Psychological Medicine

cambridge.org/psm

The impact of the COVID-19 pandemic on depression in community-dwelling older adults: a prospective cohort study

Dae Jong Oh[1,2], Hee Won Yang[3], Seung Wan Suh[4], Seonjeong Byun[5], Tae Hui Kim[6], Kyung Phil Kwak[7], Bong Jo Kim[8], Shin Gyeom Kim[9], Jeong Lan Kim[10], Seok Woo Moon[11], Joon Hyuk Park[12], Seung-Ho Ryu[13], Dong Woo Lee[14], Seok Bum Lee[15], Jung Jae Lee[15], Jin Hyeong Jhoo[16], Jong Bin Bae[3], Ji Won Han[3] and Ki Woong Kim[1,3,17]

[1]Department of Psychiatry, Seoul National University College of Medicine, Seoul, Korea; [2]Department of Psychiatry, SMG-SNU Boramae Medical Center, Seoul, Korea; [3]Department of Neuropsychiatry, Seoul National University Bundang Hospital, Gyeonggido, Korea; [4]Department of Psychiatry, Kangdong Sacred Heart Hospital, Hallym University College of Medicine, Seoul, Korea; [5]Department of Psychiatry, Uijeongbu St. Mary's Hospital, Uijeongbu, Korea; [6]Department of Psychiatry, Yonsei University Wonju Severance Christian Hospital, Wonju, Korea; [7]Department of Psychiatry, Dongguk University Gyeongju Hospital, Gyeongju, Korea; [8]Department of Psychiatry, Gyeongsang National University School of Medicine, Jinju, Korea; [9]Department of Neuropsychiatry, Soonchunhyang University Bucheon Hospital, Bucheon, Korea; [10]Department of Psychiatry, School of Medicine, Chungnam National University, Daejeon, Korea; [11]Department of Psychiatry, School of Medicine, Konkuk University, Konkuk University Chungju Hospital, Chungju, Korea; [12]Department of Neuropsychiatry, Jeju National University Hospital, Jeju, Korea; [13]Department of Psychiatry, School of Medicine, Konkuk University, Konkuk University Medical Center, Seoul, Korea; [14]Department of Neuropsychiatry, Inje University Sanggye Paik Hospital, Seoul, Korea; [15]Department of Psychiatry, Dankook University Hospital, Cheonan, Korea; [16]Department of Psychiatry, Kangwon National University School of Medicine, Chuncheon, Korea and [17]Department of Brain and Cognitive Science, Seoul National University College of Natural Sciences, Seoul, Korea

Abstract

Background. There are growing concerns about the impact of the COVID-19 pandemic on the mental health of older adults. We examined the effect of the pandemic on the risk of depression in older adults.

Methods. We analyzed data from the prospective cohort study of Korean older adults, which has been followed every 2 years. Among the 2308 participants who completed both the third and the fourth follow-up assessments, 58.4% completed their fourth follow-up before the outbreak of COVID-19 and the rest completed it during the pandemic. We conducted face-to-face diagnostic interviews using Mini International Neuropsychiatric Interview and used Geriatric Depression Scale. We performed generalized estimating equations and logistic regression analyses.

Results. The COVID-19 pandemic was associated with increased depressive symptoms in older adults [b (standard error) = 0.42 (0.20), $p = 0.040$] and a doubling of the risk for incident depressive disorder even in euthymic older adults without a history of depression (odds ratio = 2.44, 95% confidence interval 1.18–5.02, $p = 0.016$). Less social activities, which was associated with the risk of depressive disorder before the pandemic, was not associated with the risk of depressive disorder during the pandemic. However, less family gatherings, which was not associated with the risk of depressive disorder before the pandemic, was associated with the doubled risk of depressive disorder during the pandemic.

Conclusions. The COVID-19 pandemic significantly influences the risk of late-life depression in the community. Older adults with a lack of family gatherings may be particularly vulnerable.

Introduction

The novel coronavirus disease (COVID-19) may have psychological impacts on the general population as well as healthcare workers (World Health Organization, 2020). In particular, many experts have raised concerns about older adults being a potential high-risk group for depression because they could be seriously affected by social isolation, bereavement, and limited access to online mental health services amidst this unprecedented pandemic (Holmes et al., 2020; Jawaid, 2020; Yang et al., 2020).

The prevalence of depression in the general population has been found to vary widely from 5.9% to 52.5% during the COVID-19 pandemic (Ahmed et al., 2020; Choi, Hui, & Wan, 2020; Ettman et al., 2020; Gao et al., 2020; Gonzalez-Sanguino, Ausin, Castellanos, Saiz, & Munoz,

Original Article

Cite this article: Oh DJ *et al* (2021). The impact of the COVID-19 pandemic on depression in community-dwelling older adults: a prospective cohort study. *Psychological Medicine* 1–8. https://doi.org/10.1017/S0033291721005018

Received: 25 August 2021
Revised: 4 November 2021
Accepted: 16 November 2021

Keywords:
COVID-19; depressive disorder; late-life depression; prospective cohort study

Author for correspondence:
Ki Woong Kim,
E-mail: kwkimmd@snu.ac.kr

CAMBRIDGE UNIVERSITY PRESS

2020a; Hyland et al., 2020; Lei et al., 2020; Mazza et al., 2020; Ozdin & Bayrak Ozdin, 2020; Palgi et al., 2020; Shi et al., 2020; Sonderskov, Dinesen, Santini, & Ostergaard, 2020; Tan et al., 2020; Wang et al., 2020a). Research results are also conflicting with respect to changes in depressive symptoms, with one study finding an increase in depressive symptoms (Gonzalez-Sanguino et al., 2020b), another finding no change (Wang et al., 2020b), and yet another study finding a decrease in symptoms (Fancourt, Steptoe, & Bu, 2021). There are several prospective studies that have compared the severity of depressive symptoms before and during the pandemic (Ettman et al., 2020; Pan et al., 2020; Racine et al., 2021; Thorisdottir et al., 2021). However, none of the previous studies investigated the effect of the COVID-19 pandemic on the risk of depressive disorders. All of the previous studies examined depressive symptoms using self-reported questionnaires through web- or app-based online surveys, which are subject to substantial selection biases, particularly with respect to older adults who are less likely to be proficient with digital devices (Pierce et al., 2020b). Most of the previous studies either excluded older individuals from their samples (Ahmed et al., 2020; Ettman et al., 2020; Gao et al., 2020; Gonzalez-Sanguino et al., 2020a; Lei et al., 2020; Mazza et al., 2020; Ozdin & Bayrak Ozdin, 2020; Racine et al., 2021; Shi et al., 2020; Tan et al., 2020; Thorisdottir et al., 2021; Wang et al., 2020a, 2020b) or did not separately analyze the effect of the COVID-19 pandemic in older adults (Choi et al., 2020; Fancourt et al., 2021; Gonzalez-Sanguino et al., 2020b; Hyland et al., 2020; Palgi et al., 2020; Pan et al., 2020; Sonderskov et al., 2020). Although the factors associated with the risk of depressive disorders during the COVID-19 pandemic may be different from those before the pandemic, none of the previous studies investigated the differences in the risk factors for depressive disorders before and during the pandemic.

