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ORIGINAL ARTICLE

The effects of changes in daily life due to the COVID-19 pandemic on the depressive symptoms among community-dwelling older adults in Korea

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ABSTRACT: *This study aims to identify the effects of daily life changes due to the coronavirus disease 2019 pandemic on the depressive symptoms among community-dwelling older adults. This cross-sectional and secondary data analysis study collected and analysed the data of 72 335 older adults aged older than 65 who participated in the 2020 Korean Community Health Survey. Changes in daily life due to the coronavirus disease 2019 pandemic were measured by changes in physical activity, sleep duration, consumption of instant foods or soda drinks, alcohol consumption, smoking, and social contact compared to before the pandemic as perceived by the participants. The Patient Health Questionnaire-9 was used to assess depressive symptoms, and multiple logistic regression analysis was conducted to explore the relationship between the two. After adjusting for socio-demographic and health-related factors, changes in daily life due to the coronavirus disease 2019 pandemic that affected depressive symptoms in older adults living in the community were observed. This study confirmed that changes in daily life due to the coronavirus disease 2019 pandemic negatively affected the mental health of older adults. Thus, there is a need to improve social support and care systems, by including non-face-to-face programmes using remote communication technology. It will allow older adults to maintain their daily lives and mental health during the COVID-19 pandemic.*

KEY WORDS: *COVID-19, pandemics, depressive symptom, aged, community health survey.*

INTRODUCTION

The World Health Organization (WHO) declared the coronavirus disease 2019 (COVID-19) as a public health emergency of international concern (World Health Organization, 2020). COVID-19 is a highly infectious disease associated with a high incidence of severe pneumonia and death for individuals with a chronic disease or older adults (Dowd *et al*. 2020). As part of the strategy to terminate the spread of COVID-19, countries worldwide have enforced quarantine and social distancing measures (Dighe *et al*. 2020). Although standards vary from country to country, various COVID-19 response policies such as blockade measures, restrictions on the use of facilities, and travel restrictions, such as mandatory diagnostic tests and proof of vaccination for entry into a foreign country, are being implemented worldwide. Similarly, Korea maintains restrictions on private gatherings, the number of gatherings and operating facilities in restaurants and multi-use facilities, and the use of quarantine passes while conducting social distancing, according to the number of confirmed cases (Korea Ministry of Health & Welfare, 2022).

Although quarantine and social distancing strategies have emerged as an effective way of preventing the

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spread of the infection, they have continuously restricted people's daily lives and engendered distress, anxiety, and psychological trauma throughout society (Ettman *et al*. 2020). In addition, quarantine and social distancing have taken a toll on the physical, mental, and social aspects of people's lives directly and indirectly by causing dietary imbalance, physical inactivity, and reduced social interactions (Feeney *et al*. 2021; Hoffart *et al*. 2021).

The consequence of quarantine and social distancing provokes an array of adverse effects, such as loneliness, anxiety, stress, and reduced physical activity, in all age groups, including older adults, highlighting the need for prompt measures to address mental health, physical activity, and other issues (Salari *et al*. 2020; Santini *et al*. 2020). In addition, the limited availability of healthcare and counselling services is an added risk to the mental health crisis (Usher *et al*. 2020).

BACKGROUND

In 2021, Korea's older adult population aged 65 or older accounted for 16.5% of the total population (Statistics Korea, 2021). Moreover, the proportion of older adults living in long-term care facilities is about 3.3%, and the proportion of older adults living in the community is high (Health Plan 2020, 2022). The main scope of activities of the community-dwelling older adults is mainly limited to their communities, so it is essential to maintain their lifestyle and daily life.

While all age groups may be vulnerable to the adverse effects of quarantine and social distancing, older adults may be the most susceptible, considering that older adulthood is a period marked by a decreasing social network and elevated vulnerability to chronic disease. Previous studies have reported that quarantine and social distancing measures enforced worldwide, including in Asia, Europe, and America, have brought about changes in the daily lives and social activities of community-dwelling older adults. These changes include reduced social interaction, decreased health-promoting behaviours, and increased health risk behaviours (Pfefferbaum & North, 2020; Pollard *et al*. 2020; Sepúlveda-Loyola *et al*. 2020). However, most previous studies focused solely on the COVID-19 pandemic, and studies identifying the impact of COVID-19-induced changes in daily lives are lacking.

