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Factors Associated with Depression by Household Type among the Elderly in the Community

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Abstract

This study aimed to identify factors associated with depression by household type among the elderly in the community during the COVID-19 pandemic. The subjects were 72,812 elderly aged 65 and over who participated in the 2020 Community Health Survey. Multivariate logistic regression with complex samples was performed to analyze the data. The incidence of depression was higher in single-person households than in multi-person households. In single-person and multi-person households, depression was higher in women, those over 75 years old, those with middle school graduates or lower, those with a household monthly income of 1 million won or less, and those receiving basic living recipients. Factors related to depression among the elderly in single-person households were physical activity, sleep time, and drinking, among the changes in lifestyle due to COVID-19. Factors related to depression among the elderly in multi-person households were physical activity, sleep time, consumption of instant food, and alcohol drinking, among the changes in lifestyle due to COVID-19, and psychological concerns due to COVID-19. Promoting mental health and developing customized programs by household type is necessary to prevent depression in the elderly in the community.

Keywords: Community, COVID-19, Depression, Elderly, Household Type

1. INTRODUCTION

Since COVID-19, the prevalence of anxiety and depression has doubled worldwide [1]. In Korea, the proportion of depression risk groups has also increased by 6 times to 22.8% compared to 3.8% before COVID-19 [2]. The rate of anxiety and depression caused by COVID-19 increased as the age group increased [3], and according to data from the National Senior Survey, 13.5% of the elderly were reported to have depressive symptoms [2]. In the catastrophic situation of COVID-19, the elderly suffered double whammy of fear of new infectious diseases, social distancing to block and minimize contact between individuals, and a decrease in physical activity due to age increase [4]. In particular, older people are at a higher risk of complications and fatality rates from COVID-19 than other age groups, so they may experience severe loneliness due to social isolation[5]. The biggest causes of depression were social isolation caused by refraining from going out and gathering, and health concerns caused by the spread of infection, especially the elderly living alone feel more anxious about new diseases. and depression also increased the level of anxiety about new diseases increased by 8.7% after COVID-19 [6]. It is reported that it is easily exposed to social problems such as loneliness, depression, and death due to isolation or disconnection due to changes in the family structure, and mental

health levels such as life satisfaction and happiness are negative compared to multi-person households [7,8,9].

In the case of single-person elderly households, the social participation rate was relatively low and the level of disease and depression was higher than that of households with two or more people [7,8]. The mental health level of elderly single-person households was significantly lower than that of multi-person households, and in particular, elderly singe-person households showed the highest level of depression. It has been reported that elderly people living alone have increased depression due to lack of economic and social support systems and chronic diseases, which can lead to suicidal thoughts, and have actually attempted suicide [10]. Depression, which is common in old age, has a risk of worsening due to COVID-19, and if old age depression is left untreated, there is a high risk that it will lead to extreme suicide[11]. If depression is neglected in old age, the risk of leading to extreme suicide is high, so research on depression in the elderly living in the community is important [12]. In addition, as concerns about infection due to COVID-19 increase, changes in daily life and social isolation intensify, it is expected to have a negative impact on the mental health of the elderly[13].

Accordingly, this study uses data from the 2020 Community Health Survey to provide basic data for an intervention program to prevent and manage depression in the elderly by identifying depression-related factors in the elderly aged 65 or older living in the COVID-19 situation by household. This study aims to identify depression-related factors by household type of the elderly in the community in the COVID-19 situation using data from the Community Health Survey, and the specific purpose is as follows. First, it compares the demographic and social characteristics of the elderly in the community by household type, changes in the lifestyle caused by COVID-19, and the degree of depression due to psychological concerns. Second, it identifies depression-related factors by household type of the elderly in the community, and identifies the effects of lifestyle changes and psychological concerns caused by COVID-19 on depression.

