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Original article

Longitudinal changes in mental health following the COVID-19 lockdown: Results from the Survey of Health, Ageing, and Retirement in Europe

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ABSTRACT

Background: To limit the spread of the coronavirus disease 2019 (COVID-19) pandemic, different restriction measures were implemented aiming to ensure social distancing and isolation. However, it is well known that such measures may lead to adverse effects on mental health.

Methods: Data from 36,478 adults aged 50+ from the Survey of Health, Ageing and Retirement in Europe was used to investigate the longitudinal changes in mental health from pre-COVID-19 to during the pandemic (summer 2020), considering national restriction levels across 26 European countries and Israel. Multilevel logistic regression models were used to assess changes in feeling 'sad or depressed', sleeping problems, and loneliness.

Results: Compared with the mental health status before the COVID-19 outbreak, participants had a lower risk of feeling "sad or depressed" (−14.4%) and having sleeping problems (−9.9%), while the risk of feeling lonely slightly increased (1.2%). However, for individuals in countries with high restriction levels, the risk of feeling "sad or depressed" was attenuated and the risk of loneliness was greater compared to countries with low restriction levels.

Conclusion: Older people felt less depressed and had fewer sleeping problems during the pandemic as compared to before the pandemic, while the risk of loneliness increased slightly. Stricter policy measures attenuated the otherwise positive impact on mental health. Future studies are needed to investigate the long-term effects of COVID-19 on mental health.

Introduction

The 2019 coronavirus disease (COVID-19) detected in December 2019 [1] has until today (May 2022) caused more than six million deaths worldwide [2]. To limit the spread of the virus in the early phases of the pandemic, governments recommended social distancing and imposed isolation of COVID-19 positive patients, and restrictions on gatherings, by closing workplaces, educational institutions, and shops. Also, in some countries, national curfews were implemented. At present, the COVID-19 vaccines have been widely distributed, and European governments have started to lift the restrictions. However, the virus continues to challenge some

Abbreviations: COVID-19, corona virus disease 2019; SHARE, Survey of Health, Ageing and Retirement in Europe; CAPI, computer-assisted personal interviews; CATI, computer-assisted telephone interviews; SW8, SHARE wave 8; SCS-1, The first SHARE Corona Survey; SCS-2, The second SHARE Corona Survey; OxCGRT, Oxford COVID-19 Government Response Tracker; OR, odds ratio; 95% CI, 95% confidence interval; *P*, *P*-value.

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societies [3 –5], and precautionary steps, such as social distancing are still recommended.

Mental wellbeing encompasses emotional, psychological, and social wellbeing [6]. The reduction of peoples' social activities by limiting movement behaviour increases the levels of stress and depression, but the extent of the impact depends on the duration of the restrictions, number of social contacts, and pre-existing mental health problems [7]. Generally, social isolation and lack of social and emotional support lead to adverse somatic and mental health outcomes [8 –], [9], [10], [11], and in middle-aged and older adults (aged 50+ years) reduced social connectedness (i.e., interacting with few close social contacts) is related to depressive symptoms [12]. Amongst older people (aged 65+ years), loneliness, defined as a discrepancy between desired and real social relations [13], is most pronounced amongst those who are less satisfied with their social relationships [14]. Moreover, as older and retired people participate in physical leisure activities and recreational activities to keep socially connected [15], they may be more susceptible to adverse mental health outcomes, such as loneliness when restrictions such as social distancing and isolation are imposed.

Several studies conducted during COVID-19 have shown that social isolation is associated with depressive symptoms, sleeping problems, and loneliness [16–19], however with considerable sex and age differences, as women experienced larger negative mental health changes than men [20,21]. Furthermore, depressive symptoms and sleeping problems increased more in the younger population (aged 18–49 years) than in people aged 50+ years [21 –23], while other studies have shown that loneliness in particular increased more amongst older people (aged 65+ years) than amongst people younger than 50 years of age [24,25].