Older adults' daily lives encompass all aspects of their lives, including caring for themselves, feeling connected with other people, engaging in productive activities, and independent living (Bruggencate *et al*. 2018). The daily routine of older adults is one of the ways to maintain the health status and is one of the important indicators reflecting health outcomes (O'Conor *et al*. 2019). Older adults often spend more time alone, and as the social role of the older adults decreases, cognitive decline occurs, and they face a variety of negative consequences (WHO, 2017).

Some research indicates that there could be a genetic association to depression or depressive symptoms (Fiske *et al*. 2009). However, biological, social, and psychological factors play an important role in depressive symptoms in older adults (Maier *et al*. 2021). In addition, depressive symptoms in older adulthood are influenced by individual factors and socio-structural contexts because daily life connects individuals to society, and depression exposes them to isolation from society (Han *et al*. 2018; Rautio *et al*. 2018). Such associations show that environmental features are risk factors of mental health and modifiable protective factors in older adults. Unlike the depressive symptoms of adolescents and younger adults, depressive symptoms in older adults not only cause other somatic symptoms that affect the quality of life, such as sleep disturbance and cognitive decline, but also significantly increase the risk of suicide (Fiske *et al*. 2009). Thus, this study aims to examine the depressive symptoms among older adults and changes in their daily lives brought about by COVID-19, the suspected reason for their depressive symptoms.

Accordingly, the hypothesis of this study is the following: After controlling for demographic and health-related characteristics, COVID-19-induced changes in daily lives will affect the depressive symptoms in community-dwelling older adults.

METHODS

Study design

This descriptive correlational study aims to identify the effects of COVID-19-induced changes in daily lives on the depressive symptoms in community-dwelling older adults.

Participants

We used the raw data of the 2020 Korean Community Health Survey (KCHS). The KCHS is conducted by the Korea Disease Control and Prevention Agency on adults aged 19 years or older nationwide. An average of 900 individuals were sampled for each of the 255

public health centres via multi-stage probability sampling, and in 2020, 229 269 participants were enrolled. Of 72 812 older adult participants (≥65 years), 7,477 with incomplete information about depressive symptoms were excluded, and the remaining 72 335 participants were included in the final analysis. Therefore, it can meet the evidence that the appropriate sample size is more than 1:10 (number of independent variables: sample size) or that the sample size is more than 500 (Bujang *et al*. 2018).

Ethical consideration

This secondary data analysis study approved an exemption by the Institutional Review Board of the institution to which the researcher belongs (IRB No. HYUIRB-202108-005).

Measures

Socio-demographic characteristics and health-related characteristics

Socio-demographic characteristics included age, gender, monthly household income, education level, employment status, living arrangement, and residential area. Monthly household income was divided into quartiles (≤630 000 KRW, 630 001–1 000 000 KRW, 1 000 001–2 200 000 KRW, and >2 200 000 KRW). Education level was classified into uneducated, elementary school, middle school, and high school or above. The residential area was categorized into urban and rural, and employment status was divided into yes or no based on the engagement in paid activities or a minimum of 18 hours of unpaid family service in the past week.

Health-related characteristics comprise hypertension, diabetes mellitus (DM), self-rated health, and perceived stress. Self-rated health required them to answer their usual health status. It was divided into very good, good, fair, poor, and very poor in the survey, and we classified these into good (very good and good), fair (fair), and poor (poor and very poor). Perceived stress confirmed their level of stress in daily life, and was divided into extra high, high, moderate, and almost none in the original survey. We classified these into high (extremely high, high, moderate) and low (almost none).

Changes in daily life due to the COVID-19 pandemic

Changes in daily life due to COVID-19 were measured based on the overall changes in the daily life score and changes in six specific categories. The overall changes in daily life score were directly answered by asking, "If you consider 100 points for your daily life before the COVID-19 pandemic and 0 points for its complete suspension, what is your current state?" In this study, this score was reverse-scored such that 0 indicates no change in daily life compared to the pre-COVID-19 period, and 100 indicates a complete halt of daily life; a higher score indicates more changes in daily life due to COVID-19. The specific categories of daily lives examined were physical activity (including walking, exercising, indoor, and outdoor activities), sleep duration, consumption of instant foods or soda drinks, alcohol consumption, smoking, and social contact (with friends or neighbours). We examined whether the frequency of these activities has increased, remained unchanged, or has decreased compared to the pre-COVID-19 period. In addition, if they responded that it was not applicable, they considered that there was no change in daily life compared to before the COVID-19 pandemic and treated it as similar.