2. METHODS

2.1 Study Design and Participants

This study is a descriptive study using secondary data from the Community Health Survey to understand the effects of lifestyle changes and psychological concerns caused by COVID-19 on depression in the elderly living in the community. In this study, among the 229,269 people who participated in the 2020 Community Health Survey, the elderly (72,812 people) aged 65 years or older collected data with missing values (4 people) in the household type questionnaire and missing values (477 people) in the depression symptom questionnaire. A total of 72,331 excluded were selected for the final study. Regarding the household type, subjects who responded that they were one-person households in a one-generation household were classified as 'single-person households', and those with one-generation households (couple, other), two-generation households, and three or more generations were classified as 'multi-person households'.

2.2 Measurements

2.2.1 Dependent variable

Depression was measured using the Patient Health Questionnaire-9 (PHQ-9). The PHQ-9 measures depressive symptoms experienced for two weeks over the past year with nine questions, ranging from 0 (not at all) to 3 (almost every day), with higher scores indicating more severe depressive symptoms. Out of 27 points, 10 points were set as the cut-off point, and more than 10 points were classified as depression 'yes' and less than 10 points as depression 'no'[14].

2.2.2 Independent variables

COVID-19-related survey items from the 2020 Korea Community Health Survey (KCHS) were used to measure lifestyle changes and psychological concerns due to COVID-19. Changes in lifestyle due to COVID-19 were composed of responses such as increased, similar, decreased, or not applicable to health-related lifestyles such as physical activity, sleep time, consumption of instant food, drinking, and smoking. In this

study, it was reclassified as 'increased', 'no change (including not applicable)', and 'decreased'. Psychological concerns due to COVID-19 included four items: concerns about infection, death due to infection, social criticism due to infection, and economic damage due to infection. Each question was calculated on a 5-point scale from 1 (not at all) to 5 (very much), with higher scores indicating a higher level of psychological concern.

2.2.3 Covariates

Covariates included gender, age, education level, monthly income level of household, and basic living recipient. Age was divided into early geriatric age (65-74 years old) and late geriatric age (75 years old or older), and education level was divided into middle school graduation or lower and high school graduation or higher. The monthly income level of household was classified as less than 1 million won, 1 to 2.99 million won, and over 3 million won and the basic living recipient was classified into 'yes' and 'no' depending on the current status of welfare.

2.3 Data Analysis

The SPSS/WIN 27.0 program (IBM Corp., Armonk, NY, USA) was used for statistical analysis. Data were analyzed by reflecting the complex sample design according to the guidelines from the Community Health Survey. The subjects' demographic and COVID-19-related characteristics are presented as frequency, weighted percentage, and average, and χ^2 test and linear regression analysis were used to compare characteristics by household type. For depression-related factors by household type, multivariate logistic regression analysis was used.

3. RESULT

Among the subjects, 18,824 (21.0%) were single-person households and 53,507 (78.9%) were multi-person households. In terms of demographic and social characteristics, single-person households had a higher proportion of groups ages 75 or older than multi-person households, and a higher proportion of women. In terms of education level, single-person households had a higher proportion of middle school graduates or less than multi-person households, and monthly income was higher than that of those with less than 1 million won.

As for lifestyle changes caused by COVID-19, multi-person households had a higher proportion of physical activity, sleeping time, instant food intake, drinking reduction, and smoking reduction, and single-person households had a higher proportion of physical activity, sleeping time reduction, instant food intake, drinking increase, smoking increase and smoking than single-person households. The total average score of psychological concerns caused by COVID-19 was higher in multi-person households (3.96 points) than in single-person households (3.91 points) (Table 1).

