) over a long period (Min et al., 2012; Luo et al., 2020), not to mention mutual relationships in older Korean people using big sample sizes. To fill up this gap, this study aimed to explore the two-way relationship between social engagement and subjective health among older Koreans using longitudinal data (2006–2018).

2. Background

2.1. Social engagement and subjective health

Many studies about health and social engagement revealed that social engagement has a crucial impact on the health and life quality of seniors (Zhang et al., 2015; Brustio et al., 2018). Health changes over the course of life are affected by the social context, which may produce inequalities in terms of exposure and vulnerability (Kumar, 2013). Mental status, functional independence, and quality of life are all affected by social determinants. The majority of older individuals live alone, do not work or work fewer hours, and participate in fewer social engagements in their later years (Cannuscio et al., 2003; Shankar et al., 2011; Zhong et al., 2017). Activities such as visiting relatives or friends and chatting with relatives have been linked to longer life and may act as a buffer against the negative effects of aging (Croezen et al., 2009; Kodzi et al., 2011).

Scholars have conducted studies on the impact of social engagement on the subjective health of older adults: not/seldom participating in or decreasing participation in social activities has a negative impact on subjective health (Dawson-Townsend, 2019). Older people in a trajectory of high and slightly increasing social engagement were related to a lower risk of mortality and improved mental health, like depression and cognitive dysfunction (Thomas, 2012; Penninkilampi et al., 2018). It has been emphasized that the effects of reducing emotional stress and the benefit to subjective health by social engagement of older people

(Dumitrache et al., 2017; Wheatley & Bickerton, 2019). Additionally, some scholars suggest that social engagement can significantly improve one's health, play a positive role in disability prevention, and positively affect the health and well-being of older adults (Bath & Deeg, 2005; Huxhold et al., 2013; Sun et al., 2016). Although social engagement is likely to vary by the type of activity and individuals, the association between health status and social engagement has been highlighted (Min et al., 2012; Utomo et al., 2019; Liu et al., 2019), such as self-rated health and psychological independence among persons with disabilities are strongly correlated with social participation (Kimura et al., 2013).

2.2. Potential dynamic relationship

Some other studies in different countries have identified that there is also a dynamic relationship between social engagement and health in old age (Min, 2013; Liu et al., 2019). Researchers pointed out that because subjective health is a response to psychological characteristics, subjective health may influence older adults' choices about whether to participate in social engagement through psychological mechanisms (Liu et al., 2019). Older adults who report good subjective health are more likely to be proactive, socialize, and participate in social engagement (Min, 2013; Jiehua et al., 2017). All kinds of social involvement could enhance the cognitive ability of older individuals, and then significantly improve the level of participation in developmental activities (e.g., attending a course of study; choosing to stay in employment) (Min et al., 2012; Dumitrache et al., 2017; Utomo et al., 2019). Thus, social engagement and subjective health may interact mutually.

It also highlighted that there was a two-way causal relationship between social engagement and subjective health of older people, and subjective health had an even greater impact on social engagement (Sirven & Debrand, 2012; Ding et al., 2015; Jiehua et al., 2017). There may be also a mutual influence on the circulation mechanism of "bad subjective health — no social engagement — bad subjective health" between social engagement and subjective health (Ding et al., 2015; Jiehua et al., 2017). Therefore, studies suggested older adults to actively change and be more involved in social activities, adjust their state of mind, and integrate more into social life for effective health promotion. Then, they may break this cycle and enter the cycle of "bad subjective health — active social engagement — subjective health improvement," and finally enter the virtuous cycle of "good subjective health — active social engagement — subjective good health" (Huxhold et al., 2014; Maass et al., 2016; Jiehua et al., 2017).

Therefore, based on the broad research that links subjective health to social engagement, the following hypotheses were developed:

Hypothesis 1. Older Korean people who rated themselves as healthy are more likely to gain health-promoting benefits from social engagement and thus remain healthier.

Hypothesis 2. There is a mutual influence between social engagement and subjective health of older Korean adults. And, social engagement has a positive facilitated impact on subjective health among them.

3. Methods

3.1. Participants

This study extracted data from the Korean Longitudinal Study of Aging (KLoSA, <http://www.kli.re.kr/ko/main/main.jspKLoSA>). KLoSA has been conducted every even-numbered year to collect residents' information aged over 45 years using the computer-assisted personal interviewing method since 2006. We included seven waves samples (2006, 2008, 2010, 2012, 2014, 2016, and 2018) and restricted our population to older people aged ≥ 60 years at each survey period in this study. Therefore, a total 5,549, 5,216, 5,194, 5,289, 5,372, 5,491, and 5527 surviving older samples in Waves 1 through 7, respectively, was

analyzed (Appendix).

