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Social participation and depressive symptoms in community-dwelling older adults: Emotional social support as a mediator

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ABSTRACT

Previous studies have documented the protective effects of social participation on depression in older adults. In this study, we investigated the association between social participation and depressive symptoms and the associated gender difference in older adults. In addition, we explored the mediating role of emotional social support in the association between social participation and depressive symptoms. We collected data from 4751 community-dwelling adults aged 60 and above from the Korean Retirement and Income Study (KReIS) conducted in 2017 and 2018. The relationship between social participation (participation in different types of activities, frequency of participation, and the number of activities participated) and the risk for depressive symptoms was examined. Older adults who participated in social activity, volunteer work, and donation had decreased risk of depressive symptoms. More frequent and more diverse participation in activities further reduced the risk. Overall, women benefited more from social participation than men. Importantly, emotional social support significantly mediated the relationship between social participation and depressive symptoms. Social participation was associated lower odds for depression in older adults, particularly in older women. Our findings provided one of very few pieces of evidence that documents the mediating role of emotional social support in the relationship between social participation and depression among the elderly.

1. Introduction

Depression is one of the most debilitating illnesses that plagues the lives of many, with older adults particularly at risk. According to the World Health Organization (World Health Organization, 2015), around 15% of adults aged 60 and above suffer from mental disorders, with depression being one of the most common disorders (Vink et al., 2008). Although depression has detrimental consequences on both the physical and mental health of individuals of all ages, it is particularly serious for the elderly. Not only are they more vulnerable to depression biologically (Alexopoulos, 2019; Lohman et al., 2016), older adults are also disadvantaged socially; they are more likely to feel isolated as their social networks shrink with age, which has negative effects on mental health (Blazer, 2005). As such, one crucial protective factor against depression that has drawn much attention is social engagement (Roh et al., 2015).

Active social engagement has been discussed as a crucial component of positive aging (Johnson and Mutchler, 2014; von Humboldt and Leal, 2014). Most notably, activity theory suggested that engaging in social activities buffers against negative consequences of aging on mental health by fulfilling older adults' psychological as well as social needs (Blazer, 1982; Lemon et al., 1972). According to the theory, older persons find their identities and meaning through social roles, leading to vitality in their lives (Ryff, 1982; Wethington et al., 2000). Also, social participation benefits older people irrespective of their physical activity level by providing opportunities to form social network and therefore acquire adequate social support, which is one of the chief protective factors against depression (Glass et al., 2006).

The link between social activities and depression has been tested by numerous studies (Hao, 2008; Hong et al., 2009; Roh et al., 2015). Overall pattern suggests that social participation is associated with

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decreased levels of depression. However, in many studies, the distinctions among different types of social activities have been blurred, making it difficult to determine the unique effects of specific types of activities (Chiao, 2011; Hao, 2008). Also, a closer look at the past studies that looked at specific types of activities independently shows inconsistent findings. For instance, economic activity significantly reduced depression in older adults in several studies (Chaaya et al., 2010), but other studies found the opposite effects (Hong et al., 2009). In addition, the associations between volunteering and depression are also inconsistent across studies (Lee and Kim, 2016; Li and Ferraro, 2006), with the nonlinear effects of volunteer hours on depression adding complexity (Hao, 2008; Morrow-Howell et al., 2003).

Just as important as the type of activities is the range of participation in various social activities (Hao, 2008). From the role accumulation theory perspective (Adelmann, 1994; Sieber, 1974), engaging in multiple roles in diverse social activities may have beneficial compensatory or complementary effects. Some researchers have documented that volunteering may compensate the deficits in participation in other activities such as paid work (Greenfield and Marks, 2004). Alternatively, others have found that volunteering complemented the benefits of being employed (Hao, 2008). In any case, commitment in diverse activities may render more protective effects against depression than engaging in a single activity (Hao, 2008; Sugihara et al., 2008). However, relatively few studies have examined the joint effects of engaging in different types of activities, particularly in non-Western cultural context.