Table 1. Sociodemographic and COVID-19 related factors by Household types

(n=72,331)

Variables	Categories	Total	Single-person households	Multi-person households	p
		n (%†)	%†(SE) or Mean (SE)		
Total	n (%†)	72,331 (100)	18,824 (21.1)	53,507 (78.9)	
Age(yr)	65-74	38,463 (57.8)	47.0 (0.5)	60.7 (0.3)	<.001
	≥75	33,868 (42.2)	53.0 (0.5)	39.3 (0.3)	
Gender	Male	30,182 (44.6)	24.3 (0.4)	50.0 (0.2)	<.001
	Female	42,149 (55.4)	75.7 (0.4)	50.0 (0.2)	
Education level	≤Middle school	54,324 (65.7)	76.3 (0.5)	62.8 (0.3)	<.001
	≥High school	17,894 (34.3)	23.7 (0.5)	37.2 (0.3)	
Monthly income	<100	27,406 (29.4)	66.5 (0.5)	19.4 (0.3)	<.001

(10^4 Korean won)	100-299	30,408 (44.1)	29.7 (0.5)	48.1 (0.4)	
	≥300	13,994 (26.5)	3.8 (0.2)	32.5 (0.3)	
Basic living recipient	No	67,397 (92.0)	81.5 (0.4)	94.9 (0.2)	<.001
	Yes	4,904 (8.0)	18.5 (0.4)	5.1 (0.2)	
Depression	PHQ score <10	69,796 (96.2)	93.7 (0.2)	96.9 (0.1)	<.001
	PHQ score ≥10	2,535 (3.8)	6.3 (0.2)	3.1 (0.1)	
Lifestyle changes due to COVID-19					
Physical activity	Increased	2,762 (4.8)	4.0 (0.2)	5.0 (0.1)	<.001
	No change‡	46,866 (56.7)	58.0 (0.5)	56.4 (0.3)	
	Decreased	22,685 (38.5)	38.0 (0.5)	38.6 (0.3)	
Sleep hours	Increased	5,030 (8.1)	7.6 (0.3)	8.3 (0.2)	<.001
	No change‡	62,791 (84.5)	82.8 (0.4)	84.9 (0.2)	
	Decreased	4,502 (7.4)	9.6 (0.3)	6.8 (0.2)	
Consumption of instant food	Increased	992 (1.9)	1.8 (0.1)	2.0 (0.1)	<.001
	No change‡	66,258 (91.5)	91.6 (0.2)	91.4 (0.2)	
	Decreased	5,044 (6.6)	6.6 (0.2)	6.6 (0.1)	
Alcohol drinking	Increased	594 (0.9)	0.9 (0.1)	0.9 (0.1)	<.001
	No change‡	61,589 (83.0)	85.9 (0.4)	82.2 (0.2)	
	Decreased	10,111 (16.1)	13.2 (0.4)	16.9 (0.2)	
Smoking	Increased	334 (0.5)	0.5 (0.1)	0.4 (0.0)	<.001
	No change‡	68,798 (94.5)	95.4 (0.2)	94.2 (0.1)	
	Decreased	3,160 (5.0)	4.0 (0.2)	5.3 (0.1)	
Psychological concerns due to COVID-19		3.95 (0.005)	3.91 (0.008)	3.96 (0.005)	<.001
Concerns about infection		4.04 (0.004)	3.99 (0.010)	4.05 (0.006)	<.001
Concerns about death		3.55 (0.008)	3.53 (0.012)	3.56 (0.008)	.052
Concerns about criticism from others		4.06 (0.006)	4.04 (0.010)	4.07 (0.006)	.004
Concerns about economic damage		4.15 (0.006)	4.08 (0.011)	4.17 (0.006)	<.001

†weighted %, SE=Standard Error, ‡'No change' category includes 'not applicable'

Table 2 shows the differences in depression according to the characteristics of subjects by household type. The incidence of depression (PHQ-9≥10 points) was higher in single-person households (6.3%) than in multi-person households (3.1%). For both single-person and multi-person households, the incidence of depression was high in women, 75-year-old or older, middle school graduates or younger, households with a monthly income of 1 million won or less, and groups receiving basic livelihood benefits. Looking at the difference in depression due to lifestyle changes caused by COVID-19, both single-person and multi-person households had high depression in the decreasing group in physical activity (p>.001), there was a significant difference in sleep time due to high depression in the increasing group and the decreasing group (p<.001). Psychological concerns caused by COVID-19 were statistically significant differences in the depression group and the non-depression group for both single-person and multi-person households (p<.001).