In the current study, we investigated the impact of the COVID-19 pandemic on the risk of depressive disorder by conducting face-to-face diagnostic interviews with the participants of the Korean Longitudinal Study on Cognitive Aging and Dementia (KLOSCAD) (Han et al., 2018). We compared the incidence of and the risk factors for depressive disorder among the participants who responded to the follow-up assessment before and during the COVID-19 pandemic in South Korea (hereafter, Korea). In Korea, a complete lockdown policy was not introduced because the increase in the number of COVID-19 cases was not considerable.

Methods

Study design, setting, and participants

KLOSCAD is a nationwide, population-based, prospective cohort study of elderly Koreans (Han et al., 2018). For KLOSCAD, 6818 community-dwelling Koreans aged 60 years or above were randomly sampled from 30 villages and towns of 13 districts across Korea using the national residential rosters of 2010. The baseline assessment was conducted from November 2010 to October 2012, and follow-up assessments have been conducted every 2 years; the first follow-up assessment was carried out from November 2012 to October 2014, the second from November 2014 to October 2016, the third from November 2016 to October 2018, and the fourth from January 2019 to November 2020. At the baseline assessment, a half of the participants were evaluated in the first year and the rest in the second year. The order of evaluation at the baseline assessment was randomly assigned. The participants who were evaluated in the first year of the baseline assessment have been evaluated in the first year of every follow-up duration of the participants. The numbers of participants who completed the baseline assessment and the four follow-up assessments were 6818, 5131 (75.3%), 4181 (61.3%), 3426 (50.2%), and 2518 (36.9%), respectively.

From among the 2518 participants who completed the fourth follow-up assessment, we included 2308 participants in the current analysis after excluding those who did not respond to the assessment of depressive disorders ($N = 146$), did not respond to the third follow-up assessment ($N = 25$), or completed the fourth follow-up assessment between December 2019 and January 2020 ($N = 39$). We excluded the 39 participants who completed the fourth follow-up assessment between December 2019 and January 2020 from the current analysis because the psychological impact of COVID-19 on the general population just around the time of the outbreak might be unclear. Among the 2308 participants included in our analysis, 1348 (58.4%) completed their fourth follow-up assessment before the COVID-19 outbreak (pre-pandemic group; followed from 1 January 2019 to 30 November 2019) and 960 (41.6%) completed it after the COVID-19 outbreak (intra-pandemic group; followed from 1 February 2020 to 30 November 2020). At the time of assessment, none of the participants had been diagnosed with COVID-19 or had any symptoms of the disease such as fever, cough, sore throat, dyspnea, myalgia, fatigue, and loss of taste or smell. The demographic and clinical characteristics of the participants are summarized in Table 1. In addition, online Supplementary Table S1 summarizes our comparison of the demographic and clinical characteristics of the participants of the third follow-up assessment who responded to the fourth follow-up and those who did not respond to the fourth follow-up assessment or were excluded from the current analysis.

All participants were fully informed about the study protocol and they provided written informed consent. This study was approved by the Institutional Review Board of the Seoul National University Bundang Hospital.

Assessment of depressive disorder and depressive symptoms

Geriatric psychiatrists performed a face-to-face standardized diagnostic interview with each participant using the Korean version of the Mini International Neuropsychiatric Interview (MINI-K) (Sheehan et al., 1998). The diagnostic interview using the MINI-K was administered after the evaluations by trained research nurses and neuropsychological researchers with an interval of 1 week. We made a diagnosis of depressive disorder when a participant exhibited major or minor depressive disorders according to the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) criteria or subsyndromal depression according to the operational diagnostic criteria (Oh et al., 2020). The participants without any current depressive disorder and manic/hypomanic episode were defined as euthymic participants. We used the Geriatric Depression Scale (GDS) to assess the severity of depressive symptoms (Kim et al., 2008).

Assessment of potential risk factors

Trained research nurses evaluated sociodemographic and clinical factors such as age, sex, residential area, economic status, burden of comorbidities, cohabitants, social activities, physical activities,

Table 1. Demographic and clinical characteristics of the participants

	Pre-pandemic group[a] (*n* = 1348)		Intra-pandemic group[b] (*n* = 960)		Statistics*		
	3rd F/U	4th F/U	3rd F/U	4th F/U	group	time	time*group
Age, years, mean (S.D.)	**73.7 (5.5)**	**75.8 (5.5)**	**74.5 (5.7)**	**76.9 (5.6)**	**<0.001**	**<0.001**	**<0.001**
Economic disadvantage, *n* (%)[c]	67 (5.0)	69 (5.1)	41 (4.3)	42 (4.4)	0.410	0.531	0.948
CIRS, points, mean (S.D.)	**6.0 (3.0)**	**6.8 (3.3)**	**6.2 (3.2)**	**6.6 (3.3)**	**0.928**	**<0.001**	**<0.001**
Living alone, *n* (%)	267 (19.8)	293 (21.7)	178 (18.5)	213 (22.2)	0.783	<0.001	0.071
Low level of family gatherings, *n* (%)[d]	518 (38.4)	535 (39.8)	320 (33.4)	335 (35.0)	0.005	0.147	0.876
Low level of religious activities, *n* (%)[d]	**859 (63.7)**	**859 (63.7)**	**620 (64.7)**	**683 (71.3)**	**0.021**	**<0.001**	**<0.001**
Low level of social activities, *n* (%)[d]	**569 (42.2)**	**561 (41.6)**	**385 (40.2)**	**522 (54.5)**	**0.004**	**<0.001**	**<0.001**
Low level of physical activities, *n* (%)[e]	636 (47.2)	662 (49.1)	414 (43.1)	425 (44.3)	0.015	0.145	0.718
Current drinking, *n* (%)[f]	118 (8.8)	105 (7.8)	85 (8.9)	67 (7.0)	0.717	<0.001	0.216
Current smoking, *n* (%)	81 (6.0)	77 (5.7)	47 (4.9)	41 (4.3)	0.163	0.041	0.354
Depressive disorders, *n* (%)	150 (11.5)	160 (11.9)	97 (10.1)	109 (11.4)	0.355	0.332	0.404
GDS, points, mean (S.D.)	**8.7 (6.3)**	**9.0 (6.5)**	**8.3 (6.1)**	**9.0 (6.4)**	**0.404**	**<0.001**	**0.027**
Antidepressants use, *n* (%)	54 (4.0)	86 (6.4)	26 (2.7)	38 (4.0)	0.019	<0.001	0.651