One critical mechanism through which social participation may exert protective effects against depression is the provision of social support (Glass et al., 2006; Li et al., 2018). Engaging in diverse activities may offer older adults opportunities to form social relationships and exchange emotional intimacy, resulting in higher levels of perceived connectedness and lower levels of loneliness (Park et al., 2013). Perceived emotional social support, in particular, is well-documented to be an effective buffer against depression (Blazer, 2005; Carstensen et al., 1999; Jacobson et al., 2017), and may be superior over instrumental support (i.e., help with daily chores around the house), which may violate one's autonomy and cause feelings of helplessness (Penninx et al., 1998). However, few studies have examined the mechanism underlying the relationship between social participation and depression. Moreover, none of the prior studies have tested whether participation in different types of activities are consistently associated with emotional social support, which in turn may reduce the levels of depression. Considering that the kinds of social resources available vary by types of sources (Cornwell and Waite, 2009), it is beneficial to understand if social participation of different types provides emotional support in older adults.

The goal of the present study was to examine the relationship between social participation and depressive symptoms in older adults. Since earlier research and its findings have been limited in examining distinct types of activities individually and collectively, we investigated a comprehensive list of social participation; including economic activity, social activity, volunteer, and donation, as well as the frequency of the participation in these activities. We hypothesized that social participation in general would be associated with lower odds for depressive symptoms. Moreover, based on the role accumulation theory and empirical findings from previous research (Hao, 2008), we hypothesized that more diverse social participation might be associated with lower odds for having depressive symptoms. In addition, we explored the possibility of gender difference in the relationship between social participation and depressive symptoms, as previous studies identified gender as the crucial factor that may moderate the beneficial effects of social roles (Agahi and Parker, 2008). Finally, we hypothesized that the association between social participation and decreased likelihood of depressive symptoms would be partly mediated by perceived emotional social support.

2. Material and methods

2.1. Study population

Data were obtained from the main and additional survey of the Korean Retirement and Income Study (KReIS), which was conducted in 2017 and 2018, respectively. The main survey of the KReIS is conducted biennially since 2005 by the National Pension Research Institute for examining the income security and retirement status of middle-aged adults in South Korea. The KReIS is a panel survey that includes a national representative sample of households with at least one family member aged 50 years or older and their spouses (or legal partners) (Lee and Kim, 2017). In order to acquire a nationally representative sample, the survey selects households using a stratified cluster sampling based on the Korean Population and Housing Census. The respondents in the survey are all non-institutionalized people living in the community. The main survey of the KReIS investigated the retirement, economic and financial status, employment status, pension, housing, health status, satisfaction with living conditions using the computer-assisted individual interviewing technique, and the additional survey assessed respondent's social participation of previous year. A growing body of social epidemiological studies on mental health have been performed using the data of the KReIS (Kim et al., 2017; Nam et al., 2018). Among the data of 7572 adults from 4449 households in the main survey of the KReIS conducted in 2017 (response rate = 92.0%), 5291 individuals were aged 60 years or older. Among them, we used a sample of 4751 adults and excluded the data of individuals with missing values (or non-response) in the following variables: questionnaire of depressive symptoms (n = 51), education level (n = 6), household income (n = 173), self-rated health (n = 51), satisfaction with living conditions (n = 51), and social participation (n = 345). The dataset of the KReIS is publicly available (http://www.kreis.or.kr/), and all the respondents gave informed consent for survey data to be used for research purposes before participating in the survey. The protocol for this study was approved by the ethics committee of Korea University Anam Hospital (IRB No. 2020AN0040).

2.2. Assessments of social participation

In the present study, the social participation was defined as being earnestly involved in economic activity, social activity, volunteer work, or donation at least once per year. The additional survey of the KReIS conducted in 2018 gathered information about social activity, volunteer work, and donation and their frequency during the past year (i.e., 2017), and the information about economic activity was obtained from the main survey conducted in 2017. Respondents were asked whether they engaged in the following social participation domains: 1) economic activity: engagement of paid work at least 7 h or unpaid family work at least 18 h during past week; 2) social activity: engagement of activities in social club, hobby club, sports club, community circle, civic organization, political party, religious communion, or academic association during past year; 3) volunteer work: engagement of volunteer work during past year; and 4) donation: participation in cash donation or in-kind donation during past year. Except for economic activity, the frequencies of all social participation were investigated. In the analysis, they were coded as 'once per two weeks or more frequent', 'once per month or less frequent', or 'never' for social activity and volunteer work; and as '12 per year or more frequent', '2–11 per year', 'once per year' or 'never' for donation.

2.3. Assessments of depressive symptoms

In the main survey of the KReIS 2017, depressive symptoms of respondents were assessed using a 20-item version of the Center for Epidemiologic Studies Depression (CES-D) Scale questionnaire, which is one of the most widely used in population-based studies (Radloff, 1977).