In this study, demographic and social characteristics were corrected and multivariate logistic regression analysis was conducted to determine the effect of lifestyle changes and psychological concerns cause by COVID-19 on depression by household type. In Model 2, which corrected the control variables, the risk of depression in single-person households was 1.27 times higher in the 65-74 year-old groups, 1.31 times higher

in the middle school and lower middle school group, and 2.54 times higher in the non-wage group. The risk of depression caused by lifestyle changes caused by COVID-19 was 1.25 times higher in the physical activity reduction group than in the non-change group, 2.63 times higher in the sleep time reduction group, and 0.74 times lower in the alcohol reduction group than in the non-change group. The effects of gender, monthly income level, changes in instant food intake and smoking, and psychological concerns caused by COVID-19 on depression in the elderly in single-person households were not significant (Table 3).

The risk of depression in the elderly in multi-person households was 1.77 times higher for women than men, 1.93 times higher for those aged 75 or older than those aged 65 to 74, and 1.38 times higher for those under middle school graduates than those above high school. Compared to the group with more than 3.01 million won in households, the group with less than 1 million won had a 1.54 times higher risk of depression, and the group with 1.01-3 million won had a 1.90 times higher risk of depression than the nonwage group. The risk of depression caused by lifestyle changes caused by COVID-19 was 0.69 times lower in the group that increased physical activity than in the group that did not change, and 1.44 times and 2.71 times higher in the group that increased sleep time and decreased, respectively. The group that increased instant food intake was 1.93 times higher than the group that did not change, the group that increased drinking was 2.31 times higher than the group that did not change, and the group that decreased was 0.68 times lower. Both the smoking increase and decrease groups increased the risk of depression in the elderly in multi-person households compared to the unchanged group, but they were not statistically significant. When psychological concerns caused by COVID-19 increased by 1, the risk of depression in the elderly in multi-person households increased by 1.23 times (Table 3).

Table 2. Differences of depression according to the sociodemographic and COVID-19 related factors by household types

Variables	Categories	Single-person households (n=18,824)			Multi-person households (n=53,507)		
		PHQ-9 score<10	PHQ-9 score≥10	p	PHQ-9 score<10	PHQ-9 score≥10	p
		%[†](SE) or Mean (SE)			%[†](SE) or Mean (SE)		
Total	N (%[†])	17,838 (93.7)	986 (6.3)		51,958 (96.9)	1,549 (3.1)	
Gender	Male	24.4 (0.4)	22.9 (1.8)	.441	50.6 (0.2)	32.8 (1.4)	<.001
	Female	75.6 (0.4)	77.1 (1.8)		49.4 (0.2)	67.2 (1.4)	
Age(yr)	65-74	47.4 (0.4)	40.5 (1.8)	<.001	61.3 (0.3)	43.5 (1.7)	<.001
	≥75	52.6 (0.4)	59.5 (1.8)		38.7 (0.3)	56.5 (1.7)	
Education level	≤Middle school	75.8 (0.4)	83.0 (1.5)	<.001	62.4 (0.3)	77.1 (1.5)	<.001
	≥High school	24.2 (0.4)	17.0 (1.5)		37.6 (0.3)	22.9 (1.5)	
Monthly income (10⁴ Korean won)	<100	65.5 (0.4)	82.3 (1.6)	<.001	19.0 (0.3)	30.5 (1.5)	<.001
	100-299	30.7 (0.4)	15.5 (1.5)		48.0 (0.4)	46.0 (1.8)	
	≥300	3.8 (0.2)	2.2 (0.5)		32.9 (0.3)	23.5 (1.6)	
Basic living recipient	No	82.8 (0.4)	62.4 (1.8)	<.001	95.1 (0.2)	87.2 (1.1)	<.001
	Yes	17.2 (0.4)	37.6 (1.8)		4.9 (0.2)	12.8 (1.1)	
Lifestyle changes due to COVID-19							
Physical activity	Increased	4.1 (0.2)	2.7 (0.7)	<.001	5.1 (0.1)	2.9 (0.5)	<.001
	No change[‡]	58.4 (0.4)	51.5 (1.8)		56.5 (0.3)	52.4 (1.6)	
	Decreased	37.5 (0.4)	45.8 (1.8)		38.4 (0.3)	44.8 (1.7)	