F/U, follow-up assessment; CIRS, Cumulative Illness Rating Scale; GDS, Geriatric Depression Scale.
[a]Participants who completed their 4th follow-up assessment before the COVID-19 outbreak.
[b]Participants who completed their 4th follow-up assessment after the COVID-19 outbreak.
[c]Covered by the National Medicaid Program.
[d]Less than 1 h per week.
[e]Under 600 metabolic equivalent task minutes per week.
[f]Drinking above 7 standard units per week within the past one year.
*p Values for group, time, and time×group interaction from generalized estimating equations; bold values for $p < 0.05$ in time × group interaction.

alcohol drinking, smoking, and use of anti-depressants. Persons supported by the National Medicaid Program were categorized as economically disadvantaged, those with a Cumulative Illness Rating Scale (CIRS) score of 5 points or higher were considered to have a high burden of comorbidities (Miller et al., 1992), and those with an exercise routine translating to less than 600 metabolic equivalent task minutes per week were considered to have a low level of physical activity (Ainsworth et al., 2000).

We also measured the frequency of family gatherings, religious activities, and social activities, and considered the level of each activity to be low when its frequency was less than 1 h per week.

Incident depressive disorders in participants diagnosed with dementia were not ascertained as incident cases. To diagnose dementia, geriatric psychiatrists administered standardized diagnostic interviews and physical examinations using the Korean version of the Consortium to Establish a Registry for Alzheimer's Disease Assessment Packet (CERAD-K) clinical assessment battery (Lee et al., 2002) for all participants. Neuropsychological researchers administered a comprehensive neuropsychological battery that included CERAD-K (Lee et al., 2004). Trained nurses administered laboratory tests including complete blood cell count, chemistry panels, serologic test for syphilis screening, thyroid function test, serum levels of vitamin B, and apolipoprotein E genotyping. A panel of geriatric psychiatrists confirmed the diagnosis of dementia based on the DSM-IV criteria.

Statistical analysis

We compared the changes in the demographic and clinical characteristics of the participants during the follow-up period using generalized estimating equation for each variable.

We examined the effect of the COVID-19 pandemic on changes in GDS scores during the follow-up period using generalized estimating equation after adjusting for age, sex, economic status, comorbidities, cohabitants, family gatherings, religious activities, social activities, physical activities, alcohol drinking, smoking, depressive disorders, and the follow-up interval. We examined the correlates of the changes in GDS scores during the follow-up period in the pre-pandemic and intra-pandemic groups separately using generalized estimating equations after adjusting for follow-up duration.

To investigate the effect of the COVID-19 pandemic on the future risk of depressive disorder, we separately analyzed the 1963 participants who were euthymic and not using any antidepressant at the third follow-up assessment. We estimated the age- and sex-adjusted 2-year incidence of depressive disorder by direct standardization based on the 2010 National Census data. We examined the effect of the COVID-19 pandemic on the risk of incident depressive disorder during the follow-up period using multivariate logistic regression analyses after adjusting for a history of depressive disorders, age, sex, economic status, comorbidities, cohabitants, family gatherings, religious activities, social activities, physical activities, alcohol drinking, smoking, and follow-up interval. We examined the factors associated with the risk of incident depressive disorder in the pre-pandemic and intra-pandemic groups separately using multivariate logistic regression analyses.

As sensitivity analyses, we examined the effects of dementia on the changes in the GDS scores and on the risk of incident depressive disorder in the intra-pandemic group using generalized estimating equations and multivariate logistic regression analyses respectively with adjustments of same covariates as above.

Table 2. The estimated effects of the correlates on the depressive symptoms by the influence of COVID-19 pandemic[a]

	Pre-pandemic group[b]		Intra-pandemic group[c]	
	b (S.E.)	*p*	*b* (S.E.)	*p*
Older age (⩾75 years)	0.83 (0.29)	0.004	1.04 (0.33)	0.001
Women	1.50 (0.32)	<0.001	0.88 (0.36)	0.014
Economic disadvantage[d]	1.97 (0.72)	0.006	2.21 (0.87)	0.011
High comorbidities[e]	1.13 (0.28)	<0.001	1.56 (0.33)	<0.001
Living alone	0.38 (0.36)	0.293	0.90 (0.47)	0.055
Low level of family gatherings[f]	0.29 (0.28)	0.292	0.86 (0.35)	0.014
Low level of religious activities[f]	1.25 (0.29)	<0.001	0.92 (0.33)	0.005
Low level of social activities[f]	1.67 (0.30)	<0.001	1.18 (0.34)	0.001
Low level of physical activities[g]	1.41 (0.30)	<0.001	0.45 (0.33)	0.171
Current drinking[h]	0.11 (0.49)	0.829	0.62 (0.65)	0.345
Current smoking	1.72 (0.56)	0.002	1.71 (0.78)	0.028
Depressive disorders	6.95 (0.50)	<0.001	8.21 (0.58)	<0.001

b, *β* coefficient; S.E., standard error.
[a]Multivariate generalized estimated equation adjusted for the follow-up duration.
[b]Participants who completed their fourth follow-up assessment before the COVID-19 outbreak.
[c]Participants who completed their fourth follow-up assessment after the COVID-19 outbreak.
[d]Covered by the National Medicaid Program.
[e]Cumulative Illness Rating Scale total scores of 5 points or higher.
[f]Less than 1 h per week.
[g]Under 600 metabolic equivalent task minutes per week.
[h]Drinking above 7 standard units per week within the past 1 year.

