Effect of social network on body mass index among the elderly

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Directed by Professor Hyeon Chang Kim

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ABSTRACT

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Objective: It is known that obesity appears to spread through social ties. However, the association between other characteristics of social network and obesity is unclear. This study aimed to identify the association between social network characteristics such as density of communication network and average frequency of communication with body mass index in an elderly Korean population.

Methods: This cross-sectional study analyzed data from 660 Koreans (275 men, 385 women) aged 60 years or older who participated in the Korean Social Life, Health, and Aging Project. Density of communication network is the number of connections in the social network reported as a fraction of the total links possible. Average frequency of communication measures how often network members communicate each other. The association of those social network measures with body mass index was investigated by multiple linear regression analysis.

Results: The lower tertiles of communication density and frequency were correlated with higher body mass index among the elderly. After adjusting for potential confounders, the lower tertile of communication density was associated with higher body mass index in men (p=0.041), but not in women (p=0.400). The lower tertile of communication frequency was associated with higher body mass index in women (p=0.043), but not in men (p=0.130).

Conclusions: Our study suggests that density of communication network and average frequency of communication are associated with obesity among the elderly. There may also be gender differences in this association.

Key words: aged, body mass index, obesity, social networks

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I. INTRODUCTION

The study of the effects of social networks on health rose to the surface in the 1970s through pioneers such as Cassel, Cobb, and Berkman, who theorized or demonstrated empirically that social networks could affect mortality.[1-5] After those mortality studies, several studies have reported that social networks are related to infectious diseases, such as sexually transmitted disease,[6-9] tuberculosis,[10] severe acute respiratory syndrome,[11] and pneumonia.[12] Additionally, evidence suggests that health-related emotional states such as depression,[13] suicide,[14] and happiness[15] are also associated with social networks. Social networks affect health through a variety of mechanisms, including the provision of social support (both perceived and actual), social influence (e.g., norms, social control), social engagement, person-to-person contacts (e.g., pathogen exposure, secondhand cigarette smoke), and access to resources (e.g., money, jobs, information).[16]

Studies have suggested that health behaviors spread in social networks in a contagious manner. For example, the smoking behaviors of adolescents' friends influence the odds of smoking initiation, continuation, and cessation,[17-19] and similar effects have been documented for alcohol use.[20,21] Like tobacco and alcohol consumption, some behaviors related to weight gain and weight loss appear to be socially transmissible. A study has linked unhealthy weight-control behaviors among adolescent girls to the dieting behaviors of their peers.[22] Among adults, evidence suggests that weight-loss interventions that target social networks are more effective than are those that target isolated individuals.[23-26] Social network assessment over 32 years in the Framingham Heart Study found that obesity tended to spread among close social ties.[27] It found that a person's chances of becoming obese increased by 57% if she or he had a friend who also became obese. Additionally, the evidence for the influence of friends on body weight comes from other studies examining the relationships between the weight of individuals and their friends.[28-32] These studies tested the relationship between the body mass index (BMI) of individuals and their friends in order to address the peer effect.

It is known that obesity appears to spread through social ties. However, the association between other characteristics of social network and obesity is unclear. Thus we investigated whether social network characteristics such as network size, density of communication network, average frequency of communication, and average frequency of meeting are associated with BMI in an elderly Korean population.

II. MATERIALS AND METHODS

The Korean Social Life, Health, and Aging Project (KSHAP) conducted a social network survey and health examination from Nov 2011 through Jul 2012 among 860 community-dwelling adults aged 60 or older and their spouses living in Yangsa-myeon, Ganghwa-gun, Incheon, Korea. The Institutional Review Board of Yonsei University approved this study (YUIRB-2011-012-01) and informed consent was obtained from all participants. A total of 814 people responded to the social network survey (response rate 94.7%). Potentially confounding factors were assessed as well, including age, education, smoking status (never or ever smoker), alcohol drinking status (non-drinker or drinker), depression score (Center for Epidemiologic-Depression Scale, CES-D), and self-reported hypertension and diabetes. Among them, 660 participants (81.1%) were examined for height and weight in a public health center (n=514) or at home (n=146). In order to collect social network data, KSHAP adopted a model similar to that of National Social Life, Health, and Aging Project.[33] On the 'Social network card I', the respondents were asked questions about three types of alters: their spouse (Roster A), a maximum of five people with whom the respondents discussed things that were important to them (Roster B), and someone to whom the respondents felt especially close (Roster C). On the 'Social network card II', respondents answered questions about the relationships among the alters listed on the rosters, and this information was used to build up egocentric network variables.