3.2. Study design

First, the samples extracted from each wave with socioeconomic characteristics in each survey were studied. Second, solving the mutual influence mechanism to investigate the influence of the independent variables from the previous period on the current dependent variables is an important method (Thomas, 2011; Yang et al., 2016). Thus, we adopted it in our research. Due to data limitations, most previous similar studies used only one period of the follow-up survey. However, in this study, seven periods of KLoSA survey data were used to constitute six sample follow-up survey periods (i.e., from 2006 to 2008, 2008 to 2010, 2010 to 2012, 2012 to 2014, 2014 to 2016, and 2016 to 2018). The social engagement (or subjective health) status of the sample and other control variables were obtained in the previous period (i.e., the base period). Because each respondent had their own personal ID, their status (social engagement and subjective health) in the current standard period was matched to the base period of each study period. Changes and associations in social engagement (or subjective health) during each period were aimed to explore.

3.3. Measures

3.3.1. Social engagement

Social engagement includes social contacts with friends and family members in all groups, regardless of age or ethnicity. Questions such as these were used to determine whether or not there was social engagement: "Are you a member of any of the following organizations, clubs, or societies: religious organizations; social clubs; leisure, culture, or sports clubs; school or family reunions; voluntary or charity work; political organizations, others, or none of any?"; "Do you have close friends, relatives, or neighborhood friends? How often do you get together with them?" For one month, if participants responded with any of the four items, "Almost every day," "Once a week," "2–3 times a week," or "Once a month," they were assumed to have social interaction (Yes = 1). Other responses (i.e., once every 2 months, once or twice a year, or 3 or 5 times a year) led to the assumption that they had no social engagement (No = 0) (Min & et al., 2012).

3.3.2. Subjective health

Subjective health is a common health status indicator. In KLoSA, subjective health was obtained by asking participants, "What do you think of your health? Is it excellent, very good, good, poor, or bad?" For regression model applicability, we redefined "excellent," "very good," and "good" as good health and assigned a value of 1; we redefined "poor" and "bad" as bad health and assigned a value of 0 (Liu et al., 2019; Lee and Lyu, 2020).

3.3.3. Other variables

This study controlled for basic demographic and health-related variables (Liu et al., 2019; Lee and Lyu, 2020). The basic demographic variables were "age" (60–69 = 1, 70–79 = 2, ≥80 = 3), "educational level" (Low [below elementary school] = 0, High [high school and above] = 1), "marital status" (Others [separated, divorced, widowed, or never married] = 0, Married or living with a partner = 1), "religion" (No religion = 0, Have religion = 1), "work currently" (No = 0, Yes = 1). Other health status variables: "disability diagnosis" (Yes = 1, No = 0), "chronic disease" (Yes, at least one = 1, No = 0), "current pain" (Yes, at least one = 1, No = 0), and "hospitalization times in the past 2 years" (Yes, at least once = 1, No = 0) were used as indicators and measured by self-reported disease histories.

3.4. Statistical analyses

First, the chi-squared test was conducted between social engagement

and subjective health among older participants in each wave. Changes in base and current standard periods are presented as percentages (%).

Second, among each two survey periods, lagged generalized estimating equation (GEE) logistic regression was to examine the effect of sociodemographic and health factors on subjective health (or social engagement) in the subsequent period (i.e., the current standard period). The main advantage of GEE is that it allows us to specify a correlation structure for different responses within a subject or group (Ghisletta & Spini, 2004). The GEE enables repeated measure analysis for longitudinal data, such as KLoSA. It considers the correlation within the subject and generates the regression coefficient (β) to compare (Nari et al., 2021). Because of the variety of confounding factors (e.g., time), the relationship between social engagement and subjective health during some periods may be unstable. Summarizing and comparing model regression results for each follow-up survey period enables us to examine the relationship between subjective health and social engagement in more than one period, thus reducing the randomness effects of a survey year. 2-year lagged changes in social engagement and subjective health were calculated in the preceding and following years (2006–2008; 2008–2010; 2010–2012; 2012–2014; 2014–2016, and 2016–2018).

Then, to strengthen our longitudinal analysis, the cross-lagged panel analysis was conducted between social engagement and subjective health in every two waves. Cross-lagged models have been extensively used in some studies to examine the stability and relationships between variables over time to better understand how variables influence each other (De Jonge et al., 2001).

These approaches could approach maximizes the use of longitudinal sample information such as KLoSA samples, and track sample at least twice (Jiehua et al., 2017). All the analyses were performed using the Statistical Package for Social Science (SPSS) software suite, version 24.0, and AMOS version 21.0.