We performed all statistical analyses using IBM SPSS Statistics, version 19.0 (IBM Corporation).

Results

As summarized in Table 1, 2308 participants completed both the third and the fourth follow-up assessments. Among them, 1348 completed the fourth follow-up assessment before the COVID-19 pandemic and 960 after the outbreak. The follow-up interval of the intra-pandemic group was longer than that of the pre-pandemic group (27.7 ± 2.7 *v.* 24.6 ± 2.0 months, $p < 0.001$). The intra-pandemic group was older and had lower proportion of participants with a low level of physical activity than the pre-pandemic group. Although the CIRS scores were comparable between the two groups, they increased during the follow-up period, with the increase in the intra-pandemic group lower than that in the pre-pandemic group. The number of drinkers and smokers was comparable between the two groups and decreased during the follow-up period in both groups. The intra-pandemic group had fewer participants with a low frequency of family gatherings and social activities but more participants with a low level of religious activities than the pre-pandemic group. During the follow-up period, the number of participants with a low frequency of family gatherings remained stable, while the number of those with a low frequency of religious and social activities increased, with this increase larger in the intra-pandemic group than the pre-pandemic group (Table 1). The number of participants with dementia was comparable between two groups ($p = 0.071$) and increased during the follow-up period in both groups (from 3.8% to 5.1% in pre-pandemic group; from 2.5% to 3.6% in intra-pandemic group, *p* value for time × group interaction = 0.642).

Although the intra-pandemic group and the pre-pandemic group had comparable GDS scores and rates of depressive disorders, the intra-pandemic group had fewer anti-depressant users than the pre-pandemic group. During the follow-up period, the increase in the incidence of depressive disorder was comparable between the two groups. However, the intra-pandemic group showed a greater increase in the GDS score than the pre-pandemic group (Table 1). Multivariate generalized estimated equation analysis revealed that the COVID-19 pandemic was significantly associated with the increase in the GDS score during the follow-up period [from 8.6 ± 6.3 points to 9.0 ± 6.4 points; *b* (standard error, S.E.) = 0.42 (0.20), $p = 0.040$].

The correlates of the increase in GDS scores during the follow-up period mostly overlapped between the two groups (older age, women, economic disadvantage, high CIRS score, low frequency of religious activities, low frequency of social activities, current smoking, and depressive disorders). However, a low level of physical activity was associated with an increase in GDS scores in the pre-pandemic group only while a low frequency of family gatherings was linked to an increase in GDS scores in the intra-pandemic group only (Table 2). The follow-up duration was significantly associated with the changes in GDS scores in intra-pandemic group [*b* (S.E.) = −0.20 (0.07), $p = 0.002$]. The presence of dementia did not affect the changes in GDS score during the pandemic [*b* (S.E.) = 1.58 (1.15), $p = 0.167$].

Then, we analyzed 1963 participants separately (1121 in the pre-pandemic group and 842 in the intra-pandemic group) who were euthymic and not using anti-depressants at the time of the third follow-up assessment (Table 3). During the follow-up period, 104 participants (53 from the pre-pandemic group and 51 from the intra-pandemic group) developed depressive disorder. The age- and sex-adjusted 2-year incidence of depressive disorder

Table 3. Characteristics of the participants who were euthymic at the third follow-up assessment

	Pre-pandemic group[a] (*n* = 1121)		Intra-pandemic group[b] (*n* = 842)		Statistics*		
	3rd F/U	4th F/U	3rd F/U	4th F/U	Group	Time	Time×group
Age, years, mean (S.D.)	73.4 (5.4)	75.5 (5.4)	74.4 (5.6)	76.7 (5.6)	<0.001	<0.001	<0.001
Economic disadvantage, *n* (%)[c]	50 (4.5)	51 (4.6)	32 (3.8)	32 (3.8)	0.428	0.849	0.851
CIRS, points, mean (S.D.)	5.7 (2.9)	6.4 (3.2)	5.9 (3.1)	6.3 (3.1)	0.642	<0.001	<0.001
Living alone, *n* (%)	208 (18.6)	233 (20.8)	152 (18.1)	186 (22.1)	0.842	<0.001	0.086
Low level of family gatherings, *n* (%)[d]	409 (36.5)	424 (38.0)	272 (32.3)	287 (34.2)	0.034	0.130	0.832
Low level of religious activities, *n* (%)[d]	715 (63.8)	716 (63.9)	548 (65.2)	600 (71.4)	0.026	<0.001	<0.001
Low level of social activities, *n* (%)[d]	446 (39.8)	434 (38.7)	313 (37.2)	441 (52.5)	0.005	<0.001	<0.001
Low level of physical activites, *n* (%)[e]	505 (45.0)	524 (46.7)	351 (41.7)	365 (43.3)	0.085	0.139	0.998
Current drinking, *n* (%)[f]	99 (8.8)	84 (7.5)	78 (9.3)	60 (7.1)	0.996	<0.001	0.374
Current smoking, *n* (%)	65 (5.8)	61 (5.4)	42 (5.0)	36 (4.3)	0.307	0.039	0.396

F/U, follow-up assessment; CIRS, Cumulative Illness Rating Scale.
[a]Participants who completed their 4th follow-up assessment before the COVID-19 outbreak.
[b]Participants who completed their 4th follow-up assessment after the COVID-19 outbreak.
[c]Covered by the National Medicaid Program.
[d]Less than 1 h per week.
[e]Under 600 metabolic equivalent task minutes per week.
[f]Drinking above 7 standard units per week within the past one year.
*p Values for group, time, and time×group interaction from generalized estimating equations.

was 4.6% [95% confidence interval (CI) 3.3–5.8] in the pre-pandemic group and 5.2% (95% CI 3.7–6.7) in the intra-pandemic group. Multivariate logistic regression analysis revealed that the COVID-19 pandemic doubled the risk of incident depressive disorder [odds ratio (OR) 2.00, 95% CI 1.18–3.38, $p = 0.010$]. This was also the case when we separately analyzed euthymic participants without a previous history of mood disorder (OR 2.44, 95% CI 1.18–5.02, $p = 0.016$).