Network size

The egocentric network was composed of Roster A and B. Network size was simply a count of the number of alters provided in response to questions on the 'Social network card I'.

Density of communication network

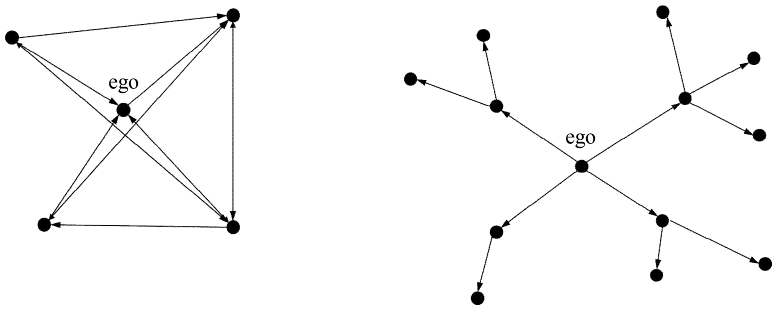
KSHAP data can be used to construct a personal (ego-centric) network density variable that reflects the extent to which someone's closest contacts are connected to one another. Density of communication network (or communication density) is calculated as:

$$D_e(n_i) = \frac{\sum_{j,k}^{e} d(n_j,n_k)}{(e-1)(e-2)} \quad (i{\neq}j{\neq}k)$$

Node n_j and n_k represents the adjoined nodes connected to node n_i and 'e' represents the number of adjoined nodes connected to n_i. If node n_j and n_k are connected, d(n_j, n_k) becomes one and if not, it becomes zero. After summing and dividing by every possible number of connections between adjoined nodes, this becomes density of communication network. A figure 1 show two personal networks, (a) one that has some interconnectivity among alters, and (b) the other with alters that connect to others outside ego's immediate network.[34]

Figure 1. Dense and radial networks

(a) (b)



Average frequency of communication and average frequency of meeting

Respondents were asked to rate how often they talked to each network member on an 8-point scale, ranging from 'everyday' to 'less than once per year'. The scores were coded by assigning the approximate number of times per year egos interacted with alters (e.g., 'everyday'=365; 'once a month'=12) and the scores were summed across all alters on Roster A and Roster B to obtain a measure of the overall volume of contact with network members. Then, scores were summed and divided by the network size. Average frequency of communication (or communication frequency) indicates how often network members communicated. Average frequency of meeting (or meeting frequency) was likewise calculated to determine how often network members met.

Height, weight, and BMI

Standing height was measured to the nearest 0.1 cm on a stadiometer. The participant stood on the floor with the heels of both feet together and the toes pointed slightly outward. The position of the heels, the buttocks, shoulder blades, and the back of the head was checked to contact with the vertical backboard. Once correctly positioned, the participant took a deep breath and the headboard was lowered and positioned firmly on top of the head with sufficient pressure to compress the hair. When the participant was properly positioned, the height was recorded by the examiners. Body weight was measured to the nearest 0.1 kg on a digital scale. The participant stood still in the center of the scale platform, hands at side, and looking straight ahead. When the digital readout was stable, the weight was recorded by the examiners. BMI (kg/m2) was calculated from measured weight and height.

Statistical analysis

All analysis was performed separately in men and women. To gain information on the distribution of the continuous variables (age, depression score, BMI, network size, density of communication network, average frequency of communication, and average frequency of meeting), we drew a histogram, and calculated the minimum, lower quartile, median, upper quartile, maximum, and mean values. Due to non-normal distribution, communication density, communication frequency, and meeting frequency were categorized into three classes using the tertile method. The Spearman correlation test was used to examine the possibility of multicollinearity among social network measures. For selection of significant social network variables, we drew box plots and performed trend tests on BMI according to each of the social network measures. Multiple linear regression analyses were performed to assess the linear relationship between each of the social network measures and BMI. In order to select significant social network measures, three models were tested: Model 1 included age and education, Model 2 added smoking, alcohol drinking and depression score, and Model 3 added hypertension and diabetes. Selected significant measures were included in the final regression model. Among non-hypertensive and non-diabetic persons, that final regression model was examined. Additionally, we constructed the partial regression plots to isolate the effect of the selected social measures as continuous variable. All statistical tests were performed with SAS version 9.2 (SAS Inc., Cary, NC, USA). All analyses were two-sided and p-values <0.05 were regarded as statistically significant.