4. Results

4.1. The general demographic characteristics of samples

Table 1 shows the sample distribution and demographic variables for the seven waves. Regarding the age group, the numbers, and percentages of the young-old group (60–69) were decreasing, while the numbers and proportions of the very older population (≥80) reversed. As time progressed, the percentages of high educational levels increased wave by wave (34.2% in 2006; 53.0% in 2018). The marital status of these older Koreans had not changed much over the years. Considering religion, the proportion of older people who were religious was declining every year, reaching the lowest proportion (38.6%) in the seventh wave. The share of working older individuals rose slightly and then fell slightly, peaking in 2010 (30.0%). The proportion of older adults who were disabled, had chronic diseases, or were currently experiencing pain had generally been declining every year. While the percentage of people with hospitalization experience decreased (from 14.1% to 11.1%), it increased first and then decreased. In addition, the results of the chi-squared test between social engagement and subjective health were significant for each wave.

4.2. Correlation between social engagement and subjective health

To obtain a general understanding of the relationship between social engagement and subjective health, a simple correlation between the two was examined first. At all seven survey points, the proportion of social engagement in the sample with good subjective health was increased and was higher than that in the sample with bad subjective health (Fig. 1). Additionally, the sample with social engagement had a higher proportion of subjective good health than the sample without social engagement in all waves (Fig. 2).

The samples with bad subjective health in the base period were

Table 1
General demographic characteristics of the study sample (2006–2018).

Variables	2006 Wave 1 Samples (N = 5549)	2008 Wave 2 Samples (N = 5216)	2010 Wave 3 Samples (N = 5194)	2012 Wave 4 Samples (N = 5289)	2014 Wave 5 Samples (N = 5372)	2016 Wave 6 Samples (N = 5491)	2018 Wave 7 Samples (N = 5527)
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Age							
60–69	2894 (52.2)	2447 (47.5)	2354 (45.3)	2242 (42.4)	2214 (41.2)	2229 (40.6)	2214 (40.1)
70–79	1996 (36.0)	1999 (38.3)	2013 (38.8)	2120 (40.1)	2113 (39.3)	2075 (37.8)	2002 (36.2)
≥80	659 (11.9)	740 (14.2)	827 (15.9)	927 (17.5)	1045 (19.5)	1187 (21.6)	1311 (23.7)
Mean ± SD	70.27 ± 7.23	70.93 ± 7.53	71.30 ± 7.68	71.75 ± 7.84	72.24 ± 8.04	72.57 ± 8.31	72.80 ± 8.55
Educational Level							
Low	3651 (65.8)	3417 (65.5)	3231 (62.2)	3104 (58.7)	2986 (55.6)	2820 (51.4)	2596 (47.0)
High	1898 (34.2)	1799 (34.5)	1963 (37.8)	2185 (41.3)	2386 (44.4)	2671 (48.6)	2931 (53.0)
Marital Status							
Others	1775 (32.0)	1612 (30.9)	1566 (30.2)	1537 (29.1)	1567 (29.2)	1599 (29.1)	1555 (28.1)
Married/living with a partner	3774 (68.0)	3604 (69.1)	3628 (69.8)	3752 (70.9)	3805 (70.8)	3892 (70.9)	3972 (71.9)
Religion							
No religion	2464 (44.4)	2509 (48.1)	2582 (49.7)	2509 (47.4)	2979 (55.5)	3129 (57.0)	3392 (61.4)
Have religion	3085 (55.6)	2707 (51.9)	2612 (50.3)	2780 (52.6)	2393 (44.5)	2362 (43.0)	2135 (38.6)
Work Currently							
No	4325 (77.9)	3824 (73.3)	3636 (70.0)	3767 (71.2)	3816 (71.0)	3912 (71.2)	3889 (70.4)
Yes	1224 (22.1)	1392 (26.7)	1558 (30.0)	1522 (28.8)	1556 (29.0)	1579 (28.8)	1638 (29.6)
Disability Diagnosis							
No	5110 (92.1)	5135 (98.4)	5112 (98.4)	5255 (99.4)	5314 (98.9)	5455 (99.3)	5483 (99.2)
Yes	439 (7.9)	81 (1.6)	82 (1.6)	34 (0.6)	58 (1.1)	36 (0.7)	44 (0.8)
Chronic Disease							
No	3778 (68.1)	4092 (78.5)	4207 (81.0)	4543 (85.9)	4462 (83.1)	4849 (88.3)	4878 (88.3)
Yes (at least one)	1771 (31.9)	1124 (21.5)	987 (19.0)	756 (14.1)	910 (16.9)	642 (11.7)	649 (11.7)
Current Pain							
No	1371 (24.7)	1421 (27.2)	1627 (31.3)	1631 (30.8)	1613 (30.0)	1728 (31.5)	1676 (30.3)
Yes (at least one)	4178 (75.3)	3795 (75.8)	3567 (68.7)	3658 (69.2)	3759 (70.0)	3763 (68.5)	3851 (69.7)
Hospitalization times in past 2 years							
No	4767 (85.9)	4424 (84.8)	4309 (83.0)	4449 (84.1)	4653 (86.6)	4775 (87.0)	4912 (88.9)
Yes (at least once)	782 (14.1)	792 (15.2)	885 (17.0)	840 (15.9)	719 (13.4)	716 (13.0)	615 (11.1)
Social Engagement							
No	1076 (19.4)	829 (15.9)	883 (17.0)	804 (15.2)	1037 (19.3)	922 (16.8)	1207 (21.8)
Yes	4473 (80.6)	4387 (84.1)	4311 (83.0)	4485 (84.8)	4335 (80.7)	4569 (83.2)	4320 (78.2)
Subjective health							
Bad	2439 (44.0)	2086 (40.0)	2058 (39.6)	1990 (37.6)	1918 (35.7)	1862 (33.9)	1737 (31.4)
Good	3110 (56.0)	3130 (60.0)	3136 (60.4)	3299 (62.4)	3454 (64.3)	3629 (66.1)	3790 (68.6)
X ² test	73.194***	133.507***	185.066***	151.108***	141.298***	215.188***	184.485***