Depressive symptoms

Depressive symptoms were measured using the Korean version of the Patient Health Questionnaire-9 (PHQ-9) (Lee *et al*. 2014; Spitzer *et al*. 1999). The PHQ-9 is a nine-item self-administered scale to determine the frequency of depression-related symptoms in the past two weeks, such as depressed mood, lack of interest, reduced or increased sleep, reduced or increased appetite, psychomotor retardation or agitation, feeling tired, feeling guilty, difficulty in concentration, and suicidal ideation. The total score ranges from 0 to 27, and a higher score indicates more severe depressive symptoms. In this study, we set the cut-off to 10 with reference to a previous study (Byeon, 2021) to distinguish between individuals with no depressive symptoms and individuals with significant depressive symptoms. The Cronbach's alpha was 0.802 in this study.

Data analysis

The collected data were analysed using the IBM SPSS Statistics 26.0 software. Considering a complex sampling design, we applied stratification variables, cluster variables, and weights. Participants' socio-demographic characteristics, health-related characteristics, changes in daily life due to COVID-19, and depressive symptoms were analysed with real numbers, percentage, mean, and standard deviation. Variations in depressive symptoms according to the changes in daily life due to

COVID-19 were analysed with the Rao-Scott chi-square test and independent t-test. The effects of changes in daily life due to COVID-19 on depressive symptoms were analysed using multiple logistic regression. The reliability of the PHQ-9 for measuring depressive symptoms was analysed with Cronbach's α. The data were presented as unweighted frequency, weighted percentage, standard error, odds ratio (OR), and 95% confidence interval (CI). The level of statistical significance (α) was set at 0.05.

RESULTS

Depressive symptoms according to socio-demographic characteristics and health-related characteristics

Of the participants, 60,828 (83.5%) did not have depressive symptoms, while 11 507 (16.5%) did. The presence of depressive symptoms statistically significantly differed according to age ($P < 0.001$), gender ($P < 0.001$), monthly household income ($P < 0.001$), educational level ($P < 0.001$), employment status ($P < 0.001$), living arrangements ($p < 0.001$), residential area ($p < 0.001$), hypertension ($p < 0.001$), diabetes mellitus ($p < 0.001$), self-rated health status ($p < 0.001$), and perceived stress ($p < 0.001$) (as shown in Table 1).

Depressive symptoms according to changes in daily life due to the COVID-19 pandemic

The overall changes in daily life score were 43.59 ± 0.14 in the non-depressed group and 48.00 ± 0.33 in the depressed group, showing that individuals with depressive symptoms claimed to have more changes in daily life due to COVID-19 ($p < 0.001$). Furthermore, depressive symptoms also statistically significantly differed according to the changes in specific areas of daily life, namely, physical activity, sleep duration, consumption of instant foods or soda drinks, alcohol consumption, smoking, and social contact (as shown in Table 2).

Factors of changes in daily life due to COVID-19 that predict depressive symptoms

The factors of changes in daily life due to COVID-19 that predict depressive symptoms were analysed using logistic regression (as shown in Table 3).

The OR for depressive symptoms was 1.007 (95% CI: 1.006–1.008) with a higher overall change in daily life score and 1.349 (95% CI: 1.274–1.429) with less physical activities compared to the pre-COVID-19 period. Similarly, the OR was 1.348 (95% CI: 1.219–1.489) with increased sleep duration, 2.707 (95% CI: 2.483–2.951) with decreased sleep duration, 1.408 (95% CI: 1.161–1.708) with increased consumption of instant foods or soda drinks, 1.169 (95% CI: 1.052–1.299) with decreased consumption of instant foods or soda drinks, 1.614 (95% CI: 1.153–2.259) with increased smoking, 1.488 (95% CI: 1.030–2.150) with increased social contact, and 0.706 (95% CI: 0.663–0.751) with decreased social contact compared to the pre-COVID-19 period.