III. RESULTS

Table 1. Characteristics of the study population (n=660)

Variable	Men (n=275)	Women (n=385)
Age, years	72.80 ± 7.05	71.72 ± 8.13
Body mass index, kg/m²	23.56 ± 3.28	24.30 ± 3.42
Depression score (CES-D)	10.40 ± 7.80	11.81 ± 7.93
Education, year		
≥10	55 (20.0%)	28 (7.3%)
7-9	58 (21.1%)	34 (8.8%)
0-6	162 (58.9%)	323 (83.9%)
Smoker	191 (69.5%)	8 (2.1%)
Alcohol drinker	120 (43.6%)	25 (6.5%)
Hypertension	125 (45.5%)	214 (55.6%)
Diabetes	58 (21.1%)	64 (16.6%)
Social network measures		
Network size	3.33 ± 1.25	2.99 ± 1.19
Communication density	0.75 ± 0.09	0.77 ± 0.09
Upper (>0.83)	63 (22.9%)	139 (36.1%)
Middle (0.71-0.83)	105 (38.2%)	128 (33.2%)
Lower (<0.71)	107 (38.9%)	118 (30.7%)
Communication frequency	246.39 ± 100.44	250.91 ± 104.72
Upper (365)	86 (31.3%)	135 (35.0%)
Middle (208-364)	92 (33.5%)	130 (33.8%)
Lower (<208)	97 (35.2%)	120 (31.2%)
Meeting frequency	237.60 ± 105.56	237.75 ± 114.59
Upper (365)	84 (30.6%)	131 (34.0%)
Middle (186-364)	103 (37.5%)	134 (34.8%)
Lower (<186)	88 (32.0%)	120 (31.2%)

Mean ± standard deviation; Number of people (%)
CES-D, Center for Epidemiologic-Depression Scale

Characteristics of study population were summarized in Table 1. Network size and communication density were strongly and inversely correlated in men (Spearman correlation coefficient (r_s)= -0.98, p <0.001) and women (r_s= -0.97, p<0.001). Strong positive correlations were observed between communication frequency and meeting frequency in men (r_s=0.93, p <0.001) and women (r_s=0.91, p <0.001) [Table 2].

Table 2. Correlations among social network measures

	Variable	Men (n=275)			
		Network size	Communication density	Communication frequency	Meeting frequency
Women (n=385)	Network size		-0.98 (<0.001)	-0.27 (<0.001)	-0.30 (<0.001)
	Communication density	-0.97 (<0.001)		0.29 (<0.001)	0.32 (<0.001)
	Communication frequency	-0.29 (<0.001)	0.31 (<0.001)		0.93 (<0.001)
	Meeting frequency	-0.32 (<0.001)	0.33 (<0.001)	0.91 (<0.001)	

All values are Spearman correlation coefficients (p-value).

We assessed the relationships between the social network measures and BMI by drawing a box plot [Figure 2]. In men, the tertiles of communication density and frequency were significantly inversely associated with BMI (p for trend = 0.011, and 0.019, respectively), but network size and the tertiles of meeting frequency were not significant. In women, all social network measures were significantly associated with BMI.

