Effects of Social Capital on Subjective Health in the Community Indwelling Elderly

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Purpose: The aim of this study is to examine a path model on the relationship among social capital, physical activity and subjective health status in the community indwelling elderly. **Methods:** The study was conducted utilizing the 2014 Seoul Survey, in the method of analyzing cross-sectional design and secondary data. Among 45,497 participants in total, the data of 4578 adults aged 65 or above was analyzed. Social capital was measured by social trust and social participation. Physical activity was measured by regular exercise. Additionally, a numerical rating scale was used to assess subjective health status. The data were analyzed using descriptive statistics, Pearson's correlation coefficients and path analysis. **Results:** Social participation and physical activity showed a direct effect on subjective health status in community indwelling elderly while social trust and physical activity showed an indirect effect on their subjective health status. The hypothetical path model of community indwelling elderly's subjective health status was proved correct. **Conclusion:** Findings from this study indicate that health-promoting intervention for community indwelling elderly should consider social trust and participation.

Key Words: Aged, Social Capital, Health Status

INTRODUCTION

1. Background

In 2017, the number of elderly people aged 65 or older in South Korea had reached 13.8% of the total population, and the proportion of elderly population is estimated to reach 47.7% by 2045[1]. This increase in the elderly population leads to a rise in social burdens such as an increase in the cost of managing chronic degenerative diseases, and the importance of health care services for the elderly in the community is being increased. Aging process causes physical deterioration and chronic degenerative diseases that require continuous management such as long-term uses of health care and social welfare services, so if the elderly maintain a healthy and independent life in the community, it can reduce social burdens [2].

For the elderly, health status is a major factor influencing the quality of life, and it is recognized as a result of interaction of various factors such as socioeconomic status, living environment, and health promoting behaviors. The subjective health status of the elderly reflects the multiple dimensions of health and is a predictor of health status widely used worldwide. In a previous study in Korea [2], the subjective health status of the elderly in the community was assessed as 'somewhat poor', and the proportion of the elderly who assessed themselves as 'not healthy' was more than twice that of those who rated themselves as 'healthy'[3]. In a comparative study between countries [4], the elderly in Korea showed a significantly more negative evaluation of their health status than the elderly in Germany, Sweden and Italy. It is known that the subjective health status of the elderly in the community is affected by sociodemographic characteristics such as age, gender, economic status and health-related characteristics such as regular excercise, the number of comorbidities and pain [5,6].

In particular, physical activity as a health-promoting behavior of the elderly is an enhancing factor to prevent degenerative diseases and improve the quality of life. The importance of physical activity is also emphasized as one of the priority tasks in the "4th Health Plan 2020". Physical activity of moderate intensity reduces the mortality due to cardiovascular disease and it reduces the morbidity of chronic diseases such as hypertension, diabetes, and colorectal cancer. On top of the that, It helps to maintain or improve independence and cognitive functioning [7].

According to the 2017 Korea Statistics on the Aged [1], only 46.4% of the elderly aged 65 years or over perform regular exercise, including walking, and this shows that elderly people living in community do not perform proper physical activity. In order to actually enhance health status and health-promoting behaviors such as physical activity in the elderly living in the community, it is necessary to identify influencing factors and to establish an intervention strategy based on them.

In addition to the sociodemographic factors and health-related characteristics, recent studies showed that social capital is a factor significantly influencing the health status of the elderly living in the community [8,9]. Social capital is a concept that encompasses the attributes of intangible assets in social networks and includes various elements such as trust, reciprocal relationships among community residents, social support and networks [10,11]. The core components of social capital are social trust and social participation [12], and trust in neighbors and participation in social gatherings are the most important factors for elderly people. As elderly people tend to perform most of their daily activities in their residential areas, they have the environmental characteristic that inhibits the formation of a wide variety of relationships [13], and elderly people need voluntary social participation through mutual exchange with their neighbors. When an elderly person trusts someone or participates in social gatherings, the influence of neighborhood in the community plays an important role [14]. Considering that elderly people are vulnerable due to physical aging, the loss of social roles due to retirement, chronic diseases, and economic challenges, these characteristics of elderly people are more easily exposed to socio-environmental factors, and thus social interventions are further necessitated [15].

The recent trends in the health and welfare policies for older people emphasize the concept of "Aging in place" and "Age-friendly community"[16], which mean that it is important to ensure that they can continue to live in the community by maintaining and promoting the health of the elderly. The elderly tend to have a strong attachment to familiar places and tend to want to live in the community where they have lived independently rather than living in long-term care facilities. In addition, the health status of the elderly is an important factor for their continuous residence in the community [13].