CES-D evaluates depressive symptoms with 4-point Likert scale based on the frequency of the symptoms (i.e., ≤1 day in the past week; 2–3 days in the past week; 4–5 days in the past week; ≥ 6 days in the past week) and the sum of the score is positively correlated with severity of depressive symptoms (Radloff, 1977). In the present study, presence of significant depressive symptoms was defined as having a total score of 16 or greater on the CES-D according to previous studies (Gomez and McLaren, 2015; Thomas et al., 2001). The Korean version of the 20-item CES-D was validated with high internal consistency (Cho and Kim, 1993). In the present sample (n = 4751), Cronbach's alpha for internal consistency of CES-D was 0.942.

2.4. Assessment of emotional social support

Emotional social support was assessed in the additional survey of the KReIS conducted in 2018. Eight items were used to measure perceived emotional social support (e.g., "I have someone to talk to when I am lonely", "Others comfort me when I am upset", "I have someone to trust and rely on") (see Supplementary materials for full items). Responses indicated the degree to which they agree on the aforementioned items on a 5-point Likert scale (1 = not at all; 5 = very much). Cronbach's alpha for internal consistency of emotional social support was 0.891.

2.5. Covariates

The following socioeconomic and health-related variables were included as covariates in the analyses: age, gender, education level (non-regular education; elementary school graduation or below; middle school graduation or below; high school graduation or below; college degree or above), equivalent household income (below the first quartile [Q1]; above Q1 and below the second quartile [Q1–Q2]; above Q2 and below the third quartile [Q2–Q3]; above the Q3), marital status (widowed/divorced/never married; married), living alone (yes; no), chronic disease (yes; no), self-rated health, satisfaction with living conditions, and limitation of activity of daily living (ADL). Equivalent household income was determined by dividing the raw yearly household income by the square root of family size. Self-rated health and satisfaction with living conditions were assessed with five-point Likert scales (Table 1). The limitation of ADL was evaluated by the 7-item Korean Activity of Daily Living (K-ADL) scale, which was developed to assess independence of basic activity of elderly including dressing, washing (face and hands), bathing, eating, transferring, toileting, and continence (Won et al., 2002). We determined the limitation of ADL as partially or fully requiring help with at least one activity.

2.6. Statistical analyses

A logistic regression model was used to analyze the association between social participation and depressive symptoms, adjusted for potential confounding factors including all the socioeconomic and health-related variables mentioned in the covariates. The model included social participation as an independent variable and the presence of depressive symptoms as a dependent variable. The association of social participation and depressive symptoms was investigated in regard to the type (i.e., economic activity, social activity, volunteer work, and donation), frequency, and how many types of social participation were made (i.e., any one or more vs. never; 3 or more, 2, 1, never). We also performed regression analyses without controlling for potential confounding factors (i.e., unadjusted model). To investigate the potential moderating role of gender in the association between social participation and depressive symptoms, we performed gender-stratified logistic regression analysis including all the aforementioned socioeconomic and health-related variables as covariates. Finally, we tested the indirect effect of emotional social support on the relationship between social participation and depressive symptoms using type of social participation as the predictor and the total score of CES-D as the outcome. We used PROCESS

Table 1
Socioeconomic and health-related characteristics of study population.