Note: ***p < 0.001.

divided into two categories: those with social engagement and those without it. Tables 2 and 3 reported that among the older people who had no social engagement in the base period, the proportion of those who switched to social engagement in the current standard period was higher for those with good subjective health compared to bad subjective health in the base period (4.6%–17.4%). However, for the base period of those who had bad subjective health, the proportion of those who had social engagement and changed to reporting good subjective health in the current standard period was higher than in the base period of the older adults without social engagement (6.1%–11.8%).

4.3. Relationship between social engagement and subjective health

The impacts of social engagement on current subjective health and of subjective health on current social engagement were investigated for the six survey periods.

After controlling for other sociodemographic and health factors, GEE binary logistic regression analysis was performed for further analysis to investigate whether there was a mutual relationship between subjective health and social engagement (Fig. 3). According to the results of the model, when controlling for other variables, the occurrence rate of more social engagement was significantly higher among older adults with good subjective health than among those with bad subjective health by

more than 1.678 times (p < 0.001), which is consistent with the research hypotheses. In contrast, having social engagement could significantly improve the occurrence rate of subjective good health in older people by at least 1.650 times (p < 0.001) during 2006–2008. The ORs of social engagement on subjective health were greater than subjective health on social engagement among the older Koreans in the other five survey periods (p < 0.001).

(Fig. 4) Additionally, cross-lagged panel analysis only including subjective health and social engagement in each survey period were performed. The analysis of the result coefficient (standardized regression weights) was also helpful for understanding the relationship between the two directions. In the three survey periods (2006–2008, 2008–2010, and 2014–2016), the coefficient of subjective health on social engagement was larger than that of social engagement on subjective health; the results were reversed in the other three periods.

5. Discussion

Using the data from the KLoSA follow-up survey from 2006, 2008, 2010, 2012, 2014, 2016, and 2018, the results were obtained from these seven samples. The study found that there is a mutual influence between social engagement and subjective health of Korean older adults, and the impact of social engagement on the subjective health of older people

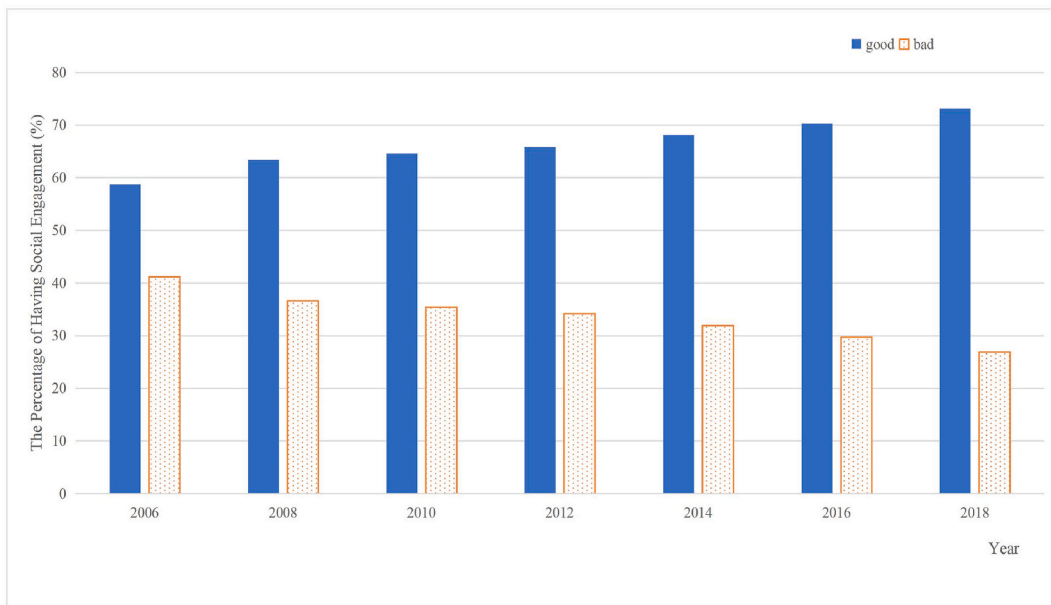


Fig. 1. Percentage of participants having social engagement by different levels of subjective health (2006–2018).