A previous history of depression was associated with the risk of incident depressive disorder in both the pre-pandemic and intra-pandemic groups. A low frequency of family gatherings was associated with the doubled risk of incident depressive disorder in the intra-pandemic group only, while fewer social activities were associated with the doubled risk of incident depressive disorder in the pre-pandemic group only (Table 4). The follow-up duration was not associated with the risk of incident depressive disorder in intra-pandemic group (OR 0.99, 95% CI 0.87–1.12, $p = 0.811$). The presence of dementia was not associated with the risk of incident depressive disorder during the pandemic (OR 0.28, 95% CI 0.03–2.65, $p = 0.264$).

Discussion

This study found that the COVID-19 pandemic was significantly associated with the risk of depressive disorder as well as depressive symptoms in older adults, with older adults who had a low frequency of family gatherings being at a higher risk of depression during the COVID-19 pandemic.

The UK Household Longitudinal Study found that the increase in general mental distress during the COVID-19 pandemic was more subtle in older adults than in younger adults. In that study, the average change in the 12-item General Health Questionnaire after the pandemic outbreak was just 0.8 points in adults aged 55 years or older but 2.7 points in those aged below 24 years (Pierce et al., 2020a). The recent longitudinal study from Denmark also found that the negative impact of the pandemic on the psychological well-being decreased by increasing ages (Vistisen, Sonderskov, Dinesen, & Ostergaard, 2021). Several cross-sectional studies have also found that the prevalence of mental distress, depressive symptoms, anxiety, post-traumatic symptoms, and negative affect was lower in older adults than younger adults during the pandemic (Gonzalez-Sanguino et al., 2020a; Klaiber, Wen, DeLongis, & Sin, 2021; van Tilburg, Steinmetz, Stolte, van der Roest, & de Vries, 2020). This may be explained by the relatively high psychological resilience of older adults during this unprecedented pandemic, which is contrary to the expectations of experts (Holmes et al., 2020).

In line with previous studies, the current study found that the increase in depressive symptoms in older adults who were in the middle of the pandemic was modestly higher than that in older adults who were not influenced by the pandemic. However, the incidence of depressive disorder was doubled in older adults who were in the middle of the pandemic compared to those who were not influenced by the pandemic after adjusting for various potential risk factors for depressive disorders. The changes in depressive symptoms decreased by the increasing follow-up duration, but the risk of incident depressive disorder was not affected by the follow-up duration during the pandemic. The impact of the COVID-19 pandemic on the risk of depression in older adults has not been well represented in previous studies that tracked the mean changes in depressive symptoms only using dimensional scales, but this risk should not be underestimated.

The effect of the COVID-19 pandemic on the risk of depressive disorder may be larger in areas where the pandemic situation is more serious compared to Korea. The spread of COVID-19 is relatively modest in Korea compared to most other countries. There were 166.9 cumulative confirmed cases and 3.01 cumulative deaths per 100 000 people in Korea as of 18 February 2021, far

Table 4. Risk factors of incident depressive disorders in the pre-pandemic and intra-pandemic groups[a]

	Pre-pandemic group[b]		Intra-pandemic group[c]	
	OR (95% CI)	*p* values	OR (95% CI)	*p* values
Older age (⩾75 years)	0.76 (0.39–1.48)	0.413	1.50 (0.78–2.89)	0.224
Women	0.77 (0.37–1.62)	0.492	0.69 (0.32–1.45)	0.325
History of depressive disorder	**5.15 (2.71–9.81)**	**<0.001**	**5.55 (2.91–10.58)**	**<0.001**
Economic disadvantage[d]	0.69 (0.18–2.71)	0.595	2.68 (0.88–8.23)	0.084
High comorbidities[e]	1.37 (0.69–2.75)	0.371	1.95 (0.89–4.25)	0.093
Living alone	1.07 (0.48–2.40)	0.870	1.86 (0.89–3.87)	0.098
Low level of family gatherings[f]	1.12 (0.59–2.14)	0.729	**2.15 (1.13–4.09)**	**0.020**
Low level of religious activities[f]	1.08 (0.56–2.11)	0.817	0.75 (0.40–1.42)	0.376
Low level of social activities[f]	**2.13 (1.10–4.12)**	**0.026**	1.21 (0.63–2.33)	0.564
Low level of physical activities[g]	1.85 (0.93–3.71)	0.081	0.84 (0.43–1.64)	0.606
Current drinking[h]	0.67 (0.14–3.14)	0.609	0.57 (0.12–2.69)	0.479
Current smoking	0.61 (0.13–2.88)	0.532	0.41 (0.05–3.44)	0.409

OR, odds ratio; CI, confidence interval.
[a]Odds ratios from multivariate logistic regression analyses adjusted for the follow-up duration were presented; bold values for $p < 0.05$.
[b]Participants who completed their fourth follow-up assessment before the COVID-19 outbreak.
[c]Participants who completed their fourth follow-up assessment after the COVID-19 outbreak.
[d]Covered by the National Medicaid Program.
[e]Cumulative Illness Rating Scale total scores of 5 points or higher.
[f]Less than 1 h per week.
[g]Under 600 metabolic equivalent task minutes per week.
[h]Drinking above 7 standard units per week within the past 1 year.

below the numbers in American (an average of 2198.0 cases and 38.58 deaths per 100 000) and European countries (an average of 4603.1 cases and 85.64 deaths per 100 000) (World Health Organization, 2021). Furthermore, depressive disorder, even when mild, can result in serious health-related outcomes including various morbidities and mortality in older adults (Blazer, 2003; Meeks, Vahia, Lavretsky, Kulkarni, & Jeste, 2011). Therefore, the impact of depressive disorder on the life of older adults may be even more serious in areas with a chronic shortage of medical resources for managing mental and physical illnesses. There have been concerns that people with mental illnesses would suffer from low accessibility to medical resources amidst the pandemic; recent data from the Chinese general population with mental illnesses showed that 22.0% of them could not maintain their routine psychiatric care visits and 35.3% of them self-reduced or stopped their medications (Zhou, Liu, Xue, Yang, & Tang, 2020). Online mental health services have been broadly adopted in China to overcome this problem of low accessibility, but only a few older adults with mental illness could benefit from such services due to the age-related 'digital divide' (Ju et al., 2020). A recent clinical trial examined the usefulness of a 4-week telephone program in improving depression and anxiety in homebound middle-aged and older adults (Kahlon et al., 2021). In the same way, future studies should investigate the effectiveness of providing interventions for late-life depression through electronic tools such as mental health support hotlines or regular contact via telephone, as older adults are more familiar and comfortable with these tools than they are with the Internet or smartphone applications.