After univariate logistic regression analysis, another regression analysis was performed after adjusting for the socio-demographic and health-related characteristics. The OR for depressive symptoms was 1.005 (95% CI: 1.004–1.007) with a higher overall change in daily life score. The OR for depressive symptoms was significantly higher than one with decreased physical activity compared to the pre-COVID-19 period (OR: 1.317, 95% CI: 1.237–1.402), increased sleep duration (OR: 1.425, 95% CI: 1.277–1.590), decreased sleep duration (OR: 2.373, 95% CI: 2.157–2.611), increased consumption of instant foods or soda drinks (OR: 1.434, 95% CI: 1.159–1.775), decreased consumption of instant foods or soda drinks (OR: 1.154, 95% CI: 1.022–2.269), increased alcohol consumption (OR: 1.703, 95% CI: 1.278–2.269), and increased smoking (OR: 1.823, 95% CI: 1.220–2.726). Contrarily, the OR for depressive symptoms was 0.814 with decreased social contact compared to the pre-COVID-19 period (95% CI: 0.761–0.871).

The results of the multivariate logistic regression analysis after adjusting for socio-demographic characteristics, health-related characteristics, the overall change in daily life score, and variables related to the changes in specific areas of daily life are as follows.

The OR for depressive symptoms was 1.004 (95% CI: 1.002–1.005) with a higher overall change in daily life score. The OR for depressive symptoms was significantly greater than that with decreased physical activity compared to the pre-COVID-19 period (OR: 1.197, 95% CI: 1.119–1.280), increased sleep duration (OR: 1.338, 95% CI: 1.196–1.497), decreased sleep duration (OR: 2.252, 95% CI: 2.040–2.487), and increased alcohol consumption (OR: 1.478, 95% CI: 1.091–2.002). Conversely, the OR for having depressive symptoms was 0.754 with decreased social contact compared to the pre-COVID-19 period (95% CI: 0.701–0.810).

TABLE 1 *Depressive symptoms according to socio-demographic and health-related characteristics* (N = 72 335)

Variable	Categories	Not-depressed (*n* = 60 828, 83.5%)		Depressed (*n* = 11 507, 16.5%)		Total (*N* = 72 335, 100%)		Rao-Scott χ^2/t	*P*
		n	Weighted %	*n*	Weighted %	*n*	Weighted %		
Age	M±SE	73.49 ± 0.038		75.32 ± 0.089		73.79 ± 0.036		373.890	<0.001
Gender	Male	26 788	47.1	3394	32.2	30 182	44.6	525.893	<0.001
	Female	34 040	52.9	8113	67.8	42 153	55.4		
Monthly household income	Ⅰ(lowest)	13 786	17.0	3952	27.6	17 738	18.7	164.337	<0.001
	Ⅱ	15 141	22.2	3013	24.9	18 154	22.7		
	Ⅲ	15 070	26.8	2284	23.0	17 354	26.2		
	Ⅳ(highest)	15 532	34.0	2065	24.5	17 597	32.4		
Education level	No formal education	8900	9.6	2711	17.3	11 611	10.9	176.281	<0.001
	Elementary school	24 721	24.5	4961	39.4	29 682	35.3		
	Middle school	10 905	19.5	1698	17.3	12 603	19.1		
	≥ High school	16 205	36.4	2123	26.0	18 328	34.7		
Employment status	Employed	25 069	31.9	2995	20.0	28 064	30.0	401.339	<0.001
	Unemployed	35 371	68.1	8261	80.0	43 632	70.0		
Living arrangements	Living with spouse	38 926	66.4	5642	50.8	44 568	63.8	528.895	<0.001
	Living alone	21 856	33.6	5854	49.2	27 710	36.2		
Residential area	Urban	24 628	72.2	5050	73.7	29 678	72.5	7.569	0.006
	Rural	36 200	27.8	6457	26.3	42 657	27.5		
Hypertension	Yes	32 324	51.7	6661	57.1	38 985	52.6	60.281	<0.001
	No	28 493	48.3	4844	42.9	33 337	47.4		
Diabetes Mellitus	Yes	13 023	22.3	2975	26.5	15 998	23.0	55.402	<0.001
	No	47 797	77.7	8528	73.5	56 325	77.0		
Self-rated health status	Good	22 093	38.9	1469	14.5	23 562	34.8	1697.204	<0.001
	Fair	25 149	42.2	3447	33.3	28 596	40.7		
	Poor	13 584	18.9	6590	52.2	20 174	24.4		
Perceived stress	Low	28 695	55.9	2283	81.1	30 978	39.9	1514.598	<0.001
	High	32 114	44.1	9213	18.9	41 327	60.1		