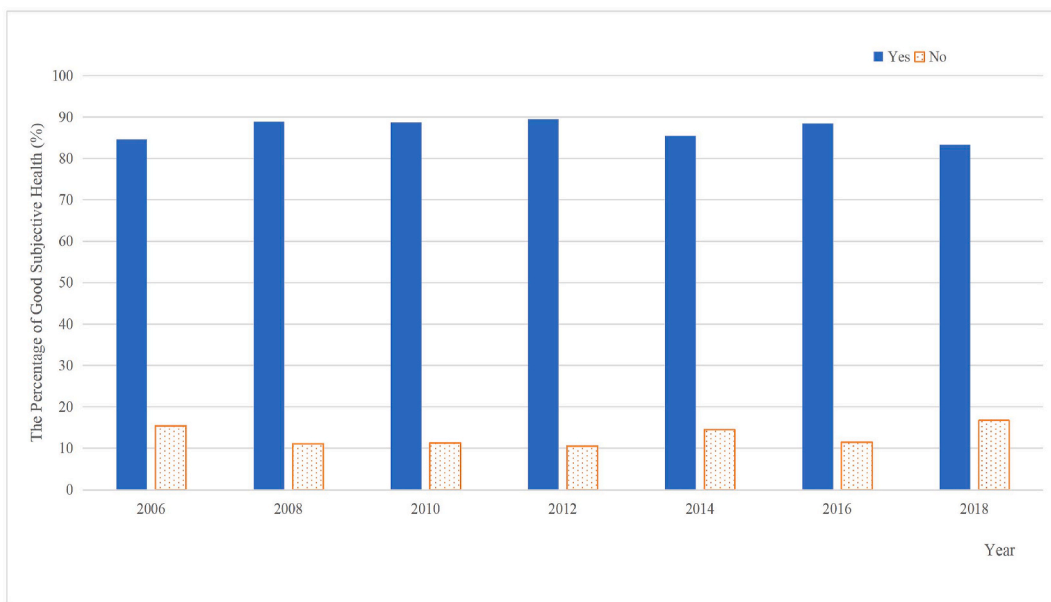


Fig. 2. Percentage of participants having good subjective health by different levels of social engagement (2006–2018).

might be greater than that of subjective health on social engagement.

5.1. Relationship between subjective health and social engagement

The result suggested that social engagement levels differed among the older group with different levels of subjective health. Compared with the samples with poor subjective health in the base period, social engagement was more likely to have a significant influence in the samples with good subjective health in the base period, indicating that older adults with good subjective health were more likely to benefit from social engagement and thus would be more likely to have good subjective health. However, older adults with poor subjective health during the base period were less likely to have significantly good subjective health in the current period, even if they participated in society.

Some scholars believe that this may be related to the psychological characteristics of older individuals (Kekäläinen et al., 2020). Subjective

health is regarded as an important reflection of older adults' psychological status and may affect their choice of whether to contribute to social engagement through psychological mechanisms (Kuykendall et al., 2018; Kekäläinen et al., 2020). These mechanisms may include: making older people feel fulfilled, more interaction with others, etc. It is possible that the psychological characteristics of older people with good subjective health are more positive and proactive, socializing and participating in social engagement (Zhang et al., 2015). They are more likely to obtain positive effects from social engagement, thus significantly improving their subjective level of health (Jang et al., 2004; Gunawan & Chich-Jen, 2014). However, the psychological characteristics of older individuals with poor subjective health in the basic period were relatively negative, and the process of social engagement did not have a positive effect on them (Gunzelmann et al., 2006; Gleibs et al., 2011). They have more difficulty in improving their health status due to the lower benefits obtained from social participation activities and

Table 2
The change in social engagement among older Koreans with different subjective health status at the base period.

		No Social Engagement in Base Period		Change Difference(%)
		Good Subjective Health (%) ^a	Bad Subjective Health (%) ^b	
Have Social Engagement in Current Standard Period	2006–2008	72.0	54.4	15.6
	2008–2010	53.2	37.8	15.4
	2010–2012	26.7	22.1	4.6
	2012–2014	43.0	32.9	10.1
	2014–2016	54.2	36.8	17.4
	2016–2018	43.4	27.8	15.6

^a Good Subjective Health (%) = $\frac{No(social_engagement) \rightarrow Have(social - engagement)}{Good(subjective_health)}$.

^b Bad Subjective Health (%) = $\frac{No(social_engagement) \rightarrow Have(social - engagement)}{Bad(subjective_health)}$.

Table 3
The change in subjective health among older Koreans with different social engagement status at the base period.