Governmental responses to the pandemic differed across countries globally [26]. Cross-sectional studies investigating how the pandemic affected people aged 60+ years demonstrated that those living alone in countries with a high amount of COVID-19-related deaths per 100,000 and strict lockdown measures had an increased risk of feeling depressed or lonely [27,28], and a longitudinal study using data on people aged 60 years and above showed that a stricter COVID-19 lockdown predicted an increase in loneliness [29]. A recent study based on data from the Survey of Health, Ageing, and Retirement in Europe suggested worsened mental health for people aged 50+ years when asking respondents retrospectively how they felt during the outbreak compared with before the outbreak [20].

To our knowledge, no previous studies have investigated how a change in people's movement behaviour, through a limitation of their movement options and social activities, may impact their mental health from before to during the COVID-19 pandemic in a longitudinal setting across Europe. As social isolation is associated with mental health problems in older people [10,12], it is crucial to understand the mental health consequences caused by the pandemic and the effect of different national lockdown strategies while considering age, sex, education, and social factors. Therefore, this longitudinal study aims to evaluate if mental health in the middle-aged and older European population has declined approximately 4 months after the first COVID-19 lockdown (June–August 2020) as compared to prior to the lockdown overall and across sociodemographic groups, and moreover, evaluate whether the national restriction level had a negative influence on mental health, generally and at a country level.

Thus, the two main hypotheses of the study are:

1) Mental health will decline from before the lockdown to during the first wave of the COVID-19 pandemic, and with significant differences across sociodemographic factors.
2) A higher national restriction level will have a negative impact on mental health during the pandemic as compared to before the pandemic.

Methods

Data source and study sample

Data are drawn from the European cross-disciplinary longitudinal Survey of Health, Ageing, and Retirement in Europe (SHARE) Wave 8 and the first SHARE Corona Survey (www.share-project.org) [30–32]. SHARE consists of 28 countries including Israel and provides researchers with data on the lives of Europeans aged 50+ years to understand why Europe is ageing differently [33]. Data are collected biannually as computer-assisted personal face-to-face interviews, but due to the COVID-19 outbreak, the computer-assisted personal face-to-face interviews were suspended when 70% of the regular interviews of the SHARE Wave 8 (SW8) survey (October 2019–March 2020) had been collected. The SHARE organisation responded swiftly to the new situation by developing the first SHARE Corona Survey (SCS-1)—a specific survey for computer-assisted telephone interviews [34]. These interviews were conducted from June to August 2020. The study population initially comprised the 46,500 SHARE respondents, aged 50 years and older, who participated in SW8. To examine the longitudinal consequences of the pandemic, only respondents who further participated in SCS-1 were kept in the study sample, resulting in a final study population of 36,478 (78.4%). To link observations from the same participant between the two survey waves, a unique participant identifier provided by SHARE was used (Fig. 1).

Eligible participants are described in Figure 1. The 9790 nonrespondents from the SCS-1 Survey were older, included more men, and more participants reported feeling "sad or depressed" compared to the SCS-1-respondents (Supplementary Table 1). Portugal did not participate in the SW8 Survey, leaving 27 countries in the study.

Measures

Outcome variables at the individual level

Mental health encompassed feeling "sad or depressed," sleeping problems, and loneliness, and was assessed using three questions: "In the last month, have you been sad or depressed?" (feeling "sad or depressed") with a yes/no response option; "Have you had trouble sleeping recently?" (sleeping problems), with the answer categories "Trouble with sleep or recent change in pattern" ("Yes") and "No trouble sleeping" ("No"); and "How much of the time do you feel lonely?" (loneliness) with the response options "Often," "Some of the time" and "Hardly ever or never," dichotomised in this study to "Often/Some of the time" ("Yes") and "Hardly ever or never" ("No")."

Explanatory variables at the country level

To assess the influence of the country-specific COVID-19-related restrictions on mental health, we used data from the Oxford COVID-19 Government Response Tracker (OxCGRT) [26]. The OxCGRT was initiated in January 2020 and has since then tracked daily country-specific governmental policy responses to the COVID-19 pandemic, for example, travel restrictions, school and workplace closures and vaccination policies. The OxCGRT data is used to calculate the Oxford Stringency Index, yielding time-dependant country-specific scores from 0 (no restrictions) to 100 (complete lockdown). For this study, we computed a Stringency Index score reflecting the mean value of the Stringency Index level within the