Additionally, to examine differences according to community features, we analysed the effects of overall change in daily life score and changes in specific areas of daily life on depressive symptoms according to the residential area (as shown in Supplementary Table S1). Regardless of the residential area, the OR for depressive symptoms was significantly greater than that with decreased physical activity (Urban OR: 1.215, 95% CI: 1.117–1.322, Rural OR: 1.122, 95% CI: 1.010–1.245), increased sleep duration (Urban OR: 1.321, 95% CI: 1.152–1.515, Rural OR: 1.406, 95% CI: 1.181–1.674), decreased sleep duration (Urban OR: 2.238, 95% CI: 1.983–2.526, Rural OR: 2.307, 95% CI: 1.975–2.694). The OR for depressive symptoms was significantly lower than that decreased social contact compared to the pre-COVID-19 period (Urban OR: 0.752, 95% CI: 0.683-0.828, Rural OR 0.761, 95% CI: 0.682-0.849). Among urban dwellers, the OR for depressive symptoms was 1.713 with increased alcohol consumption (95% CI: 1.181–2.483) but was 0.360 among rural dwellers even with increased social contact (95% CI: 0.159–0.814) (as shown in Supp 1).

DISCUSSION

This study aimed to examine the levels of depressive symptoms in older adults aged 65 years using the 2020 KCHS data and analyse the effects of changes in daily life provoked by the COVID-19 pandemic on their depressive symptoms.

In this study, a total of 11,507 older adults (16.5%) had significant depressive symptoms. This was a higher percentage than a previous study result that reported 9.2% of the older adults had significant depressive symptoms in Korea (Kim, 2020). This is consistent with previous findings that the prevalence of depressive symptoms increased due to the COVID-19 pandemic (Feter *et al*. 2021). The COVID-19 pandemic crisis demands social distancing and changes in daily life, which can lead to psychological problems such as

TABLE 2 *Depressive symptoms according to changes in daily life due to COVID-19* (N = *72 335*)

Variable	Categories	Not depressed (*n* = 60 828, 83.5%)		Depressed (*n* = 11 507, 16.5%)		Total (*N* = 72 335, 100%)		Rao-Scott χ^2/t	*P*
		n	Weighted %	*n*	Weighted %	*n*	Weighted %		
Overall changes in daily life due to COVID-19 pandemic	M ± SE	43.59 ± 0.14		48.00 ± 0.33		44.31 ± 0.13		20.848	<0.001
Physical activity	Similar	2533	5.3	424	4.3	2957	5.1	54.376	<0.001
	Increased	39 458	57.6	6825	51.2	46 283	56.6		
	Decreased	18 357	37.1	4036	44.5	22 393	38.3		
Sleep duration	Similar	4168	8.0	906	9.5	5074	8.2	277.566	<0.001
	Increased	53 237	85.9	9012	75.9	62 249	84.3		
	Decreased	3152	6.1	1456	14.7	4608	7.5		
Consumption of instant foods or soda drinks	Similar	859	1.9	225	2.7	1084	2.1	10.399	<0.001
	Increased	55 532	91.5	10 335	89.8	65 867	91.2		
	Decreased	4284	6.6	859	7.5	5143	6.7		
Alcohol consumption	Similar	517	1.0	120	1.2	637	1.0	21.661	<0.001
	Increased	51 526	82.5	10 013	85.4	61 539	82.9		
	Decreased	8732	16.6	1349	13.4	10 081	16.1		
Smoking	Similar	279	0.4	75	0.7	354	0.5	4.693	0.009
	Increased	57 767	94.4	10 933	94.5	68 700	94.4		
	Decreased	2732	5.2	483	4.8	3215	5.1		
Social contact	Similar	192	0.3	44	0.5	236	0.3	74.286	<0.001
	Increased	14 230	20.4	3400	26.5	17 630	21.4		
	Decreased	46 388	79.3	8056	72.9	54 444	78.3		