		Bad Subjective Health in Base Period		Change Difference (%)
		Having Social Engagement (%) ^c	No Social Engagement (%) ^d	
Good Subjective Health in Current Standard Period	2006–2008	35.0	28.6	6.4
	2008–2010	30.6	21.5	9.1
	2010–2012	32.9	22.6	10.3
	2012–2014	34.2	22.4	11.8
	2014–2016	32.8	26.7	6.1
	2016–2018	35.5	22.5	13

Percentage: From the base period (e.g., in 2006) to the current standard period (e.g., in 2008), people whose social engagement changed with subjective health level accounted for a percentage of total people who had good subjective health (bad subjective health) in the base period (e.g., in 2006).

Percentage: From the base period (e.g., in 2006) to the current standard period (e.g., in 2008), people whose subjective health changed with social engagement level accounted for a percentage of total people who had social engagement (no social engagement) in the base period (e.g., in 2006).

^c Have Social Engagement (%) = $\frac{Bad(subjective_health) \rightarrow Good(subjective_health)}{Having(social_engagement)}$.

^d No Social Engagement (%) = $\frac{Bad(subjective_health) \rightarrow Good(subjective_health)}{No(social_engagement)}$.

social engagement, which would lead to a greater gap in health inequality over the long term (Eo et al., 2017; Nazroo, 2017). Similarly, studies also indicated that people who remained in good health at middle old age were more likely to participate in social activities and gain utility (Sirven & Debrand, 2012); those who were in poor health were likely to decline even more rapidly as they did not benefit from social activities (Ohemeng et al., 2020). However, other opinions pointed out that whether there is social engagement in the base period or not, good subjective health would promote social engagement among seniors. That suggested that subjective health may have a greater influence on social participation (Maass et al., 2016; Jiehua et al., 2017), which is not in line with our study’s results.

Consistent with our hypothesis, the findings of this study indicated that a higher level of social engagement was consistently associated with better subjective health (Choi et al., 2019). Social engagement is more commonly thought of as the extent to which people are meaningfully involved in their social environment (Lewis, 2014; Tellado et al., 2017). Studies on social engagement and mental health are also helpful in understanding the relationship between social engagement and subjective health: social engagement improves older adults’ mental health, especially their psychological distress and depressive disorders (Luo et al., 2020). According to a Japanese longitudinal study, social engagement helps older adults’ mental health, especially their ability to cope with psychological distress and depressive symptoms (Kikuchi et al., 2017). It had been discovered that the quality of life was positively associated with social contacts among older adults (Lei et al., 2016), and the contact frequency independently connected to future subjective well-being (Rafnsson & Shankar, 2015). Findings from older Americans also revealed that diverse social engagement and networks were

associated with improved well-being, regardless of demographic and health characteristics (Litwin & Shiovitz-Ezra, 2011).

The complex associations between social engagement and health also pointed out that the impact of social relationships on health and physical function may be influenced by physiological and psychological mechanisms (Thoits, 2011). Social engagement could broaden older people’s social networks, which fosters attachment, acceptance by others, a sense of community, identity and esteem, and easier access to social assistance (Takagi et al., 2013). In particular, older people could enable access to functional support and help from family members, neighbors, and friends. That may attenuate the impact of declining physical health on everyday function and disability by providing a sense of purpose and a sense of control over one’s life as well as efficacy in one’s abilities (Mendes, 2003). This connection is important and has been linked to older individuals’ greater sense of control, subjective health, and quality of life (Rafnsson & Shankar, 2015). Therefore, we may also predict that social engagement may be an important factor contributing to health inequality among older adults (Rainer, 2014). That is, the healthier older people are, the more likely they are to gain health promotion effects from social engagement and thus become healthier (Liu et al., 2019; Deeg et al., 2019).

5.2. Implications for Korean society

Social engagement has the potential to expand older people’s social networks, leading to esteem, attachment, belongingness, social approval and identity, increasing access to social support (Takagi et al., 2013). To improve the subjective health of older adults and promote active social engagement, it is critical to strengthen the publicity and guidance