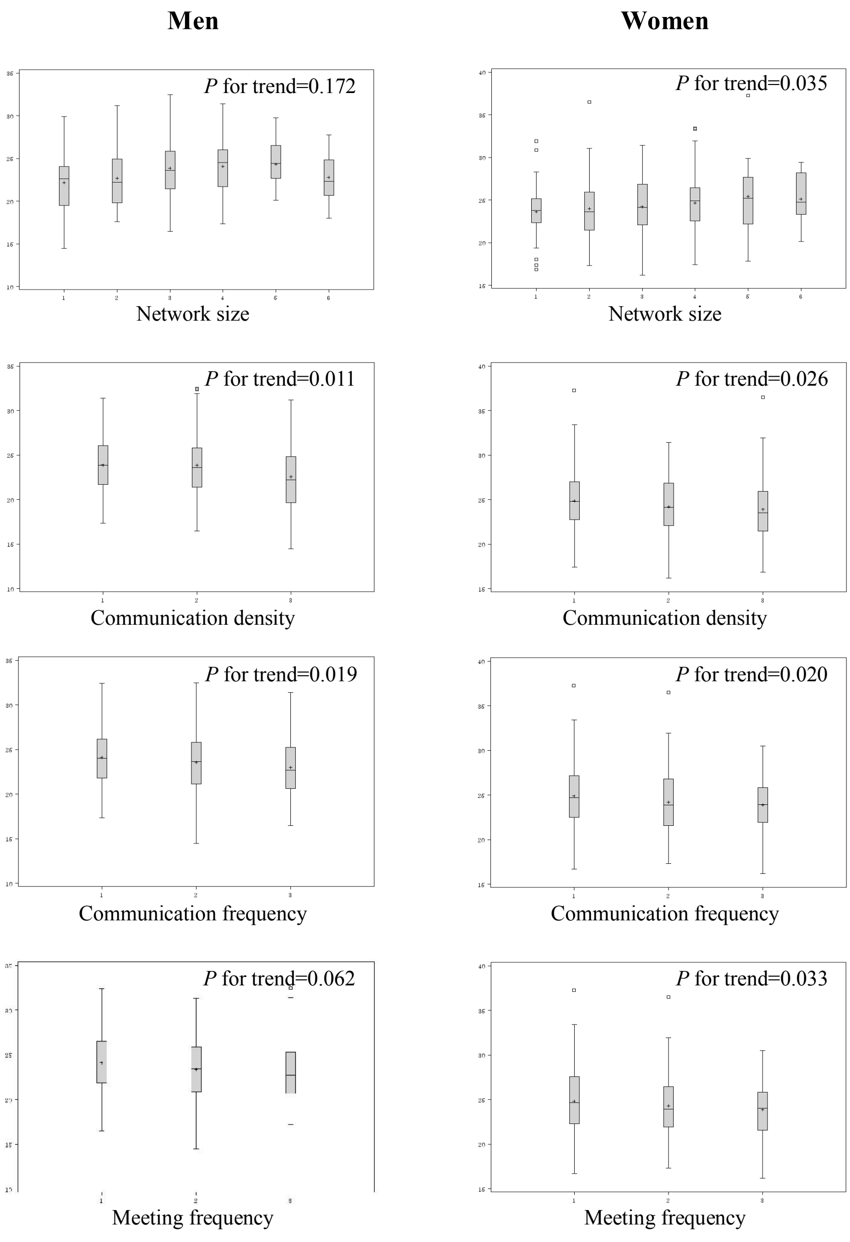


Figure 2. Social network measures and body mass index: box plots
The bottom and top of the box are the first and third quartiles, and the band inside the box is the median. The mean value is marked with a plus sign. The upper fence is defined as the third quartile plus 1.5 times the interquartile range (IQR). The lower fence is defined as the first quartile minus 1.5 times the IQR. Observations outside the fences are identified with a square.

From table 3 to 6, multiple linear regression analysis was performed to assess the linear relationship between each social network measures and BMI. Network size was not significantly associated with BMI in men and women [Table 3]. Density of communication network was associated with BMI in all models in men, but was not significantly associated in women [Table 4]. Average frequency of communication was significantly associated with BMI in men and women [Table 5], the association between meeting frequency and BMI was significant only in model 3 in women [Table 6].

Table 3. Network size and body mass index: multiple linear regression

Variable	Men (n=275)						Women (n=385)					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	ß	*p*-value	ß	*p*-value	ß	*p*-value	ß	*p*-value	ß	*p*-value	ß	*p*-value
Network size	0.194	0.211	0.235	0.134	0.263	0.085	0.226	0.123	0.235	0.111	0.235	0.109
Age, years	**-0.079**	**0.007**	**-0.068**	**0.024**	**-0.058**	**0.049**	**-0.121**	**<.001**	**-0.120**	**<.001**	**-0.129**	**<.001**
Education, years												
≥10	Reference		Reference		Reference		Reference		Reference		Reference	
7-9	0.160	0.790	0.105	0.859	0.010	0.987	**1.659**	**0.049**	**1.709**	**0.044**	**1.767**	**0.037**
0-6	-0.872	0.095	-0.948	0.066	-0.962	0.055	**2.178**	**0.002**	**2.183**	**0.002**	**2.104**	**0.002**
Smoker			**-1.553**	**<.001**	**-1.622**	**<.001**			-0.669	0.578	-0.646	0.589
Alcohol drinker			0.556	0.159	0.301	0.439			1.247	0.072	**1.383**	**0.046**
Depression score			0.005	0.861	-0.022	0.393			-0.008	0.700	-0.007	0.737
Hypertension					**0.884**	**0.021**					**0.806**	**0.021**
Diabetes					**1.571**	**0.001**					0.377	0.405

ß: ß-coefficients; The *p*-values <0.05 which statistically significant estimates appear in bold.
Model 1 included age and education, Model 2 added smoking, alcohol drinking and depression score, and Model 3 added hypertension and diabetes.