In the current study, a low frequency of family gatherings was found to be associated with the risk of incident depressive disorder and depressive symptoms in older adults during the COVID-19 pandemic but not before the pandemic. Meanwhile, a low level of engagement in social activities with peers was associated with the risk of incident depressive disorder only before the pandemic. This was similar to the pattern in younger adults. In a recent cross-sectional study from the USA, support from families protected younger adults against depressive symptoms during the COVID-19 pandemic but that from familiar others did not (Liu, Zhang, Wong, Hyun, & Hahm, 2020). Family gatherings and social activities with peers are the critical components of social connectedness in older adults (Van Orden et al., 2020), and the loss of social connectedness exacerbated perceived social isolation and strongly predicted an increase in depressive symptoms in older adults (Santini et al., 2020). However, the impact of the COVID-19 pandemic on family gatherings and social activities has been different; the frequency of family gatherings has remained unchanged while social activities have largely decreased. This differential impact of COVID-19 may be attributable to the national social distancing policy, which has limited social activities more than family gatherings. Compared to other social relationships, familial relationships have a qualitatively different structure based on high homophily and homogeneity, and an intense affective bond (McPherson, Smith-Lovin, & Cook, 2001). Therefore, familial connections may serve as the last bastion in buffering the impact of crises like the COVID-19 pandemic on the risk of depression. Since non-face-to-face social interactions have been proposed as an effective tool to manage social isolation in older adults (Van Orden et al., 2020), it is worth investigating whether safe gatherings that follow social distancing norms can reduce the risk of depression in older adults with a low level of family support during the pandemic.

We found significant associations between a history of depression and the risk of incident depressive disorder in euthymic older adults, and those associations were similar before and during the COVID-19 pandemic. Although the pandemic did not pose an

additional risk on older adults with a history of depression, they still should be the target population of prevention strategies for mental health promotion in the era of pandemics because they have a 5.6-fold higher association with the risk of incident depression than those without a history of depression. In countries under a lockdown in particular, the management of this at-risk group is essential because low accessibility to mental health services may aggravate that risk substantially.

Due to Korea's unique situation that is characterized by the absence of a complete lockdown policy and the steadily but moderately increasing numbers of people with COVID-19, the comprehensive face-to-face diagnostic assessments were relatively less affected by selection bias, which is common in online self-reported questionnaires. However, we must acknowledge that this study has some limitations. First, we did not administer the diagnostic tests for COVID-19 to the participants. However, we evaluated the history of COVID-19 infection of the participants and their family members who were living together. None of the participants or their family members had a history COVID-19 infection. Second, there might be a selective attrition bias, which could limit the generalizability of this study. Third, the psychological impact of the pandemic and the risk factors of depression during the pandemic might have been underestimated in the current study because the outbreak was relatively modest in Korea and accessibility to medical resources has been maintained well during the pandemic. Fourth, there might be a detection bias that interviewers might be more sensitive to detect depressive disorders in intra-pandemic group than in pre-pandemic group, although the risk of bias might be minimized by using structured diagnostic interview. Finally, all participants were living in the community. In older adults living in institutions, the impact of the COVID-19 pandemic may be different.

Conclusion

This study is significant because it is the first to demonstrate that the COVID-19 pandemic is associated with a doubling of the risk for depressive disorder in older adults and to suggest that the risk of depressive disorder may be mitigated by promoting family gatherings during the COVID-19 pandemic. It highlights the need to implement measures for maintaining or promoting family interactions and to evaluate whether contactless family gatherings are as effective in reducing the risk of depression in older adults as conventional family gatherings.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S0033291721005018.

Acknowledgements. None.

Financial support. This research was supported by a grant from the Korean Health Technology R&D Project, Ministry of Health, Welfare, Republic of Korea (grant no. A092077) and a grant from the Research of Korea Centers for Disease Control and Prevention (grant no. 2019-ER6201-01). The sponsors were not involved in the design and administration of the study; collection, management, analysis, or interpretation of the data; preparation, review, or approval of the manuscript; or decision to submit the manuscript for publication.

Conflict of interest. None.

References

Ahmed, M. Z., Ahmed, O., Aibao, Z., Hanbin, S., Siyu, L., & Ahmad, A. (2020). Epidemic of COVID-19 in China and associated psychological problems. *Asian Journal of Psychiatry*, *51*, 102092. doi:10.1016/j.ajp.2020.102092

Ainsworth, B. E., Haskell, W. L., Whitt, M. C., Irwin, M. L., Swartz, A. M., Strath, S. J., … Leon, A. S. (2000). Compendium of physical activities: An update of activity codes and MET intensities. *Medicine and Science in Sports and Exercise*, *32* (Suppl 9), S498–S504.

Blazer, D. G. (2003). Depression in late life: Review and commentary. *The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*, *58*(3), 249–265. doi:10.1093/gerona/58.3.m249

Choi, E. P. H., Hui, B. P. H., & Wan, E. Y. F. (2020). Depression and anxiety in Hong Kong during COVID-19. *International Journal of Environmental Research and Public Health*, *17*(10), 3740. doi:10.3390/ijerph17103740.