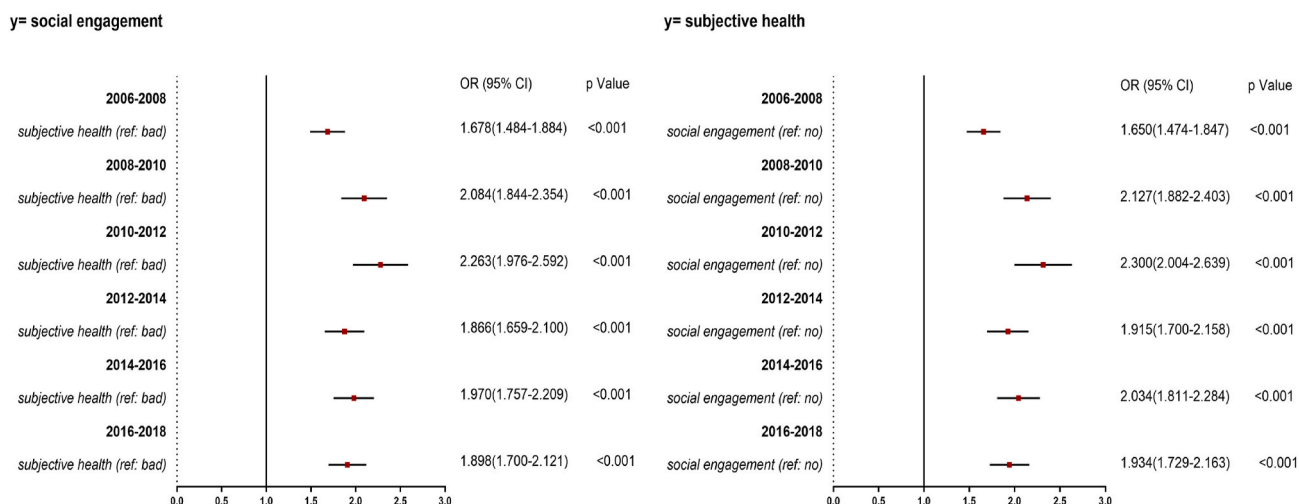


Fig. 3. Partial coefficients of GEE results between social engagement and subjective health among Older Koreans in six survey periods. Note: models in every two waves adjusted for demographic and health-related variables (including: age, educational level, marital status, religion, work currently, disability diagnosis, chronic disease, current pain, hospitalization times) (Tables S5 and S6).