depression. Depressive symptoms in older adults is a significant societal problem, as it harms their physical health, life satisfaction, and quality of life and may cause cognitive impairment, dementia, and suicide (Brzezińska *et al*. 2020; Carlo *et al*. 2019; De Oliveira *et al*. 2019). Therefore, active intervention is needed to maintain the psychological health of the older adults in infectious disease circumstances, when the elderly can be more psychologically vulnerable than typical everyday lives.

In this study, the non-depressed group and depressed group differed significantly in socio-demographic and health-related characteristics. This is presumably since depressive symptoms are influenced by an array of factors, including individuals' psychological factors, environmental factors, and health status (Barnett *et al*. 2018; Han *et al*. 2018; Rautio *et al*. 2018; Mohd *et al*. 2019). Furthermore, this is consistent with previous findings that the social circumstances engendered by the COVID-19 pandemic may pose a more severe threat to individuals' psychological and mental health depending on their characteristics (Salari *et al*. 2020). However, evidence supporting the impact of a prolonged public health crisis that provokes social isolation worldwide, such as the COVID-19 on older adults' health outcomes, is lacking. Thus, the differences in depressive symptoms according to individuals' socio-demographic characteristics amid the COVID-19 pandemic should be repeatedly studied to understand their situation and prepare for a subsequent, unpredictable public health crisis. Moreover, a comprehensive approach that encompasses socio-demographic and health-related characteristics to resolve depressive symptoms in older adults is needed. Furthermore, this requires individualized management tailored to each individual's vulnerabilities.

Regarding the differences in depressive symptoms according to the changes in daily life due to COVID-19, individuals who sustained changes in daily life suffered from more depressive symptoms than their counterparts who did not. Additionally, depressive symptoms also statistically significantly differed according to physical activity, sleep duration, consumption of instant foods or soda drinks, alcohol consumption, smoking, and social contact. Older adults have less adaptability to new situations than other populations. Therefore, maintaining a sense of stability in daily life and living environment in old age is a fundamental

TABLE 3 *Factors of changes in daily life due to the COVID-19 pandemic affecting depressive symptoms* (N = 72 335)

Variable	Categories	Unadjusted		Adjusted†		Adjusted‡	
		ORs	95% CI	ORs	95% CI	ORs	95% CI
Overall changes in daily life due to COVID-19 pandemic		1.007**	1.006–1.008	1.005**	1.004–1.007	1.004**	1.002–1.005
Physical activity	Similar (ref.)	1		1		1	
	Increased	0.927	0.779–1.074	1.074	0.908–1.270	0.932	0.781–1.113
	Decreased	1.349**	1.274–1.429	1.317**	1.237–1.402	1.197**	1.119–1.280
Sleep duration	Similar (ref.)	1		1		1	
	Increased	1.348**	1.219–1.489	1.425**	1.277–1.590	1.338**	1.196–1.497
	Decreased	2.707**	2.483–2.951	2.373**	2.157–2.611	2.252**	2.040–2.487
Consumption of instant foods or soda drinks	Similar (ref.)	1		1		1	
	Increased	1.408**	1.161–1.708	1.434**	1.159–1.775	1.215	0.971–1.521
	Decreased	1.169*	1.052–1.299	1.154*	1.022–1.282	1.043	0.926–1.175
Alcohol consumption	Similar (ref.)	1		1		1	
	Increased	1.236	0.956–1.597	1.703**	1.278–2.269	1.478*	1.091–2.002
	Decreased	0.779**	0.719–0.844	0.966	0.886–1.054	0.940	0.856–1.032
Smoking	Similar (ref.)	1		1		1	
	Increased	1.614*	1.153–2.259	1.823*	1.220–2.726	1.333	0.871–2.038
	Decreased	0.922	0.807–1.052	1.065	0.920–1.232	1.030	0.879–1.207
Social contact	Similar (ref.)	1		1		1	
	Increased	1.488*	1.030–2.150	1.400	0.925–2.119	1.217	0.814–1.818
	Decreased	0.706**	0.663–0.751	0.814**	0.761–0.871	0.754**	0.701–0.810

*$P < 0.05$, **$p < 0.01$.