Ettman, C. K., Abdalla, S. M., Cohen, G. H., Sampson, L., Vivier, P. M., & Galea, S. (2020). Prevalence of depression symptoms in US adults before and during the COVID-19 pandemic. *JAMA Network Open*, *3*(9), e2019686. doi:10.1001/jamanetworkopen.2020.19686

Fancourt, D., Steptoe, A., & Bu, F. (2021). Trajectories of anxiety and depressive symptoms during enforced isolation due to COVID-19 in England: A longitudinal observational study. *The Lancet. Psychiatry*, *8*(2), 141–149. doi:10.1016/S2215-0366(20)30482-X

Gao, J., Zheng, P., Jia, Y., Chen, H., Mao, Y., Chen, S., … Dai, J. (2020). Mental health problems and social media exposure during COVID-19 outbreak. *PLoS ONE*, *15*(4), e0231924. doi:10.1371/journal.pone.0231924

Gonzalez-Sanguino, C., Ausin, B., Castellanos, M. A., Saiz, J., Lopez-Gomez, A., Ugidos, C., & Munoz, M. (2020b). Mental health consequences during the initial stage of the 2020 Coronavirus pandemic (COVID-19) in Spain. *Brain Behavior and Immunity*, *87*, 172–176. doi:10.1016/j.bbi.2020.05.040

Gonzalez-Sanguino, C., Ausin, B., Castellanos, M. A., Saiz, J., & Munoz, M. (2020a). Mental health consequences of the Covid-19 outbreak in Spain. A longitudinal study of the alarm situation and return to the new normality. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, *107*, 110219. doi:10.1016/j.pnpbp.2020.110219.

Han, J. W., Kim, T. H., Kwak, K. P., Kim, K., Kim, B. J., Kim, S. G., … Kim, K. W. (2018). Overview of the Korean longitudinal study on cognitive aging and dementia. *Psychiatry Investigation*, *15*(8), 767–774. doi:10.30773/pi.2018.06.02

Holmes, E. A., O'Connor, R. C., Perry, V. H., Tracey, I., Wessely, S., Arseneault, L., … Bullmore, E. (2020). Multidisciplinary research priorities for the COVID-19 pandemic: A call for action for mental health science. *The Lancet. Psychiatry*, *7*(6), 547–560. doi:10.1016/S2215-0366(20)30168-1

Hyland, P., Shevlin, M., McBride, O., Murphy, J., Karatzias, T., Bentall, R. P., … Vallieres, F. (2020). Anxiety and depression in the Republic of Ireland during the COVID-19 pandemic. *Acta Psychiatrica Scandinavica*, *142*(3), 249–256. doi:10.1111/acps.13219

Jawaid, A. (2020). Protecting older adults during social distancing. *Science*, *368* (6487), 145. doi:10.1126/science.abb7885

Ju, Y., Zhang, Y., Wang, X., Li, W., Ng, R. M. K., & Li, L. (2020). China's mental health support in response to COVID-19: Progression, challenges and reflection. *Globalization and Health*, *16*(1), 102. doi:10.1186/s12992-020-00634-8

Kahlon, M. K., Aksan, N., Aubrey, R., Clark, N., Cowley-Morillo, M., Jacobs, E. A., … Tomlinson, S. (2021). Effect of layperson-delivered, empathy-focused program of telephone calls on loneliness, depression, and anxiety among adults during the COVID-19 pandemic: A randomized clinical trial. *JAMA Psychiatry*, *78*(6), 616–622. doi:10.1001/jamapsychiatry.2021.0113.

Kim, J. Y., Park, J. H., Lee, J. J., Huh, Y., Lee, S. B., Han, S. K., … Woo, J. I. (2008). Standardization of the Korean version of the geriatric depression scale: Reliability, validity, and factor structure. *Psychiatry Investigation*, *5* (4), 232–238. doi:10.4306/pi.2008.5.4.232

Klaiber, P., Wen, J. H., DeLongis, A., & Sin, N. L. (2021). The ups and downs of daily life during COVID-19: Age differences in affect, stress, and positive events. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, *76*(2), e30–e37. doi:10.1093/geronb/gbaa096

Lee, D. Y., Lee, K. U., Lee, J. H., Kim, K. W., Jhoo, J. H., Kim, S. Y., … Woo, J. I. (2004). A normative study of the CERAD neuropsychological assessment battery in the Korean elderly. *Journal of the International Neuropsychological Society: JINS*, *10*(1), 72–81. doi:10.1017/S1355617704101094

Lee, J. H., Lee, K. U., Lee, D. Y., Kim, K. W., Jhoo, J. H., Kim, J. H., … Woo, J. I. (2002). Development of the Korean version of the consortium to establish a registry for Alzheimer's disease assessment packet (CERAD-K): Clinical and neuropsychological assessment batteries. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, *57*(1), P47–P53. doi:10.1093/geronb/57.1.p47

Lei, L., Huang, X., Zhang, S., Yang, J., Yang, L., & Xu, M. (2020). Comparison of prevalence and associated factors of anxiety and depression among people affected by versus people unaffected by quarantine during the COVID-19 epidemic in Southwestern China. *Medical Science Monitor: International Medical Journal of Experimental and Clinical Research*, *26*, e924609. doi:10.12659/MSM.924609

Liu, C. H., Zhang, E., Wong, G. T. F., Hyun, S., & Hahm, H. C. (2020). Factors associated with depression, anxiety, and PTSD symptomatology during the COVID-19 pandemic: Clinical implications for U.S. young adult mental health. *Psychiatry Research*, *290*, 113172. doi:10.1016/j.psychres.2020.113172

Mazza, C., Ricci, E., Biondi, S., Colasanti, M., Ferracuti, S., Napoli, C., … Roma, P. (2020). A nationwide survey of psychological distress among Italian people during the COVID-19 pandemic: Immediate psychological responses and associated factors. *International Journal of Environmental Research and Public Health*, *17*(9), 3165. doi:10.3390/ijerph17093165.

McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, *27*, 415–444.

Meeks, T. W., Vahia, I. V., Lavretsky, H., Kulkarni, G., & Jeste, D. V. (2011). A tune in 'a minor' can 'b major': A review of epidemiology, illness course, and public health implications of subthreshold depression in older adults. *Journal of Affective Disorders*, *129*(1–3), 126–142. doi:10.1016/j.jad.2010.09.015

Miller, M. D., Paradis, C. F., Houck, P. R., Mazumdar, S., Stack, J. A., Rifai, A. H., … Reynolds, C. F., III. (1992). Rating chronic medical illness burden in geropsychiatric practice and research: Application of the Cumulative Illness Rating Scale. *Psychiatry Research*, *41*(3), 237–248.