Social capital is known to affect health through a variety of paths, such as enhancing social support and self-efficacy, improving access to community health care services, health-promoting behaviors, and sharing health information [17]. However, there is still a lack of studies on the effects of social capital on the health status of the elderly in Korea. If social capital is a factor affecting the health of elderly people through various paths, it is important to establish a basis for community-based nursing interventions and health policies that take social capital into account. Therefore, the purpose of this study was to investigate the effect of social capital on the subjective health status of elderly people living in the community and to provide preliminary data for the development of health promotion programs and policies for elderly people living in the community.

2. The Conceptual Framework and Hypothetical Path Model

The conceptual framework of this study was set up to identify the path through which social capital affects physical activity and subjective health status in elderly people living in the community. Therefore, the conceptual framework for the model of the factors affecting the subjective health status of elderly people living in the community was set up based on the neighborhood resource-based theory of social capital for health proposed by Carpiano [18] through a literature review of the studies of subjective health status of the elderly.

METHODS

1. Study design

This cross-sectional study used secondary data from the 2014 Seoul Survey. We constructed a path model for the paths through which social capital affects the subjective health status of the elderly living in the community and examine the hypothesized path model.

2. Participants

In this study, We utilized the raw data of the 2014 Seoul

Survey [19]. As for the Seoul Survey, samples are extracted by stratified cluster sampling based on the district and housing type. The 2014 Seoul Survey was conducted by the household interview survey with household heads and household members aged 15 years or older of the selected households residing in Seoul. Among a total of 45,497 persons who were surveyed in 2014, 4,578 elderly people aged 65 years or older were included in this study for final analysis.

3. Measures

The factors influencing the subjective health status of the elderly were selected through a literature review. The selected variables are as follows:

1) General characteristics
In this study, general characteristics were classified into sociodemographic characteristics and neighborhood environmental characteristics. Sociodemographic characteristics included age, gender, education level, marital status, perceived socioeconomic position, religion, the number of family members. The education level was classified into elementary school graduation or lower, middle school graduation, high school graduation, college graduation or higher, and the marital status were divided into the presence or absence of the spouse. The perceived socioeconomic position was classified into upper, middle, and lower, and The employment status was divided into employed and unemployed. The religion was classified as the presence or absence of religion. Neighborhood environmental characteristics included housing type, type of housing tenure, satisfaction for the neighborhood green space, and satisfaction for the neighborhood walking environment. The housing type was divided into detached house and apartment house according to the definition of the enforcement decree of the building act, and type of housing tenure was classified into owner-occupied dwelling, rental dwelling based on a deposit system, and monthly rental dwelling.

2) Social capital
In this study, social capital was defined as social trust and social participation. Social trust was measured on a 5-point Likert scale as a measure of trust in neighbors. Social participation was measured as the sum of participations in social gatherings for the past one year by classifying group activities into 11 kinds, including the 'social gathering clubs', 'alumni associations', 'local community meetings', 'internet communities', 'clubs or societies', 'vo-

lunteer groups or organizations', 'civic groups', 'unions and vocational organizations', 'political organizations', 'religious groups', and 'other groups.' For both the social trust and social participation, higher scores indicate higher levels of social capital.

3) Physical activity
In this study, the level of physical activity was defined as the frequency of physical activity regardless of the type of activity. The frequency of physical activity was measured by one question reflecting the combined practice of intense physical activity performed once or more a week for at least 20 minutes, three days a week and moderate physical activity performed 5 days or more a week for at least 30 minutes as suggested by the World Health Organization. For the question 'Do you exercise regularly? (for at least 30 minutes at one time)', the responses were scored on a 4-point scale from 1 point for 'Hardly' to 4 points for 'Regularly 3 times or more a week. Higher scores indicate higher levels of physical activity.

4) Subjective health status
Subjective health status refers to the self-assessed health status rated by individuals themselves, and in this study, subjective health status refers to the overall health status that the individual perceives. The subjective health status was measured on a 11-point Likert scale (0 point for the worst health status and 10 points for the best health status).