Characteristics	Depressed (n = 1280)		Non-depressed (n = 3471)		chi-square or *t*-test	
	n	%	n	%	χ^2 or t	P
Age						
60–64 years	195	15.2	786	22.6	115.04	<0.001
65–69 years	222	17.3	771	22.2		
70–74 years	244	19.1	763	22.0		
75–79 years	294	23.0	659	19.0		
80+ years	325	25.4	492	14.2		
Mean ± SD	73.82 ± 7.90		71.24 ± 7.42		10.15	<0.001
Gender						
Female	859	67.1	1959	56.4	44.12	<0.001
Male	421	32.9	1512	43.6		
Education level						
Non-regular education	266	20.8	385	11.1	116.66	<0.001
Elementary school graduation or below	522	40.8	1259	36.3		
Middle school graduation or below	221	17.3	694	20.0		
High school graduation or below	213	16.6	834	24.0		
College degree or above	58	4.5	299	8.6		
Household income						
Less than Q1	453	35.4	736	21.2	154.82	<0.001
Q1 - Q2	357	27.9	831	23.9		
Q2 - Q3	273	21.3	915	26.4		
More than Q3	197	15.4	989	28.5		
Marital status						
Widowed/Divorced/Never married	572	44.7	956	27.5	125.99	<0.001
Married	708	55.3	2515	72.5		
Living alone						
Yes	412	32.2	635	18.3	105.06	<0.001
No	868	67.8	2836	81.7		
Chronic disease						
Yes	910	71.1	2391	68.9	2.15	0.142
No	370	28.9	1080	31.1		
Self-rated health						
Very bad	172	13.4	61	1.8	533.84	<0.001
Bad	505	39.5	909	26.2		
Fair	481	37.6	1278	36.8		
Good	118	9.2	1176	33.9		
Very good	4	0.3	47	1.4		
Limitation of ADL						
Yes	139	10.9	89	2.6	140.85	<0.001
No	1141	89.1	3382	97.4		
Satisfaction with living conditions						
Very dissatisfied	18	1.4	2	0.1	567.30	<0.001
Dissatisfied	206	16.1	139	4.0		
Neither satisfied nor dissatisfied	884	69.1	1719	49.5		
Satisfied	172	13.4	1558	44.9		
Very satisfied	0	0.0	53	1.5		
CES-D score (mean ± SD)	24.36 ± 6.42		5.08 ± 4.09		100.14	<0.001
Social participation						
Economic activity						
Yes	358	28.0	1379	39.7	55.764	<0.001
No	922	72.0	2092	60.3		
Social activity						
Yes	497	38.8	2168	62.5	212.06	<0.001
No	783	61.2	1303	37.5		
Frequency						
Once per two weeks or more frequent	87	6.8	588	16.9	227.29	<0.001
Once per month or less frequent	410	32.0	1580	45.5		
No	783	61.2	1303	37.5		
Volunteer work						
Yes	15	1.2	138	4.0	23.59	<0.001
No	1265	98.8	3333	96.0		
Frequency						
Once per two weeks or more frequent	3	0.2	64	1.8	25.308	<0.001
	12	0.9	74	2.1		

(*continued on next page*)

Table 1 (*continued*)

Characteristics	Depressed (n = 1280)		Non-depressed (n = 3471)		chi-square or *t*-test	
	n	%	n	%	χ^2 or t	P
Once per month or less frequent						
No	1265	98.8	3333	96.0		
Donation						
Yes	80	6.3	445	12.8	41.073	<0.001
No	1200	93.8	3026	87.2		
Frequency						
12 per year or more frequent	23	1.8	126	3.6	41.22	<0.001
2 -11 per year	29	2.3	173	5.0		
Once per year	28	2.2	146	4.2		
No	1200	93.8	3026	87.2		

Abbreviations: SD = standard deviation, Q1 = the first quartile, Q2 = the second quartile, Q3 = the third quartile, ADL = activity of daily living, CES-D = 20-item version of the Center for Epidemiologic Studies Depression Scale.

macro (Hayes and Preacher, 2014) with 5000 bootstrap resampling and 95% confidence intervals (CI) with full adjustment for the covariates. The indirect effect was significant when 0 was not between the lower and upper confidence limit. The difference in socioeconomic and health-related variables between older adults with and without depressive symptoms was analyzed using chi-square test or independent *t*-test. All statistical analyses in the present study were performed using IBM SPSS Statistics for Windows, Version 24.0 (IBM Corporation, Armonk, NY, USA), and statistical significance was considered at P = 0.05.

3. Results

3.1. Socioeconomic and health-related characteristics of the sample

Among 4751 adults aged 60 years or older in the total sample, 1280 (26.9%) had significant depressive symptoms (i.e., CES-D score ≥ 16) in the one week prior to the survey. Older adults with and without depressive symptoms showed significant differences in all the socioeconomic and health-related variables, except for the presence of chronic disease (Table 1, all, P < 0.001; chronic disease, P > 0.1). Female gender, higher age level, low education or income levels, being widowed/divorced/never married, living alone, poor self-rated health, having limitation of ADL, and dissatisfaction with living conditions were factors associated with depressive symptoms (Table 1). Older adults without depressive symptoms were more likely to participate in economic activity, social activity, volunteer work, and donation (Table 1). They also showed higher frequencies in all type of social participation (Table 1).