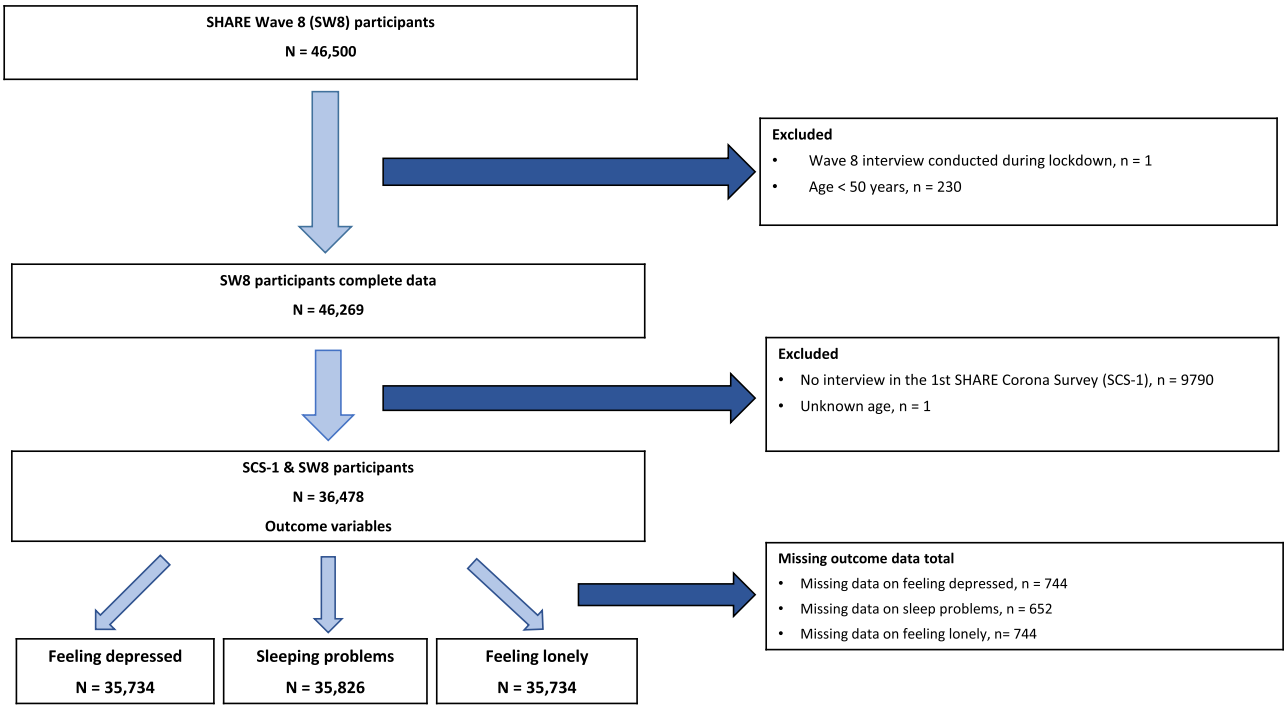

Fig. 1. Flow-chart of study inclusion of participants.

interview period for each country, leaving one Stringency Index score per country. The Stringency Index was then dichotomised to a "Low Stringency Index" (score < 46.1) and a "High Stringency Index" (score > 46.1), based on the median value of the Stringency Index mean scores from the 27 countries (Table 3). Other studies using the OxCGRT between March and April 2020 demonstrated a mean Stringency Index score at 78.6 [35], while the interviews for the present study were conducted later (June-August 2020), when the Stringency Index was lower in the most of Europe.

Covariates

Socio-demographic variables included sex (male, female), age (50–64 years, 65–79 years, 80+ years), educational level according to the International Standard Classification of Education (lower (0–2), medium [3,4], higher [5,6]) [36], employment status at the time of the SW8 Survey (employed, retired, not working [e.g., disabled, homemaker]), and number of close social relations ("0–1" and "2 or more") defined by the number of people with whom the respondent discussed important things with. Household composition was categorised as "living alone," "living with 1 person," and "living with 2 or more persons," being limited in daily activities due to a health problem for the past 6 months (severely limited or limited as "yes" and not limited as "no"), and whether the respondent or a near contact to the respondent had been infected or hospitalized due to COVID-19 ("yes" and "no"). Covariates were based on the SW8 Survey except for infection/hospitalization. See also Supplementary Table 2.