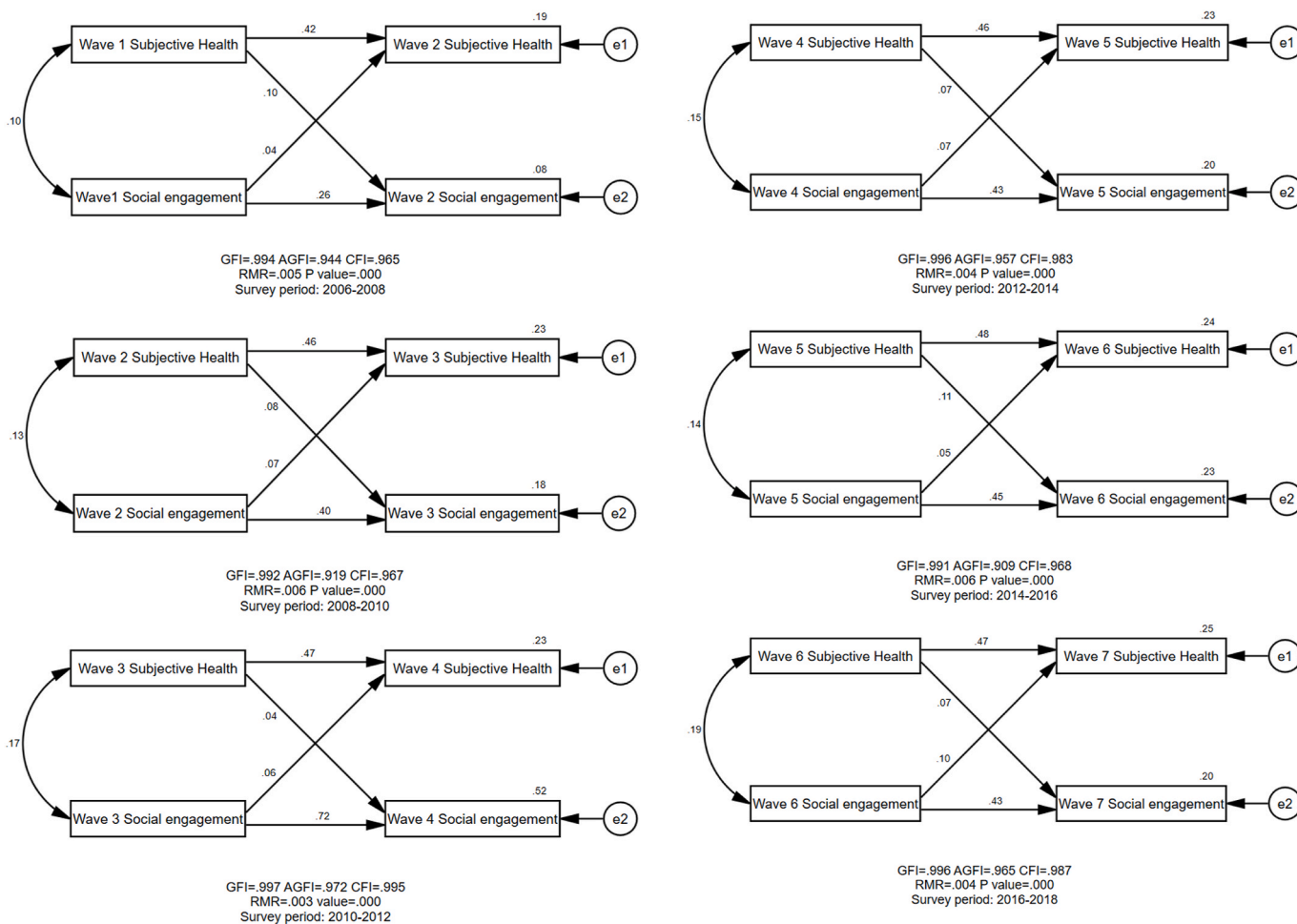


Fig. 4. cross-lagged panel analysis results between social engagement and subjective health among Older Koreans in six survey periods Note: In 2012–2014, “Wave 4 Subjective health” on “Wave 5 Social engagement” is 0.065; “Wave 4 Social engagement” on “Wave 5 Subjective health” is 0.074.

mechanisms, encourage older people to participate in society, cultivate awareness of social engagement among them, and improve their rate of social participation. Given the importance of older adults’ subjective health, policymakers should take how social engagement could be

incorporated into preventive health into account.

In Korea, a variety of policies and programs are being used to create more engagement opportunities for older adults. For example, social networks are formed through activities that promote job creation for

seniors, participation in cultural events, education for older individuals, and participation in religious events (Choi et al., 2021). There are policy directions for older individuals' work and social participation, such as increasing senior productivity through lifelong education expansion and activating leisure and volunteering activities (Lee et al., 2022). The Korean government has prioritized providing support for senior centers, private sectors in each region for the social activities and engagement of older adults (Ko et al., 2019).

However, since the characteristics of urban and rural areas are different, policies that could reflect these differences are needed (Won & Kim, 2020). Given the shifting characteristics of seniors, professional domains of volunteering, such as education, social services, culture, and sports, are being criticized. Partnerships with the private sector in elder programs need to be further evaluated to improve the quality and expand elder programs (Jeong & Park, 2020). Therefore, Korea government departments should consider not only regional but also local characteristics to create more social participation opportunities for the elderly and a facilitative environment (Ko et al., 2019; Won & Kim, 2020; Choi et al., 2021).

5.3. Limitations and future research

Some limitations should be considered in this study. Firstly, due to the design of the questionnaire, there may be some limitations in variables' inclusion and collation, which may lose some detailed information and affect the findings of this study. Multi-data coding and widely used scales are planned to contribute to the next study. Second, this study aimed to explore the two-way relationship between social engagement and subjective health. Although the GEE analyzed all other variables (sociodemographic and health-related factors), we did not show their relationship with social engagement (or subjective health) instead put the results in Appendix. Third, mutual association relationships have long been a serious problem in the social sciences. The GEE model and cross-lagged panel analysis were used to clarify the mutual association relationship between social engagement and subjective health to some extent under the control of other variables and time effect. However, given the effects of other related factors (e.g: individuals who may participate multiple times), this method cannot fully investigate the possible error correlation between the two. Therefore, it would be useful to analyze the relationship between social engagement and subjective health using multi-period survey samples, which could involve more variables in scales and more rigorous research methods in the future.

6. Conclusions

Our findings suggest that older Korean adults with good subjective health were more likely to participate in socially engaging activities. Social engagement could also significantly improve the subjective health of older Koreans. Thus, there is a circular mechanism of mutual influence between the two, and the impact of social engagement on subjective health may be stronger. This finding has meaningful implications for successful and healthy aging in Korea. To improve the subjective health and quality of life of older individuals, it would be worthwhile to increase their control of negative emotions and self-efficacy through social engagement (Cybulski et al., 2017a). This research is generally consistent in supporting the notion that higher levels of social engagement have a positive impact on the subjective well-being of the elderly and is important for successful aging (Cybulski et al., 2017b). To prepare for the golden years of the Korean elderly, it is recommended that not only policies but individual and community interventions should promote and facilitate older people being more socially engaged within specific cultural contexts.

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Declaration of competing interest

The authors declare that they have no competing interest.

Authors' contributions

Bo Zhao: Conceptualization, Methodology, Validation, Formal analysis, Data curation, Writing – original draft, Visualization, Ji Eon Kim: Writing – review & editing, Jiyoung Moon: Writing – review & editing, Eun Woo Nam: Supervision, Writing – review & editing.

Ethics statement

The KLoSA is a national public database operated by the Korea Labor Institute. To the public for scientific research, KLoSA data have been anonymized and released. This study was also approved by Yonsei University Institutional Review Committee (IRB) (Task No. 1041849-202104-SB-068-01).

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmph.2023.101341>.

Abbreviations

KLoSA Korean Longitudinal Study of Aging
GEE Generalized estimating equation

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