3.2. Association of social participation between depressive symptoms

For type of social participation, in the adjusted model, participation in social activity (odds ratio [OR] = 0.60, 95% CI = 0.52–0.70), volunteer work (OR = 0.42, 95% CI = 0.24–0.74), or donation (OR = 0.56, 95% CI = 0.43–0.74) at least once per year were associated with lower OR for having depressive symptoms compared to non-participation of each activity (Table 2). However, participation in economic activity was not associated with depressive symptoms (Table 2, OR = 0.97, 95% CI = 0.82–1.14). In unadjusted model, all types of social participation showed significantly lower OR for having depressive symptoms (Table 2).

Having any one or more type of social participation was associated with lower odds for having depressive symptoms compared to never having social participation in the adjusted model (Table 2, OR = 0.60, 95% CI = 0.51–0.71). Furthermore, having three or more type of social participation was associated with lowest OR for having depressive symptoms (OR = 0.28, 95% CI = 0.17–0.45) followed by having two (OR = 0.60, 95% CI = 0.49–0.75) and only one type of social participation (OR = 0.63, 95% CI = 0.53–0.74) compared to never having social participation (Table 2).

Table 2
Association of social participation with depressive symptoms in older adults according to type of social participation.

Social participation	Unadjusted model		Adjusted model	
	OR	95% CI	OR	95% CI
Economic activity				
Yes	0.59[a]	0.51–0.68	0.97	0.82–1.14
No	1		1	
Social activity				
Yes	0.38[a]	0.33–0.44	0.60[a]	0.52–0.70
No	1		1	
Volunteer work				
Yes	0.29[a]	0.17–0.49	0.42[b]	0.24–0.74
No	1		1	
Donation				
Yes	0.45[a]	0.35–0.58	0.56[a]	0.43–0.74
No	1		1	
Social participation (any one or more)				
Yes (n = 3315)	0.36[a]	0.31–0.41	0.60[a]	0.51–0.71
No (n = 1456)	1		1	
Diversity of social participation				
3 or more (n = 259)	0.13[a]	0.08–0.20	0.28[a]	0.17–0.45
2 (n = 1222)	0.32[a]	0.26–0.38	0.60[a]	0.49–0.75
1 (n = 1834)	0.43[a]	0.37–0.50	0.63[a]	0.53–0.74
None (n = 1456)	1		1	

In an adjusted model, logistic regression analyses for having depressive symptoms were performed, controlling for age, gender, education level, income level, marital status, living alone, chronic disease, self-rated health, limitations on activities of daily living, and satisfaction with living conditions.
OR = odds ratio; CI = confidence interval. If OR > 1, then one is more likely to have depressive symptoms compared to referential variables.
a, p < 0.001; b, p < 0.01.

3.3. Association of frequency of social participation with depressive symptoms

For frequency of each social participation, more frequent social activity and volunteer work were associated with lower odds for having

Table 3
Association of frequency of social participation with depressive symptoms in older adults.

Social participation	Unadjusted model		Adjusted model	
	OR	95% CI	OR	95% CI
Social activity				
Once per two weeks or more frequent	0.25[a]	0.19–0.31	0.47[a]	0.36–0.62
Once per month or less frequent	0.43[a]	0.38–0.50	0.64[a]	0.54–0.75
No	1		1	
Volunteer work				
Once per two weeks or more frequent	0.12[a]	0.04–0.39	0.19[b]	0.06–0.61
Once per month or less frequent	0.43[b]	0.23–0.79	0.62	0.32–1.19
No	1		1	
Donation				
12 per year or more frequent	0.46[a]	0.29–0.72	0.84	0.51–1.37
2 -11 per year	0.42[a]	0.28–0.63	0.54[b]	0.35–0.83
Once per year	0.48[a]	0.32–0.73	0.45[a]	0.28–0.70
No	1		1	

In an adjusted model, logistic regression analyses for having depressive symptoms were performed, controlling for age, gender, education level, income level, marital status, living alone, chronic disease, self-rated health, limitation of activity of daily living, and satisfaction with living conditions.
OR = odds ratio, CI = confidence interval. If OR > 1, then more likely to have depressive symptoms compared to referential variables.
a, p < 0.001; b, p < 0.01.