Sleep hours	Increased	7.6 (0.2)	8.3 (0.9)	<.001	8.2 (0.2)	10.4 (1.1)	<.001
	No change‡	83.6 (0.3)	70.4 (1.7)		85.3 (0.2)	73.3 (1.5)	
	Decreased	8.8 (0.3)	21.3 (1.5)		6.5 (0.2)	16.3 (1.3)	
Consumption of instant food	Increased	1.7 (0.1)	2.7 (0.6)	.186	2.0 (0.1)	3.4 (0.8)	.033
	No change‡	91.7 (0.2)	91.3 (1.1)		91.5 (0.2)	89.1 (1.1)	
	Decreased	6.7 (0.2)	6.1 (0.9)		6.5 (0.2)	7.5 (0.8)	
Alcohol drinking	Increased	0.9 (0.1)	1.5 (0.7)	.115	0.9 (0.1)	1.9 (0.5)	<.001
	No change‡	85.8 (0.3)	87.9 (1.3)		82.1 (0.2)	87.8 (1.2)	
	Decreased	13.4 (0.3)	10.6 (1.2)		17.1 (0.2)	10.3 (1.1)	
Smoking	Increased	0.5 (0.1)	0.7 (0.4)	.832	0.4 (0.0)	0.8 (0.3)	.087
	No change‡	95.4 (0.2)	95.6 (0.9)		94.2 (0.1)	95.0 (0.8)	
	Decreased	4.0 (0.2)	3.7 (0.8)		5.4 (0.1)	4.1 (0.7)	
Psychological concerns due to COVID-19, Mean (SE)		3.91 (0.007)	3.95 (0.031)	.177	3.96 (0.005)	4.14 (0.028)	<.001

[†]weighted %. SE=Standard Error; [‡]'No change' category includes 'not applicable'

Table 3. Effects of sociodemographic and COVID-19 related factors on depression by household types

Variables	Categories	Single-person households (n=18,824)	Multi-person households (n=53,507)
		Adjusted OR (95% CI)	Adjusted OR (95% CI)
Gender (ref. male)	Female	0.97 (0.77-1.22)	1.77 (1.51-2.07)**
Age(yr) (ref. 65-74)	≥75	1.27 (1.08-1.50)*	1.93 (1.68-2.23)**
Education level (ref. ≥High school)	≤Middle school	1.31 (1.02-1.69)*	1.38 (1.14-1.67)*
Monthly income (10^4 Korean won) (ref. ≥301)	≤100	1.12 (0.69-1.82)	1.54 (1.24-1.90)**
	101-300	0.65 (0.39-1.09)	1.24 (1.02-1.49)*
Basic living recipient (ref. no)	Yes	2.54 (2.16-2.99)**	1.90 (1.52-2.39)**
Lifestyle changes due to COVID-19			
Physical activity (ref. no change)	Increased	0.77 (0.44-1.36)	0.69 (0.49-0.98)*
	Decreased	1.25 (1.07-1.47)*	1.09 (0.95-1.26)
Sleep hour (ref. no change)	Increased	1.17 (0.91-1.50)	1.44 (1.12-1.85)**
	Decreased	2.63 (2.15-3.22)**	2.71 (2.18-3.36)**
Consumption of instant food (ref. no change)	Increased	1.36 (0.76-2.42)	1.93 (1.18-3.14)*
	Decreased	0.83 (0.60-1.16)	1.12 (0.87-1.43)
Alcohol drinking (ref. no change)	Increased	1.57 (0.56-4.39)	2.31 (1.29-4.14)**
	Decreased	0.74 (0.56-0.96)*	0.68 (0.53-0.87)*
Smoking (ref. no change)	Increased	0.95 (0.37-2.43)	1.27 (0.53-3.08)
	Decreased	0.99 (0.61-1.60)	1.26 (0.84-1.88)
Psychological concerns related to COVID-19		1.05 (0.96-1.15)	1.23 (1.10-1.34)**