Oh, D. J., Han, J. W., Kim, T. H., Kwak, K. P., Kim, B. J., Kim, S. G., … Kim, K. W. (2020). Epidemiological characteristics of subsyndromal depression in late life. *The Australian and New Zealand Journal of Psychiatry*, *54*(2), 150–158. doi:10.1177/0004867419879242

Ozdin, S., & Bayrak Ozdin, S. (2020). Levels and predictors of anxiety, depression and health anxiety during COVID-19 pandemic in Turkish society: The importance of gender. *The International Journal of Social Psychiatry*, *66*(5), 504–511. doi:10.1177/0020764020927051

Palgi, Y., Shrira, A., Ring, L., Bodner, E., Avidor, S., Bergman, Y., … Hoffman, Y. (2020). The loneliness pandemic: Loneliness and other concomitants of depression, anxiety and their comorbidity during the COVID-19 outbreak. *Journal of Affective Disorders*, *275*, 109–111. doi:10.1016/j.jad.2020.06.036

Pan, K. Y., Kok, A. A. L., Eikelenboom, M., Horsfall, M., Jorg, F., Luteijn, R. A., … Penninx, B. (2020). The mental health impact of the COVID-19 pandemic on people with and without depressive, anxiety, or obsessive-compulsive disorders: A longitudinal study of three Dutch case-control cohorts. *The Lancet. Psychiatry*, *8*(2), 121–129. doi:10.1016/S2215-0366(20)30491-0.

Pierce, M., Hope, H., Ford, T., Hatch, S., Hotopf, M., John, A., … Abel, K. M. (2020a). Mental health before and during the COVID-19 pandemic: A longitudinal probability sample survey of the UK population. *The Lancet. Psychiatry*, *7*(10), 883–892. doi:10.1016/S2215-0366(20)30308-4

Pierce, M., McManus, S., Jessop, C., John, A., Hotopf, M., Ford, T., … Abel, K. M. (2020b). Says who? The significance of sampling in mental health surveys during COVID-19. *The Lancet. Psychiatry*, *7*(7), 567–568. doi:10.1016/S2215-0366(20)30237-6

Racine, N., Hetherington, E., McArthur, B. A., McDonald, S., Edwards, S., Tough, S., & Madigan, S. (2021). Maternal depressive and anxiety symptoms before and during the COVID-19 pandemic in Canada: A longitudinal analysis. *The Lancet. Psychiatry*, *8*(5), 405–415. doi:10.1016/S2215-0366(21)00074-2

Santini, Z. I., Jose, P. E., York Cornwell, E., Koyanagi, A., Nielsen, L., Hinrichsen, C., … Koushede, V. (2020). Social disconnectedness, perceived isolation, and symptoms of depression and anxiety among older Americans (NSHAP): A longitudinal mediation analysis. *Lancet Public Health*, *5*(1), e62–e70. doi:10.1016/S2468-2667(19)30230-0

Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., … Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (M.I.N.I.): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *The Journal of Clinical Psychiatry*, *59* (Suppl 20), 22–33; quiz 34-57.

Shi, L., Lu, Z. A., Que, J. Y., Huang, X. L., Liu, L., Ran, M. S., … Lu, L. (2020). Prevalence of and risk factors associated with mental health symptoms among the general population in China during the coronavirus disease 2019 pandemic. *JAMA Network Open*, *3*(7), e2014053. doi:10.1001/jamanetworkopen.2020.14053

Sonderskov, K. M., Dinesen, P. T., Santini, Z. I., & Ostergaard, S. D. (2020). The depressive state of Denmark during the COVID-19 pandemic. *Acta Neuropsychiatrica*, *32*(4), 226–228. doi:10.1017/neu.2020.15

Tan, W., Hao, F., McIntyre, R. S., Jiang, L., Jiang, X., Zhang, L., … Tam, W. (2020). Is returning to work during the COVID-19 pandemic stressful? A study on immediate mental health status and psychoneuroimmunity prevention measures of Chinese workforce. *Brain Behavior and Immunity*, *87*, 84–92. doi:10.1016/j.bbi.2020.04.055

Thorisdottir, I. E., Asgeirsdottir, B. B., Kristjansson, A. L., Valdimarsdottir, H. B., Jonsdottir Tolgyes, E. M., Sigfusson, J., … Halldorsdottir, T. (2021). Depressive symptoms, mental wellbeing, and substance use among adolescents before and during the COVID-19 pandemic in Iceland: A longitudinal, population-based study. *The Lancet. Psychiatry*, *8*(8), 663–672. doi:10.1016/S2215-0366(21)00156-5.

Van Orden, K. A., Bower, E., Lutz, J., Silva, C., Gallegos, A. M., Podgorski, C. A., … Conwell, Y. (2020). Strategies to promote social connections among older adults during 'social distancing' restrictions. *The American Journal of Geriatric Psychiatry*, *29*(8), 816–827. doi:10.1016/j.jagp.2020.05.004.

van Tilburg, T. G., Steinmetz, S., Stolte, E., van der Roest, H., & de Vries, D. H. (2020). Loneliness and mental health during the COVID-19 pandemic: A study among Dutch older adults. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, *76*(7), e249–e255. doi:10.1093/geronb/gbaa111.

Vistisen, H. T., Sonderskov, K. M., Dinesen, P. T., & Ostergaard, S. D. (2021). Psychological well-being and symptoms of depression and anxiety across age groups during the second wave of the COVID-19 pandemic in Denmark. *Acta Neuropsychiatrica*, *33*(6), 331–334. doi:10.1017/neu.2021.21.

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., … Ho, R. C. (2020a). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health*, *17*(5), 1729. doi:10.3390/ijerph17051729

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., McIntyre, R. S., … Ho, C. (2020b). A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. *Brain Behavior and Immunity*, *87*, 40–48. doi:10.1016/j.bbi.2020.04.028

World Health Organization. (2020) *Mental health and psychosocial considerations during the COVID-19 outbreak*. Geneva: World Health Organization.

World Health Organization. (2021) WHO Coronavirus Disease (COVID-19) Dashboard. https://covid19.who.int (accessed February 18th, 2021).

Yang, Y., Li, W., Zhang, Q., Zhang, L., Cheung, T., & Xiang, Y. T. (2020). Mental health services for older adults in China during the COVID-19 outbreak. *The Lancet. Psychiatry*, *7*(4), e19. doi:10.1016/S2215-0366(20)30079-1

Zhou, J., Liu, L., Xue, P., Yang, X., & Tang, X. (2020). Mental health response to the COVID-19 outbreak in China. *American Journal of Psychiatry*, *177*(7), 574–575. doi:10.1176/appi.ajp.2020.20030304