depressive symptoms compared to less frequent or never having social participation (Table 3). For social activity, the OR for having depressive symptoms in older adults with once per two weeks or more frequent participation was 0.47 (95% CI = 0.36–0.62) and the OR in those with once per month or less frequent participation was 0.64 (95% CI = 0.54–0.75) compared to non-participation in the adjusted logistic regression analysis (Table 3). For volunteer work, the OR for having depressive symptoms in those with once per two weeks or more frequent volunteer work was 0.19 (95% CI = 0.06–0.61), while, once per month or less frequent volunteer work was not associated with significantly lower OR for having depressive symptoms compared to non-participation (OR = 0.62, 95% CI = 0.32–1.19) in the adjusted model (Table 3). Regarding donation, highest frequency of donation (i.e., 12 per year or more frequent) was not associated with lower OR for having depressive symptoms (OR = 0.84, 95% CI = 0.51–1.37), while, the frequencies of 2–11 per year (OR = 0.54, 95% CI = 0.35–0.83) or once per year of donation (OR = 0.45, 95% CI = 0.28–0.70) were significantly associated with lower OR for having depressive symptoms compared to never-donating (Table 3).

3.4. Gender-stratified association of social participation with depressive symptoms

Overall, older men were more likely to involve in social participation than older women (Table S1). In the gender-stratified analysis with full adjustment for confounding factors (Table 4), having any one or more type of social participation was associated with lower OR for having depressive symptoms only in women (OR = 0.53, 95% CI = 0.44–0.65). For number of type of social participation, having three or more types (OR = 0.45, 95% CI = 0.24–0.85), two types (OR = 0.45, 95% CI = 0.34–0.60), and only one type of social participation (OR = 0.57, 95% CI = 0.46–0.70) were associated with lower OR for having depressive symptoms in women, while, only having three or more type of social participation was associated with lower OR in men (OR = 0.20, 95% CI = 0.09–0.45). For type of social participation, social activity (OR = 0.51, 95% CI = 0.42–0.62) and volunteer work (OR = 0.42, 95% CI = 0.19–0.91) were associated with lower OR for having depressive symptoms in women, while, volunteer work (OR = 0.42, 95% CI = 0.18–0.96) and donation (OR = 0.39, 95% CI = 0.25–0.60) were associated with lower OR in men. Economic activity was not associated with depressive symptoms in both women and men.

Table 4
Gender-stratified association of social participation with depressive symptoms in older adults.

Social participation	Female (adjusted model)		Male (adjusted model)	
	OR	95% CI	OR	95% CI
Social participation (any one or more)				
Yes	0.53[a]	0.44–0.65	0.80	0.60–1.07
No	1		1	
Diversity of Social participation				
3 or more	0.45[b]	0.24–0.85	0.20[a]	0.09–0.45
2	0.45[a]	0.34–0.60	0.93	0.65–1.33
1	0.57[a]	0.46–0.70	0.82	0.60–1.12
None	1		1	
Economic activity				
Yes	0.87	0.70–1.08	1.14	0.87–1.49
No	1		1	
Social activity				
Yes	0.51[a]	0.42–0.62	0.81	0.63–1.04
No	1		1	
Volunteer work				
Yes	0.42[b]	0.19–0.91	0.42[b]	0.18–0.96
No	1		1	
Donation				
Yes	0.73	0.51–1.04	0.39[a]	0.25–0.60
No	1		1	

In an adjusted model, logistic regression analyses for having depressive symptoms were performed, controlling for age, education level, income level, marital status, living alone, chronic disease, self-rated health, limitations on activities of daily living, and satisfaction with living conditions.
OR = odds ratio; CI = confidence interval. If OR > 1, then one is more likely to have depressive symptoms compared to referential variables.
a, $p < 0.001$; b, $p < 0.05$.

3.5. Mediating effect of emotional social support on the relationship between social participation and depressive symptoms

Consistent with our hypothesis, in general, participation in social activity significantly predicted greater levels of emotional social support and lower level of depressive symptoms (Table 5). Specifically, participating in social activity (B = 0.128, P < 0.001), volunteer work (B = 0.147, P < 0.01), and donation (B = 0.083, P < 0.01) were positively associated with higher emotional social support. Emotional social support predicted fewer depressive symptoms for all types of social participation (Bs < −0.896, P < 0.001). Furthermore, the indirect effects of social participation on depressive symptoms through emotional social support were significant for all types of social participation. That is, emotional social support significantly mediated the relationship between participation in social activity (indirect effect = −0.115, 95% CI = −0.185 to −0.055), volunteer work (indirect effect = −0.150, 95% CI = −0.268 to −0.058), donation (indirect effect = −0.084, 95% CI = −0.153 to −0.029), and depressive symptoms. The direct relationship between social participation and depressive symptoms all remained significant. One interesting exception was the economic activity. Consistent with the results from the logistic regression, participation in economic activity was not associated with fewer depressive symptoms (B = −0.53, P = 0.062), and interestingly, predicted lower levels of emotional social support (B = −0.050, P = 0.009).