Table 4. Density of communication network and body mass index: multiple linear regression

Variable	Men (n=275)						Women (n=385)					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	ß	*p*-value	ß	*p*-value	ß	*p*-value	ß	*p*-value	ß	*p*-value	ß	*p*-value
Density of communication network												
Upper (>0.83)	Reference		Reference		Reference		Reference		Reference		Reference	
Middle (0.71-0.83)	**1.122**	**0.028**	**1.221**	**0.017**	**1.031**	**0.038**	-0.058	0.888	-0.036	0.932	-0.004	0.993
Lower (<0.71)	**1.070**	**0.035**	**1.198**	**0.020**	**1.223**	**0.015**	0.567	0.183	0.574	0.182	0.605	0.159
Age, years	**-0.077**	**0.007**	**-0.068**	**0.023**	**-0.059**	**0.045**	**-0.125**	**<.001**	**-0.123**	**<.001**	**-0.132**	**<.001**
Education, year												
≥10	Reference		Reference		Reference		Reference		Reference		Reference	
7-9	0.057	0.925	-0.017	0.977	-0.084	0.883	1.565	0.063	1.612	0.058	**1.673**	**0.048**
0-6	-0.864	0.097	-0.963	0.061	-0.959	0.055	**2.166**	**<.001**	**2.172**	**<.001**	**2.095**	**<.001**
Smoker			**-1.547**	**<.001**	**-1.613**	**<.001**			-0.541	0.654	-0.521	0.664
Alcohol drinker			0.574	0.144	0.317	0.414			1.200	0.084	1.341	0.054
Depression score			0.014	0.607	-0.014	0.591			-0.009	0.667	-0.008	0.713
Hypertension					**0.847**	**0.027**					**0.815**	**0.020**
Diabetes					**1.533**	**0.001**					0.374	0.410

ß: ß-coefficients; The *p*-values <0.05 which statistically significant estimates appear in bold.
Model 1 included age and education, Model 2 added smoking, alcohol drinking and depression score, and Model 3 added hypertension and diabetes.

Table 5. Average frequency of communication and body mass index: multiple linear regression

Variable	Men (n=275)						Women (n=385)					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	ß	*p*-value	ß	*p*-value	ß	*p*-value	ß	*p*-value	ß	*p*-value	ß	*p*-value
Average frequency of communication												
Upper (365)	Reference		Reference		Reference		Reference		Reference		Reference	
Middle (208-364)	0.637	0.183	0.741	0.115	0.515	0.265	0.148	0.717	0.097	0.813	0.140	0.730
Lower (<208)	0.936	0.050	**1.000**	**0.033**	**0.914**	**0.046**	**0.936**	**0.028**	**0.960**	**0.025**	**0.990**	**0.020**
Age, years	**-0.082**	**0.005**	**-0.068**	**0.023**	-0.057	0.054	**-0.124**	**<.001**	**-0.122**	**<.001**	**-0.131**	**<.001**
Education, years												
≥10	Reference		Reference		Reference		Reference		Reference		Reference	
7-9	0.195	0.745	0.149	0.800	0.058	0.920	**1.921**	**0.024**	**2.015**	**0.019**	**2.084**	**0.015**
0-6	-0.759	0.149	-0.820	0.114	-0.845	0.095	**2.386**	**<.001**	**2.424**	**<.001**	**2.353**	**<.001**
Smoker			**-1.531**	**<.001**	**-1.597**	**<.001**			-0.613	0.610	-0.586	0.623
Alcohol drinker			0.634	0.109	0.382	0.328			1.227	0.076	**1.364**	**0.049**
Depression score			-0.004	0.886	-0.031	0.231			-0.017	0.424	-0.016	0.457
Hypertension					**0.769**	**0.046**					**0.829**	**0.018**
Diabetes					**1.572**	**<.001**					0.342	0.449

ß: ß-coefficients; The *p*-values <0.05 which statistically significant estimates appear in bold.
Model 1 included age and education, Model 2 added smoking, alcohol drinking and depression score, and Model 3 added hypertension and diabetes.