†Adjusted socio-demographic and health-related variables (age, gender, monthly household income, education attainment, employment status, living arrangements, residential area, hypertension, diabetes mellitus, self-rated health status, perceived stress).

‡Adjusted socio-demographic and health-related variables and all the other variables in the table.

issue in terms of the happiness and quality of life of older adults (Karma *et al*. 2021). However, changes in the daily life of older adults due to the COVID-19 pandemic reduce their social contact or networks, eventually harming psychological health and increasing depression. Thus, in addition to the conventional management for older adults, there is a pressing need for special care and measures for depressed older adults.

The degree of changes in daily lives provoked by COVID-19 predicted depressive symptoms in older adults. Social distancing and lockdowns during the COVID-19 pandemic hinder older adults from interacting with people within their social network. Daily life connects older adults to society, and since they feel that their daily lives have been suspended due to the pandemic, their sense of social isolation and loneliness are amplified, which intensifies their depressive symptoms (Bruggencate *et al*. 2018; Grolli *et al*. 2021). This is significantly more problematic in family-centred cultures such as the Korean society. As Korean people value family connections and interdependence, their daily lives grinding to a halt may exacerbate their psychological and emotional problems (Kim & Lee, 2019). Therefore, a national public health welfare system is called for to actively resolve the problems entailing halted daily lives in older adults. In this study, reduced physical activity, increased or decreased sleep duration, and increased drinking frequency were identified as the predictors of depressive symptoms in older adults.

Regular physical activity (primarily a walk around the neighbourhood) is known to have a positive impact on depressive symptoms in older adulthood (Lerche *et al*. 2018). However, the COVID-19 pandemic may deprive their opportunities to engage in physical activity and limit the extent of their activities. Thus, to facilitate physical activity in daily lives by developing and implementing various in-person and online intervention programmes, older adults need to be educated about

safe walking even during the pandemic and introduced to physical activities performed at home. Moreover, physical and social environments must be ameliorated considering the context of people's daily lives and physical activities. Sleep duration was another predictor of depressive symptoms in older adults. Shorter sleep duration during the night (Vorvolakos *et al*. 2020) or longer sleep duration (Fawale *et al*. 2017) beyond 7 to 8 hours were associated with the onset of depressive symptoms. Sleep pattern, sleep quality, and sleep satisfaction have a tremendous impact on older adults' quality of life and mental health. As the COVID-19 pandemic caused individuals to deviate from their daily routines and lifestyles and consequently degraded the quality of their sleep in many cases, interventions that help maintain routine activities and increase engagement in leisure activities are needed. Furthermore, a system for detecting and managing older adults with sleep problems should be established to prevent sleep disorders from becoming chronic and leading to significant depressive symptoms. In this study, we assessed sleep solely based on the total sleep duration. However, since sleep is a multifactorial construct, factors such as sleep quality and sleep disturbances should be assessed.

Increased alcohol consumption compared to the pre-COVID-19 period was identified as a predictor of depressive symptoms. Alcohol consumption and its frequency are rising during the COVID-19 pandemic (Pollard *et al*. 2020). Since alcohol has an adverse impact on depressive symptoms, it is bound to have a toll on older adults' mental health (Hunt *et al*. 2020). The increased alcohol consumption compared to the pre-COVID-19 period suggests that social restrictions or other situations provoked alcohol consumption. Hence, various intervention strategies should be employed to help older adults resolve COVID-19-included stress or mental difficulties using methods to promote their mental health.