4. Discussion

The present study examined three main research questions to acquire a more nuanced understanding of the relationship between social participation and depression using representative sample of older adults in South Korea. First, the current results indicate that participation in social activity, volunteer work, and making donations was significantly associated with a lower probability of suffering from depressive symptoms. This supports previous research findings that social or communal activities (e.g. attending religious events, clubs or group events) (Miller et al., 2014), volunteering (Hao, 2008), and donating (Choi and Kim, 2011) significantly predicted depressive symptoms. Furthermore, a linear relationship was noticed between the frequency of participation in social activity, volunteerism, and donation and reduced odds for depressive symptoms. In contrast, economic activity did not significantly reduce the odds for depressive symptoms. This suggests that unlike other activities like joining social groups or volunteering, economic activity may be associated with elements that induce stress in older adults. For instance, older adults may participate in economic activity not out of voluntary choice but out of obligations or necessity (Hong et al., 2009; Sugihara et al., 2008).

However, although economic activity alone was not associated with depression, a complementary effect was observed when it was combined with volunteer work. Additional analysis revealed that older adults who participated in economic activity in addition to volunteer work were less likely to be depressed than those who participated in volunteer work alone (OR = 0.13, 95% CI = 0.02–0.89). This suggests that those who engaged in both economic activity and volunteer work may be in a different situation from those who participated in only economic activity. Future research should address the specific condition under which economic activity might be beneficial for older adults. Also, the present finding is consistent with prior work by Hao (2008) in which he showed that full-time work combined with volunteering had a particularly protective impact against depression compared to any single activity

Table 5
Mediating effect of emotional social support on the association between social participation (economic activity, social activity, volunteer work, donation) and CES-D score.

Social participation by types	Social participation → Emotional SS (a-path)	Emotional SS predicting CES-D (b-path)	Total effect (c-path)	Direct effect (c'-path)	Indirect effect	Boot SE	LCL	UCL
Economic activity	−0.050[b]	−1.070[a]	−0.515	−0.568[c]	0.053	0.023	0.012	0.104
Social activity	0.128[a]	−0.896[a]	−1.992[a]	−1.877[a]	−0.115	0.033	−0.185	−0.055
Volunteer work	0.147[b]	−1.022[a]	−2.283[b]	−2.134[b]	−0.150	0.053	−0.268	−0.058
Donation	0.083[b]	−1.016[a]	−1.556[a]	−1.472[a]	−0.084	0.032	−0.153	−0.029

SS = social support, LCL = 95% lower confidence limit, UCL = 95% upper confidence limit; a, $p < 0.001$; b, $p < 0.01$; c, $p < 0.05$.

alone. In relation to this, we found that there were additional beneficial effects of participating in multiple types of activities. The more varied types of activities older adults engaged in, the less likely they were to experience depressive symptoms. This finding is in line with the role accumulation theory which suggests that occupying multiple roles help individuals to experience increased social network, resources, and self-esteem (Sieber, 1974). Not only the sheer frequency of participation but also the diversity of activity types mattered (Park et al., 2018).

Second, the study also revealed that there were gender differences in the relationship between social participation and depressive symptoms. Although past research theorized that gender is an important factor to consider in understanding the role of social participation and its consequences (Agahi and Parker, 2008), few studies have tested explicitly the relative importance of social participation for older men and women separately. In the present study, older men reported greater social participation in all types of activities than older women, which is in contrast to the previous studies that showed greater social participation among older women (Hong et al., 2009). This finding can be understood in the context of Korean society where men generally have more opportunities to participate in different activities based on social role expectations than women, particularly in older generations (Yoon, 2016). The same gender difference in social participation was observed among Korean immigrants residing in the United States, which attests to this cultural specificity (Park et al., 2013).

With regard to the effects of social participation on depressive symptoms, we found that older women reaped more benefits from social participation than older men. While the odds of depressive symptoms significantly decreased in older women when they participated in only one type of social participation, it took at least three or more types of activities to decrease the odds of depression in older men. This is consistent with previous work which documented a greater influence of social participation on self-reported health particularly for older women than older men or younger women (Lee et al., 2008). One possible explanation for this is that because older women have lower levels of educational or occupational opportunities than older men in Korea, social participation provides a particularly valuable experience. Considering that older women in Korea reported lower social participation and suffer from depression to a greater degree than men, targeting this group to provide opportunities for social participation would be especially effective.