Table 6. Average frequency of meeting and body mass index: multiple linear regression

Variable	Men (n=275)						Women (n=385)					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	ß	*p*-value	ß	*p*-value	ß	*p*-value	ß	*p*-value	ß	*p*-value	ß	*p*-value
Average frequency of meeting												
Upper (365)	Reference		Reference		Reference		Reference		Reference		Reference	
Middle (186-364)	0.181	0.702	0.344	0.461	0.160	0.725	0.194	0.634	0.166	0.684	0.214	0.598
Lower (<186)	0.692	0.160	0.747	0.121	0.705	0.134	0.835	0.056	0.849	0.052	**0.922**	**0.035**
Age, years	**-0.078**	**0.009**	**-0.065**	**0.034**	-0.053	0.079	**-0.123**	**<.001**	**-0.121**	**<.001**	**-0.130**	**<.001**
Education, years												
≥10	Reference		Reference		Reference		Reference		Reference		Reference	
7-9	0.172	0.775	0.127	0.830	0.032	0.956	**1.942**	**0.024**	**2.024**	**0.020**	**2.112**	**0.015**
0-6	-0.834	0.113	-0.881	0.091	-0.917	0.070	**2.439**	**<.001**	**2.469**	**<.001**	**2.411**	**<.001**
Smoker			**-1.511**	**<.001**	**-1.566**	**<.001**			-0.640	0.595	-0.617	0.605
Drinker			0.609	0.123	0.357	0.359			1.210	0.081	1.354	0.051
Depression score			-0.004	0.865	-0.032	0.210			-0.014	0.521	-0.013	0.555
Hypertension					**0.820**	**0.033**					**0.853**	**0.015**
Diabetes					**1.597**	**<.001**					0.366	0.419

ß: ß-coefficients; The *p*-values <0.05 which statistically significant estimates appear in bold.
Model 1 included age and education, Model 2 added smoking, alcohol drinking and depression score, and Model 3 added hypertension and diabetes.

Table 7. Effect of social network on body mass index: multiple linear regression

Variable	Men (n=275)		Women (n=385)	
	ß	*p*-value	ß	*p*-value
Density of communication network				
Upper (>0.83)	Reference		Reference	
Middle (0.71-0.83)	0.941	0.060	-0.128	0.759
Lower (<0.71)	**1.049**	**0.041**	0.374	0.400
Average frequency of communication				
Upper (365)	Reference		Reference	
Middle (208-364)	0.439	0.342	0.087	0.833
Lower (<208)	0.708	0.130	**0.896**	**0.043**
Age, years	**-0.059**	**0.046**	**-0.130**	**<.001**
Education, years				
≥10	Reference		Reference	
7-9	-0.016	0.978	**2.023**	**0.019**
0-6	-0.856	0.090	**2.366**	**<.001**
Smoker	**-1.634**	**<.001**	-0.507	0.672
Drinker	0.353	0.366	**1.373**	**0.048**
Depression score	-0.015	0.558	-0.014	0.519
Hypertension	**0.772**	**0.045**	**0.838**	**0.017**
Diabetes	**1.540**	**<.001**	0.316	0.485

ß: ß-coefficients; The *p*-values <0.05 which statistically significant estimates appear in bold.
Adjusted for age, education, smoking, alcohol drinking, depression score, hypertension, and diabetes

Density of communication network and average frequency of communication were further analyzed for the association with BMI in men and women [Table 7]. After adjusting for age, education, smoking, alcohol drinking, depression score, hypertension, and diabetes, men in the lower tertile of communication density had a higher BMI compared with those in the upper tertile (*p*=0.041), but communication frequency was not significantly associated with BMI (p=0.130). By contrast, in women, communication density was not significantly associated with BMI (p=0.400), but those in the lower tertile of communication frequency had higher BMI compared those in the upper tertile (p=0.043). In Table 8, that trend was also observed among non-hypertensive and non-diabetic persons.

Table 8. Effect of social network on body mass index among non-hypertensive and non-diabetic persons: multiple linear regression

Among non-hypertensive persons	Men (n=150)		Women (n=171)	
	ß	p-value	ß	p-value
Density of communication network				
Upper (>0.83)	Reference		Reference	
Middle (0.71-0.83)	1.264	0.058	-0.778	0.255
Lower (<0.71)	**1.596**	**0.015**	-0.470	0.505
Average frequency of communication				
Upper (365)	Reference		Reference	
Middle (208-364)	0.216	0.712	1.127	0.098
Lower (<208)	0.747	0.214	**1.838**	**0.010**
Among non-diabetic persons	**Men (n=217)**		**Women (n=321)**	
	ß	p-value	ß	p-value
Density of communication network				
Upper (>0.83)	Reference		Reference	
Middle (0.71-0.83)	1.068	0.059	-0.088	0.842
Lower (<0.71)	**1.209**	**0.033**	0.231	0.631
Average frequency of communication				
Upper (365)	Reference		Reference	
Middle (208-364)	0.272	0.603	-0.078	0.858
Lower (<208)	0.486	0.342	0.847	0.072