Data analyses

For the descriptive analyses, we performed a chi-squared test to assess differences in the outcome variables between the two survey times (SW8 and SCS-1). For the main longitudinal analyses, we investigated mental health changes using multilevel logistic regression models with an individual-specific random intercept to take the repeated measurements from the same individual into account. The models estimate odds ratios (ORs) with 95% confidence intervals (CI) for a change in presence of the mental health variables between the two interviews, with ORs above 1 indicating an increase in mental health symptoms and ORs below 1 indicating a decline in mental health symptoms.

We conducted a crude model with survey wave as independent variable, indicating whether the interview was carried out in SW8 or SCS-1, and each of the mental health variables (feeling "sad or depressed," sleeping problems, and loneliness) as dependant variables. The main model was adjusted for Stringency Index, age, sex, educational level, household composition, close social relations, employment status, infection/hospitalization due to COVID-19 and limitations in activities due to health. To ease interpretation, we further computed the marginal effects to estimate the percentage point (%-point) changes. The marginal effects represent the absolute differences in the predicted probabilities of the outcome being present between the two time points. These were multiplied by 100 to represent %-point changes. Only the %-point changes are presented in the results section, while both %-point changes and OR are shown in Tables 2 and 4. The analyses were conducted overall for the whole sample as well as individually for the 27 participating SHARE countries. The country specific analyses were not adjusted for Stringency Index.

To examine the overall changes in mental health, amongst different national restriction levels and for the covariates mentioned, we extended the model by including interactions between the wave variable and each of the relevant covariates. If the interaction test is significant ($P < .05$), it indicates that mental health changes differed across the levels of the covariates. Again, we computed the marginal effects to estimate the %-point changes in prevalence of mental health by the different levels of the covariates.

Moreover, we repeated the analyses and conducted the following sensitivity analyses: 1) We excluded participants from Austria since they completed the SCS-1 interview later (August 2020) [37] than the other participating countries (June–August), 2) we excluded participants who were employed in SW8 but who, in the SCS-1 survey, were laid-off due to the pandemic and 3) we categorised loneliness as "Often" ("yes") and "Some of the time/Hardly ever or never" ("no").

STATA-version 17.0 was used for the statistical analyses.

Results

Descriptive analyses

The final study population comprised 36,478 individuals, with a mean age of 70.1 years (Table 1). Women constituted 58.1%, and 53.6% of the population were aged 65–80 years. The prevalence of mental health symptoms demonstrated an overall decrease from SW8 (pre-COVID-19) to SCS-1 (COVID-19). Participants reporting feeling "sad or depressed" declined from 39.7% in SW8 to 25.4% in SCS-1, having sleeping problems declined from 36.5% to 27.2%, while loneliness increased from 27.3% to 28.9%.

Table 1
Study population characteristics (N = 36,478).

Variable	N (%)
Age-groups	
50–64 y	9669 (26.5)
65–79 y	19,552 (53.6)
80+ y	7257 (19.9)
Mean age, y (SD)	70.1 (9.2)
Sex	
Male	15,276 (41.9)
Female	21,202 (58.1)
Educational level	
Lower	11,818 (32.4)
Medium	16,040 (44.0)
Higher	8446 (23.2)
Missing	175 (0.5)
Household composition	
Living alone	9212 (25.3)
Living with 1 other person	21,041 (57.7)
Living with 2 or more persons	6226 (17.1)
Close social relations	
0–1 persons	10,136 (27.8)
2 persons or more	26,310 (72.1)
Missing	33 (0.1)
Employment status	
Employed	6524 (17.9)
Retired	24,884 (68.2)
Not working	4726 (13.0)
Missing	345 (0.9)
Employment status SC19‡	
Employed‡	5685 (15.6)
Laid off due to COVID-19‡	1336 (3.7)
Limitations in activity due to health	17,792 (48.8)
Missing	56 (0.1)
Infection or hospitalization COVID-19‡	2891 (7.9)
Missing	73 (0.2)
Sad or depressed†	
SHARE Wave 8 Survey	14,207 (39.7)
Missing	644 (1.8)
SHARE COVID-19 Survey‡	9242 (25.4)
Missing	137 (0.38)
Sleeping problems†	
SHARE Wave 8 Survey	13,301 (36.5)
Missing	603 (1.6)
SHARE COVID-19 Survey‡	9930 (27.2)
Missing	66 (0.1)
*Loneliness**	
SHARE Wave 8 Survey	9942 (27.3)
Missing	645 (1.8)
SHARE COVID-19 Survey‡	10,549 (28.9)
Missing	204 (0.6)