4. Data Collection and Ethical Consideration

The Seoul Survey is conducted annually by the Seoul Metropolitan Government to analyze the demographic structure and characteristics of Seoul and to utilize it as a basis for municipal administration and policy establishment. The survey period was from October 1 to October 31, 2014 and an additional survey was conducted from November 1 to November 17, 2014. The surveys were conducted in such a way that trained interviewers directly visited the selected households and interviewed them individually. The raw data of the Seoul Survey is public data available freely online for which free use is permitted, including the use or modification of it of commercial purposes and the creation of derivative works, if the author and source are indicated. The raw data for this study was downloaded for analysis through the Seoul Open Data Plaza (http://data.seoul.go.kr/)[19].

5. Data Analysis

The data of this study were analyzed using SPSS/WIN 21.0 and IBM AMOS 23.0 program. The specific analysis method is as follows. Standardized weights were applied to the 2014 Seoul Survey in consideration of the extraction rate and response rate so that the sample that participated in the survey could represent the population of Seoul. The real numbers, percentages, means, and standard deviations for general characteristics of the participants and measured variables were described, and the kurtosis and skewness were calculated to test the normality of the measured variables. The correlation between the measured variables was analyzed by Pearson's correlation coefficient. The model fit was evaluated by the absolute fit index (x^2), the goodness of fit index (GFI), the adjusted goodness index (AGFI), the comparative fit index (CFI), and the root mean squared error of approximation (RMSEA), which is less sensitive to the size of the sample and reflects the parsimony of the model. To test the validity for the path of the model, the parameters were estimated by the maximum likelihood method, and the statistical significance of the indirect effects was analyzed by the bootstrapping method.

RESULTS

1. General Characteristics

The general characteristics of the participants are shown in Table 1. The mean age of the participants was 70.98±5.37 years, and the number of women among them was 2,349 (54.3%), which was higher than that of men. For the marital status, 3,089 (58.3%) living with the spouse. In terms of the education level, 1,714 participants (35.7%) were high school graduates, and regarding the perceived socioeconomic position, 3,542 participants (74.6%) rated their socioeconomic position as middle. 3,111 people (67.9%) were unemployed, and 2,675 people (58.3%) had religion. 2,459 people (41.7%) responded that the number of family members including the participant was two. As for housing type, 2,479 people (55.9%) lived in apartment house. Regarding the type of housing tenure, 3,264 people (62.1%) resided in owner-occupied dwelling. For the level of satisfaction for the neighborhood green area environment, 2,315 people (51.4%) were Neutral and for the level of satisfaction for the neighborhood walking environment, 2,444 people (51.4%) were satisfied.

2. Descriptive Statistics and Correlation Matrix of Measured Variables

Table 2 shows the results of analysis of the correlation matrix between measured variables and the mean and standard deviation of each variable for verifying the hypothetical path model assumed in this study. The kurtosis and skewness of all variables did not exceed an absolute value of 2.0, so normality was satisfied [20], indicating that there was a statistically significant correlation between all variables. As a result of the multicollinearity test, the correlation coefficient between all variables did not exceed the standard value of .60, there was no variable with the tolerance value of 0.1 or lower, and there was no variable with the Variation Inflation Factor (VIP) of more than 10, so multicollinearity between independent variables could be excluded [20]. The mean scores for the variables were 3.31±0.81 points on a 5-point scale for social trust, 1.22± 1.06 points on a 11-point scale for social participation, 2.25±1.11 points on a 4-point scale for physical activity, and 5.94±1.84 points on a 11-point scale for subjective health status, respectively.

3. Model Fit Tests of the Hypothetical Path Model

1) The model fit test of the path model

As a result of analyzing the goodness of fit to evaluate how well do the observed data explain the hypothetical path model presented in this study, it was found to be a saturated model as the fit indices of the hypothetical path model were as follows: x^2=.000, GFI=1.00, AGFI=1.00, CFI=1.00, and RMSEA=1.00[21]. Thus, it was found that the model did not impose any restrictions on the parameters, and it was fit for the data. This means that the model satisfied the conditions that made it unnecessary to test the fit indices.

2) Parameter estimation and significance of the path model

Figure 1 shows the path diagram based on the standardized path parameters of the path model in this study. Among the path parameters of the path model, the path that had a direct significant effect on social participation was social trust (β=.01, p<.001), and the path that had a direct significant influence on physical activity was social participation (β=.25, p<.001). The paths which had a direct significant effect on subjective health status were social participation (β=.25, p<.001) and physical activity (β=.08, p<.001).

4. Modification of the Hypothetical Path Model

1) The model fit of the modified path model

In this study, statistically social trust did not have a direct effect on physical activity and subjective health status.