Reduced social contact with friends or neighbours decreased the odds of developing depressive symptoms by 24.6%. This is contradictory to previous results that older adults with social support networks involving friends or neighbours can resolve their psychological problems (An *et al*. 2019). In pandemic situations, depressive symptoms can worsen in the case of a lack of knowledge of infectious diseases (Wang *et al*. 2021). However, significant information related to COVID-19 can be easily accessed through the media or alarms of quarantine authorities (Korea Ministry of Health & Welfare, 2022). High knowledge of COVID-19 had a positive effect on participation in social distancing (Al-Hasan *et al*. 2020). Unlike mandatory quarantine, which involves the complete restriction of contact with others, social distancing is considered to impose a similar level of life restrictions for everyone in the community. Thus, older adults do not judge social distancing as being alienated from others. However, although face-to-face meetings have been restricted due to social distancing policies, it can be assumed that Korea's high Internet and smartphone penetration rate is due to the continued use of non-face-to-face mediums, such as video calls and social media, for meetings and interactions among older adults (ABC News, 2019).

In addition, we examined the predictors of depressive symptoms in urban and rural dwellers to determine whether community features are involved. We observed that increased social contact with friends or neighbours decreased the odds of developing depressive symptoms by 64% in rural dwellers. Rural-dwelling older adults resolve a more significant part of their problems through social relationships compared to their urban-dwelling counterparts, so face-to-face interactions with their social contacts, such as friends or neighbours, may be more crucial and meaningful to them (Tang *et al*. 2020). Social connectivity through such face-to-face social interactions would presumably have a more significant impact on mental health, such as depressive symptoms, in these older adults compared to urban-dwelling older adults. Social interactions in rural areas are more critical, informal, and dependent on social networks compared to urban areas. Thus, psychological and emotional services focused on interpersonal relationships should be expanded even during the COVID-19 pandemic to address depressive symptoms resulting from the inability to meet with friends or neighbours.

Due to the prolonged COVID-19 pandemic, social distancing, suspension of daily life, and psychological distress and depressive symptoms of the older adults can continue. In addition, it is not known what kind of infectious diseases will cause a pandemic in the future. As a result, it is necessary to find support measures for the mental health of older adults due to disasters. These services need social support to expand to the entire older adults group considering regional characteristics and high-risk and vulnerable groups.

One limitation of this study is that changes in daily life compared to the pre-COVID-19 period were subjectively assessed. Thus, further studies should utilize objective indicators of the changes in daily life since the outbreak of COVID-19. Another limitation of this

study is that it is a cross-sectional study; it is difficult to confirm the causal relationship between daily life changes due to COVID-19 pandemic and depressive symptoms. Moreover, depressive symptoms were not measured by a psychiatrist's evaluation but by a self-assessment tool that screens for depressive symptoms.

CONCLUSION

In conclusion, older adults are experiencing many changes in their daily lives due to the COVID-19 pandemic, and it was confirmed that it contributed significantly to depressive symptoms and negative changes in health behaviours. The findings of this study can provide evidence of daily life changes due to the COVID-19 pandemic affecting the depressive symptoms among community-dwelling older adults. Therefore, there is a need for preparation and support for maintaining the mental health of older adults in disaster situations that can cause sudden changes in daily life, including the COVID-19 pandemic. This study's results would contribute to the research and practice of health professionals serving older adults amid the COVID-19 pandemic.

RELEVANCE TO CLINICAL PRACTICE

Some older adults do not have the resources required to manage the daily life changes that accompanied the COVID-19 pandemic. This includes a lack of access to communication technology and the inability to engage in physical activities. Healthcare professionals must assess resource availability and consider how a lack of resources can be mitigated for older adults and their families. Mental healthcare providers should consider the effects of the COVID-19 pandemic on mental health in their practice. Many mental health nurses working in the community provide interventions aimed at reducing depressive symptoms and anxiety and raising the mental well-being of older adults during a crisis in general and during the COVID-19 pandemic. Nursing interventions, such as individual psychological counselling, daily life maintenance education, video-delivered physical activity programmes, virtual visits, and calls, should be developed and performed non-face-to-face. Simultaneously, face-to-face nursing interventions or education are also required for older adults who are unfamiliar with online communication technology. One of these interventions, such as a strategy that helps older adults maintain their daily routine, could be an effective strategy to promote mental health during the COVID-19 pandemic. In addition, to prepare for crises such as COVID-19, mental health promotion programmes or content should be developed for older adults while considering their characteristics and supportive care needs. The programmes or content should be supplied through media that older adults can easily access and use.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher's website:

Table S1. Changes in daily life due to the COVID-19 pandemic and its effect on depressive symptoms according to the residential area.