ß: ß-coefficients; The p-values <0.05 which statistically significant estimates appear in bold.
Adjusted for age, education, smoking, alcohol drinking, depression score, and diabetes (or hypertension)

In order to test whether the association between communication density (or frequency) and BMI was significant by chance when continuous variables were divided three categories, we performed a sensitivity analysis by drawing partial regression plots with BMI as continuous variables [Figure 3]. After adjusting for age, education, smoking, alcohol drinking, depression score, hypertension, and diabetes, men's BMI was significantly decreased with increase in communication density (Standardized β= -0.118, p=0.042), but communication frequency was not significantly associated with BMI (Standardized β= -0.087, p=0.125). In women, BMI was significantly decreased with increase in communication frequency (Standardized β= -0.139, p=0.006), but communication density was not significantly associated with BMI (Standardized β= -0.074, p=0.148). These statistical significances were the similar to the results of the final regression model [Table 7].

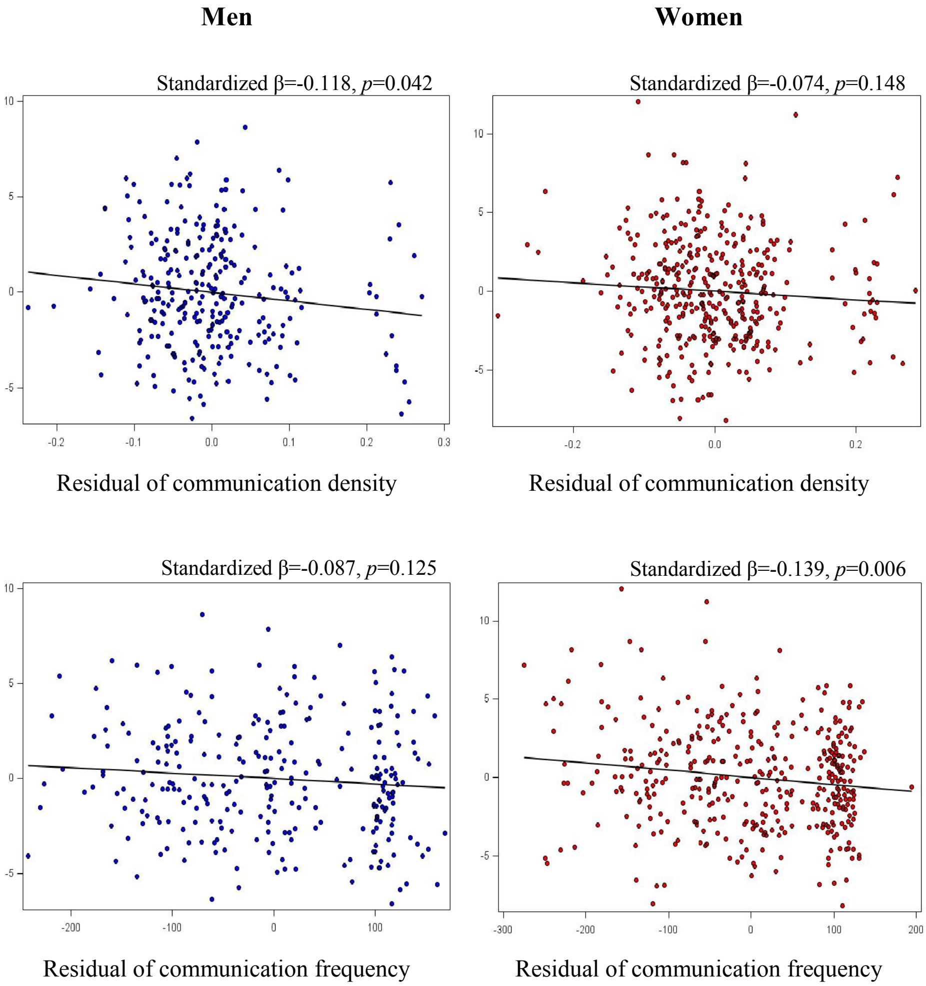


Figure 3. Residual of communication density or frequency and residual of body mass index: partial regression plots

Adjusted for age, education, smoking, alcohol drinking, depression score, hypertension, and diabetes

IV. DISCUSSION

The present study examined the association between social network measures and BMI in an elderly Korean population. Men with a sparse communication network had higher BMI compared with men embedded in dense communication networks. Women in networks with low frequency of communication had higher BMI compared with women in networks with high frequency of communication.