Table 1. General Characteristics of Participants (N=4,578[†])

Characteristics	Variables	Categories	n[†] (%)[‡]	M±SD[‡]	Range
Sociodemographic characteristics	Age (year)	65~69 70~74 ≥75	2,297 (50.8) 1,260 (26.8) 1,021 (22.4)	70.98±5.37	65~98
	Gender	Male Female	2,229 (45.7) 2,349 (54.3)		
	Marital status	Living with spouse Living without spouse	3,089 (58.3) 1,489 (41.7)		
	Education level	≤Elementary school Middle school High school ≥College	985 (24.1) 1,466 (31.7) 1,714 (35.7) 413 (8.5)		
	Perceived socioeconomic position	Upper Middle Lower	590 (12.5) 3,542 (74.6) 446 (12.9)		
	Employment status	Employed Unemployed	1,467 (32.1) 3,111 (67.9)		
	Religion	Yes No	2,675 (58.3) 1,903 (41.7)		
	Number of family members	Alone 2 ≥3	862 (25.8) 2,459 (41.7) 1,257 (27.1)	2.34±1.33	1~7
Neighborhood environmental characteristics	Housing type	Detached house Apartment house	2,099 (44.1) 2,479 (55.9)		
	Type of housing tenure[§]	Owner-occupied dwelling Rental dwelling based on a deposit system Monthly rental dwelling	3,264 (62.1) 974 (19.2) 320 (18.7)		
	Satisfaction for neighborhood green space	Dissatisfied Neutral Satisfied	366 (8.0) 2,315 (51.4) 1,897 (40.6)		
	Satisfaction for neighborhood walking environment	Dissatisfied Neutral Satisfied	440 (9.8) 1,964 (38.8) 2,444 (51.4)		

[†]Under weighted; [‡]Weighted; [§]Missing value excluded.

Table 2. Correlation Coefficient[‡], Mean and Standard Deviation[‡] of Study Variables (N=4,578[†])

Variables	Social trust	Social participation	Physical activity	Subjective health status	M±SD	Kurtosis	Skewness
	r (p)	r (p)	r (p)	r (p)			
Social trust	1	.07 (<.001)	.05 (.001)	.04 (.011)	3.31±0.81	-0.44	-0.11
Social participation		1	.22 (<.001)	.28 (<.001)	1.22±1.06	1.85	1.04
Physical activity			1	.16 (<.001)	2.25±1.11	-1.30	0.26
Subjective health status				1	5.94±1.64	0.38	-0.62

[†]Under weighted; [‡]Weighted.

On the basis of the results of previous studies that social trust did not have a direct effect on physical activity and subjective health status [22,23]. the hypothetical path mode was modified by removing the path of social trust.

We conducted the model fit test of the modified path model, and the results were follows: x^2=3.816 (p=.148), GFI=1.00, AGFI=.998, CFI=.997, and RMSEA=.014. These results indicate that fitness criteria were satisfied [20,21]. Compared with the model fit indices of the modified path model with those of the hypothetical path model, the reduction of the model fit indices was not significant considering the simplification of the model by removing two paths.

2) Parameter estimation and significance of the modified path model

Figure 2 shows the modified path model based on the standardized path parameters. In the path parameters of the modified path model, the path that directly affected so-cial participation was social trust (β=.01, p<.001), and the path that directly affected physical activity was social participation (β=.25, p<.001). The paths that directly affected subjective health status were found to be social participation (β=.24, p<.001) and physical activity (β=.08, p<.001).