Finally, emotional social support was found to be a crucial part of the mechanism by which social participation reduced the risk for depressive symptoms. One of the critical dimensions of social participation is the interpersonal component, which exerts its effects through meeting others who share similar interests or values and exchanging social support (Berkman et al., 2000). The present study is one of very few studies that tested the emotional support pathway through which social participation was associated with lower odds for depressive symptoms. To the best of our knowledge, this is the first attempt to investigate the role of emotional social support in different types of social participation. Interestingly, unlike other types of activities, participation in economic activity predicted lower, not greater, levels of emotional social support. Although engaging in productive work may be associated with a greater sense of self-efficacy or mastery for older adults (Hayward et al., 1998; Su and Ferraro, 1997), it may not be so effective in forming relational quality.

Although the present study has a number of strengths that include the large and representative community-based sample in Korea, this study has a few limitations. First, the cross-sectional design of the present study prevents us from concluding causality. A longitudinal study is required to clarify the causal relationships among these variables. Since one of the central routes for social participation is through one's social networks (Hyyppa and Maki, 2003), the reverse direction from emotional social support to social participation is also likely. Second, participants' self-reported social participation might be biased, particularly because they were asked to recall their participation in the past year. Thus, future research should utilize public records of individuals' use of facilities such as nursing homes or churches to address the potential bias. Finally, the types of activities examined in the present research were more comprehensive than most previous research (Hao, 2008; Hong et al., 2009; Lee and Kim, 2016; Roh et al., 2015; Sugihara et al., 2008), however, we were not able to distinguish between different activities within social activity category (i.e., social club, hobby club, sports club, community circle, civic organization, political party, religious communion, academic association sports), because of the relatively small number of people who engaged in each social activity.

Despite these limitations, our study presents robust evidence that non-economic social participation in social activity, volunteer work, and donation is associated with lower odds for having depressive symptoms in older adults, and particularly for older women than men. Moreover, this study identifies emotional social support as a critical element of social participation that reduces the risk of depressive symptoms. Koreans have the highest suicide rate among the elderly in the Organization for Economic Cooperation and Development (OECD) countries (2014) and the primary cause of suicide in the elderly is depression (Brown et al., 2000). Therefore, it would be worthwhile for policy makers to aim at providing opportunities for social participation in the elderly population.

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Contributors

E. Choi wrote the manuscript as a first author. E. Choi and K.-M. Han managed the literature search and performed statistical analysis of the data. E. Choi, K.-M. Han, J. Chang, Y. J. Lee, K. W. Choi, C. Han, and B.-J. Ham contributed to the analysis and interpretation of the data. K.-M. Han conceived and designed the study and wrote the protocol as a corresponding author. All authors contributed significantly and have approved the final manuscript.

CRediT authorship contribution statement

Eunsoo Choi: Writing - original draft, wrote the manuscript as a first

author, Formal analysis, Data curation, contributed to the analysis and interpretation of the data. All authors contributed significantly and have approved the final manuscript. **Kyu-Man Han:** managed the literature search and performed statistical analysis of the data, Formal analysis, Data curation, contributed to the analysis and interpretation of the data, Writing - original draft, conceived and designed the study and wrote the protocol as a corresponding author. All authors contributed significantly and have approved the final manuscript. **Jisoon Chang:** Formal analysis, Data curation, contributed to the analysis and interpretation of the data. All authors contributed significantly and have approved the final manuscript. **Youn Jung Lee:** Formal analysis, Data curation, contributed to the analysis and interpretation of the data. All authors contributed significantly and have approved the final manuscript. **Kwan Woo Choi:** Formal analysis, Data curation, contributed to the analysis and interpretation of the data. All authors contributed significantly and have approved the final manuscript. **Changsu Han:** Formal analysis, Data curation, contributed to the analysis and interpretation of the data. All authors contributed significantly and have approved the final manuscript. **Byung-Joo Ham:** Formal analysis, Data curation, contributed to the analysis and interpretation of the data. All authors contributed significantly and have approved the final manuscript.

Declaration of competing interest

The authors have no potential or actual conflicts of interest.

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Appendix A. Supplementary data

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