Social contacts can promote, discourage, and sanction attitudes and behaviors.[35,36] Additionally, social contacts may influence participation in organized sports,[37] dieting,[38] and food choices.[39] This may explain the association of communication density and frequency with BMI. Men's BMI was more strongly associated with density of communication network than average frequency of communication. Dense personal networks provide reinforcement for prevailing norms and practices and can provide protection from outside sources of influence or risk.[34] The greater the density, the more likely a network is to be considered a cohesive community, a source of social support, and an effective transmitter.[40] Women's BMI was more strongly associated with average frequency of communication than density of communication network. It could be inferred that women were less sensitive to reputation compared with men.

Previous studies have been mainly interested in the peer effect on obesity. There have been few reports about the association between other characteristics of social network and obesity. Our findings were not definite, but might illuminate the novel association between density or average frequency of communication network and BMI.

This study has several limitations. First, because of the cross-sectional design, this study could not establish a temporal relationship between BMI and density or average frequency of communication network. Second, the survey data were open to measurement error. In particular, the reported relationships among alters might differ from actual relationships. It is important to determine not only the association between an ego's health behavior and an actual social network, but the perceived social network as well. Third, questionnaires did not measure diet and physical activity. These factors are determinants for obesity, but they may be intermediate variables or pathway in aspects of the relationship between social networks and BMI. Fourth, external validity could be limited because all subjects in the study population resided in a single rural community. Accordingly, we suggest the need for further longitudinal studies in urban and rural areas.

V. CONCLUSION

This study aimed to identify density of communication network and average frequency of communication correlated with obesity in the elderly. The association between communication density or frequency and BMI was investigated by multiple linear regression analysis in 660 Koreans aged 60 years or older. Our study suggests that density of communication network and average frequency of communication are associated with obesity among the elderly. Lower density of communication network may be associated with obesity in men, while lower frequency of communication may be associated with obesity in women.

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ABSTRACT(IN KOREAN)

노인에서 사회연결망이 신체비만지수에 미치는 영향

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목적: 감염병처럼 비만이 사회연결망을 통해 퍼지는 현상은 잘 알려졌다. 하지만 사회연결망의 다른 특성과 비만과의 관련성을 본 연구는 적다. 이 연구의 목적은 한국의 지역사회에 거주하는 노인에서 의사소통연결망 밀도와 의사소통 평균빈도가 비만과 관련성이 있는지 살펴보는 것이다.

방법: 이 단면연구는 한국인의 사회활동, 건강과 노화에 관한 조사에 참여한 60세 이상의 사람과 그의 배우자 660명(남자 275명, 여자 385명)이 대상이다. 의사소통연결망 밀도란 응답자의 친구들이 서로 얼마나 알고 지내는지를 의미하고, 의사소통 평균빈도는 응답자와 친구들이 얼마나 자주 이야기를 나누는지를 나타낸다. 다중회귀분석을 통해 의사소통연결망

밀도와 의사소통 평균빈도가 신체비만지수와 어떤 연관성이 있는지 분석하였다.

결과: 남녀 모두에서 의사소통연결망 밀도가 커지고(응답자의 친구들이 서로 친하게 지내고), 의사소통 평균빈도가 높아질수록(응답자와 친구들이 자주 이야기를 나눌수록) 신체비만지수는 감소하였다. 혼란변수의 영향을 통제한 결과, 의사소통연결망 밀도가 낮은 군은 높은 군에 비하여 남자에서는 신체비만지수가 1.049 kg/m^2 컸으나(p=0.041), 여자에서는 통계적으로 유의하지 않았다(p=0.400). 의사소통 평균빈도가 낮은 군은 높은 군에 비하여 여자에서는 신체비만지수가 0.896 kg/m^2 컸지만(p=0.043), 남자에서는 통계적으로 유의하지 않았다(p=0.130).

결론: 노인에서 의사소통연결망 밀도와 의사소통 평균빈도는 비만에 영향을 줄 수 있다. 이러한 관련성은 성별에 따라 다르게 나타난다.

핵심되는 말: 노인, 비만, 사회연결망, 신체비만지수