3) Analysis the modified path model

Table 3 shows the results of analyzing the effects of the measured variables of the modified path model by classifying them into direct, indirect, and total effects. As for the effects of the variables on physical activity, social participation had a direct effect on physical activity, while social trust had an indirect effect. In terms of the impact on subjective health status, social participation and physical activity had a direct effect, whereas social trust and social participation had an indirect effect. Among the variables, the total effect of social participation was the highest, followed by that of physical activity and social trust. These variables accounted for 7.6% of participants' subjective
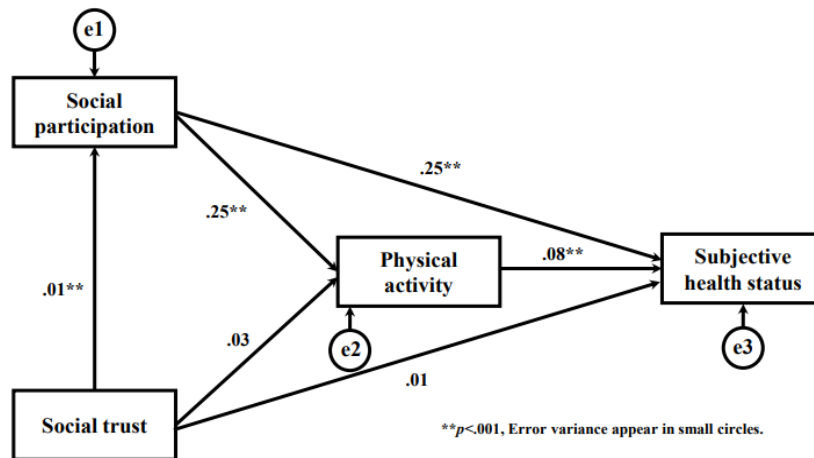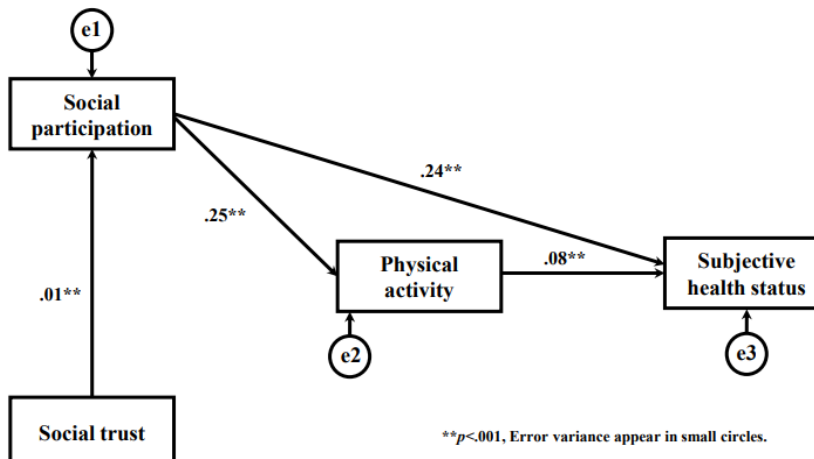

Figure 1. Hypothetical path model diagram.

Figure 2. Modified path model diagram.

Table 3. Standardized Estimates of the Path Model ($N=4{,}578$[†])

Endogenous variables	Exogenous variables	Direct effect β (p)	Indirect effect β (p)	Total effect β (p)	SMC %
Social participation	Social trust	.10 (.001)	-	.10 (.002)	1.0
Physical activity	Social trust	-	.02 (.001)	.02 (.001)	6.2
	Social participation	.25 (.003)	-	.25 (.003)	
Subjective health status	Social trust	-	.03 (.001)	.03 (.001)	7.6
	Social participation	.24 (.002)	.02 (.002)	.26 (.002)	
	Physical activity	.08 (.002)	-	.08 (.002)	

SMC=squared multiple correlations; [†] Under weighted.

health status.

DISCUSSION

This study analyzed the data of the 2014 Seoul Survey based on the previous study results showing that the subjective health status of the elderly is closely related not only to the individuals' sociodemographic characteristics but also to social capital, which is a social environmental characteristic. The purpose of this study was to investigate the paths through which the social capital of elderly people living in the community has an effect on physical activity and subjective health status in order to provide a basis for the program development and policies for the health promotion of elderly people living in the community.

In this study, the mean score for subjective health status of elderly people aged 65 years or older was 5.94±1.64 points. Although it is difficult to make a direct comparison between studies using different measurements, this result is similar to that of a cross-country comparison study which reported that elderly people in Korea showed a lower level of health status than elderly people in European countries [4].

In this study, the mean score for social trust was 3.31± 0.81 points on a 5-point scale, and this level of social trust is similar to the result of a previous study on elderly people in Korea [24]. In addition, in this study, the number of social gatherings in which the elderly people participate was 1.31±1.06 per year, and this result is similar to that of a previous study that 81.8% of elderly people in Korea participate in less than one meeting per year [25].

In this study, social trust, social participation, physical activity, and subjective health status were positively correlated. This result is similar to that of another prior study on elderly people in Korea [26], which reported that mutual reciprocity and social relationship satisfaction among sub-factors of social capital had a significant effect on subjective health status.