Cox & Snell R^2	0.106	0.086
Nagelkerke R^2	0.086	0.076

Note: OR=Odds Ratio, CI=Confidence Interval, ref.=reference group, $^*p$<.05, $^{**}p$<.001

4. DISCUSSION

This study sought to provide basic data for an intervention program to prevent and manage depression in the elderly by identifying depression-related factors of the elderly aged 65 or older living in the community in the COVID-19 situation by household type. As a result of this study, first, the incidence of depression caused by COVID-19 was higher in single-person households than in multi-person households, and in both single-person households, the incidence of depression was higher in women, 75 years of age or older, middle school graduates, households with a monthly income of less than 1 million won, and groups receiving basic livelihood benefits. This showed that the level of depression of elderly single-person households was higher than that of households with two or more people [8,9,15]. The incidence of depression is consistent with the results of the study [16], which showed that women and those over 70 years old were higher. Second, the difference in depression due to lifestyle changes caused by COVID-19 was higher in both single-person and multi-person households in the decline group in physical activity, and psychological concerns were higher in the depression group that in the non-depression group, but there was a statistically significant difference only in multi-person households. This was higher in the group with high psychological anxiety in the rate of experiencing depression in the elderly [17], and is consistent with the result that depression in the elderly is related to lack of physical activity [18]. Therefore, it is necessary to develop a physical activity program tailored to the elderly.

Third, the factors affecting depression caused by lifestyle changes in the elderly in single-person households were physical activity reduction, sleep time reduction, and drinking increase, and the effect of psychological concerns on depression in the elderly in single-person households was not significant. In addition, the factors affecting the occurrence of depression caused changes in lifestyle caused by COVID-19 in the elderly in multi-person households were found to be a decrease in physical activity, a decrease in sleep time, an increase in instant food intake and an increase in drinking. When psychological concerns increased by 1, the risk of depression in the elderly in multi-person households increased by 1.23 times. This is consistent with the results of studies showing that alcohol consumption increased due to COVID-19 [19], and sleep disorders are risk factors [20,21], which are strongly related to depression. Therefore, in order to reduce the occurrence and recurrence of depression, increased physical activity, alcohol control, and sleep disorder management are first necessary.

5. CONLUSION

This study was conducted to prepare measures to improve the healthy quality of life of the elderly by preventing and managing depression of the elderly by identifying factors related to depression of the elderly by household type in the COVID-19 situation. This study was conducted on the elderly aged 65 or older living in the community. Population and social characteristics of the elderly in the community by household type and depression-related factors of the elderly in the community were identified, and the factors influencing depression caused by COVID-19 were analyzed. The incidence of depression caused by COVID-19 was higher in single-person households than in multi-person households, and in both single-person and multi-person households, the incidence of depression was higher in women, 75 years of age or older, middle school graduates, households earning less than 1 million won per month, groups receiving basic livelihood benefits, and groups with unmet medical experience. Factors affecting the occurrence of depression due to lifestyle changes caused by COVID-19 were found to be reduced physical activity impaired sleep time, and increased drinking. These results suggest that individual health conditions and social support systems should be considered to prevent depression and improve the quality of life of the elderly in the community. Therefore, it is suggested to develop and operate customized programs for mental health promotion by household type to prevent depression in the elderly in the community.

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