In the path model of this study, the variable that directly affected the physical activity of the participants was found to be social participation. In other words, the higher the level of social participation of elderly people living in the community, the higher the level of physical activity. This result is consistent with that of Lindström et al.[27] that social participation was the strongest influencing factor explaining physical activity. Social participation has an impact on physical activity of elderly people in relation to their life course characteristics. Generally, elderly people prefer exercise such as walking with friends or family members as physical activity, and social participation can provide an opportunity to find friends or exercise mates to share physical activities. In addition, elderly people can gain social support which provides them with motivation for physical activity and leads them to continue it through the people they meet through social meetings [26]. This study result shows that health promotion programs and health policies focused on the aspects of social capital may be effective for enhancing the health status of elderly people in the community.

In this study, social trust was found to have an indirect effect on physical activity through social participation in the path model. This result is in agreement with that of a previous research that high perceived trust in neighbors was associated with low television viewing time and high level of physical activity in females [22], and it is also consistent with the finding of a previous study that low trust in the community was significantly associated with low level of physical activity [28]. Social trust can stimulate physical activity by leading elderly people residing in the community to have the perception that it is a safe social environment for physical activity. However, the result of this study is in contrast with that of Kim et al.[29]. They reported that as the level of general trust was lower, the level of physical activity was higher, and claimed that it was due to the social contextual characteristic of Korean society, which has a narrow range of trust in that people gen-

erally trust only close social relationships such as blood relation groups and friends. In this study, since the trust in neighbors was used, and neighbors is thought to act as close social relationships in the case of the elderly people who have the characteristic of residing in the same community for a long time.

In this study, social trust did not have a direct effect on subjective health status, and was found to be a factor influencing subjective health status through the indirect path of social participation. With respect to social trust, it is thought that it does not affect the health itself, but promotes elderly people's formation of social networks and participation in social gatherings [30].

In this study, variables directly affecting the subjective health status of elderly people living in the community were social participation and physical activity. In other words, the higher the level of social participation and physical activity, the higher the level of subjective health status. Social participation had not only a direct effect but also an indirect effect on subjective health status, and this finding was consistent with the result of a previous study [26], which reported that social participation not only directly affected subjective health status, but also had an indirect effect on subjective health through mediating the relationship between subjective health and health-related behaviors such as smoking, physical activity, and drinking. The results of this study are similar to the results of a previous study that elderly people who participated in various social gatherings showed a higher level of subjective health status, but they are not consistent with the previous study results showing that the social participation had no direct and indirect effects on the functional status of elderly people [30]. This may be due to the fact that the influence of social gatherings on health may be different according to the purpose and nature of them, so further research concerning this question needs to be conducted in the future. The social participation of elderly people is the most important means of receiving material and emotional support. The main components constituting the social network of elderly people in Korea are blood relation groups such as the family and relatives and non-blood relation groups such as friends and neighbors. However, considering the recent family structure of nuclear families, an approach for building and promoting non-blood relation social networks like neighborhoods in the community is needed. In the past, traditional community organization based on local communities, such as Doore and Hyang-yak, developed in traditional Korean society, and as a result, the solidarity and cooperative relationship of community groups were very strong. The revitalization of such community groups centered on local communities is expected to be beneficial for improving the health status of the elderly. Elderly people in the community are at a higher risk of experiencing social isolation because of the limited resource of social participation than other age groups. Therefore, creating and providing opportunities for social participation may generate more health benefits than in other age groups. In addition, it was found that while social participation decreases as age increases, the influence of social participation on health increases as age increases, and thus the importance of participation in social activities for health promotion of the elderly is further stressed [25]. Therefore, the results of this study are demonstrated the need to consider social capital in the development of programs and policies for health promotion for elderly people living in the community.

CONCLUSION

The purpose of this study was to construct the path model to explain the effects of social capital on physical activity and subjective health status in elderly people living in community.

Social participation and physical activity had a direct effect on subjective health status of elderly people living in community, and social trust and social participation had an indirect effect. The variable that showed the highest total effect on the subjective health status of elderly people living in the community was social participation, followed by physical activity and social trust. These variables accounted for 7.6% of the subjective health status of the participants.

In recent years, the demand for community-based participatory health programs has been increasing, and social capital may have a positive effect on health promotion behaviors and improvement of health status. Therefore, intervention strategies that take into account the life course characteristics of elderly people and the social and environmental characteristics of the community such as social capital are required.

However, this study used the data of the 2014 Seoul Survey, a cross-sectional survey, and this fact imposes constraints on causal reasoning regarding the study results. In addition, since analysis was conducted using the items surveyed in the 2014 Seoul Survey, this study has limitations in reflecting various attributes of the health of elderly people and social capital. Therefore, in follow-up studies, there is a need to improve the limitations of the secondary data analysis study and verify the relationships between the variables using validated and reliable measurements.

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