Demographic characteristics based on data from the SHARE Wave 8 Survey and the first SHARE Corona Survey (SW8 Survey if not mentioned other).
Chi-square test conducted comparing Wave-time (SW8 to SCS-1 Survey) and mental health.
COVID-19 = coronavirus disease 2019.
* $P < .01$.
† $P < .001$.
‡ Data from the SHARE COVID-19 Survey.

Results for hypothesis 1: Overall and socio-demographic changes in mental health

The results from the descriptive analysis (Table 1) were supported by the longitudinal analyses of all countries combined from SW8 to SCS-1 by demonstrating improvements in feeling "sad or depressed" and having sleeping problems, respectively, but an increased risk of feeling lonely (Table 2).

Participants had 14.3%-points (95% CI −14.9% to −13.7%) lower risk of feeling "sad or depressed." However, the reduction was attenuated in respondents with the following independent characteristics: Lower educational level (−12.0%-points [95% CI −13.0 to −11.0%]), 0 or 1 close social relations (−12.3%-points [95% CI −13.4% to −11.2%]), non-working respondents (e.g., disabled, homemaker) (−12.8%-points [95% CI −14.5% to −11.1%]), and people with no limitations in basic activities due to health (−11.2% points [95% CI −11.9% to 10.4%]). People aged 80+ years had a slightly lower decline in the probability of feeling "sad or depressed" compared to people aged 50–79 years.

During the pandemic, people had a lower probability of having sleeping problems compared to pre-pandemic. The decline was 9.9%-points (95% CI −10.4%; −9.3%)), both in men and women, but it was less pronounced in men (−7.4%-points (95% CI −8.2% to −6.7%]). A similar lesser decline was observed in participants with 0 or 1 close social relations (−8.0%-points (95% CI −9.1% to −7.0%]) compared to two or more close social relations. Educational level, household composition, and employment status showed minor differences in sleeping problems.

In contrast, the overall risk of feeling lonely increased by 1.18%-points (95% CI 0.7%−1.7%). For women, the risk of loneliness increased by 2.30%-points (95% CI 1.6%−3.0%). Furthermore, those with 2 or more close social relations before the pandemic were more prone to feeling lonely (2.33%-points [95% CI 1.8%−2.9%]), as compared to those having 1 or 0 close social relations (−1.90%-points [95% CI −2.9% to −0.9%]). Also, the respondents who themselves had COVID-19 or who knew someone who had it, were at greater risk of feeling lonely (3.08%-points [95% CI 1.4%−4.8%]) compared to those without contact to COVID-19 infection. Furthermore, educational level was associated with a small difference in loneliness.

Neither individuals with limitations in activity due to health problems nor any age groups affected loneliness or sleeping problems more than others.

Results for hypothesis 2: Stringency Index and country-level changes in mental health

The mean Stringency Index score was 46.9 across all 27 SHARE countries, ranging from 29.7 in Lithuania to 67.3 in Israel (Table 3).

The longitudinal analyses for all countries demonstrated that individuals living in a country with a high Stringency Index had a lower decline in risk of feeling "sad or depressed" (−12.1%-points [95% CI −13% to −11.3%]) compared to those living in countries with a low Stringency Index (Table 2) during the pandemic compared to pre-pandemic. Similarly, people in countries with a high Stringency Index had a higher risk of feeling lonely (2.1%-points [95% CI 1.4% to 2.8%]) compared with people from countries with a low Stringency Index score. We found no association between the Stringency Index score and having sleeping problems.

In each country, individuals had a lower risk of feeling "sad or depressed" and having sleeping problems, during SCS-1 compared to SW8 (pre-pandemic). In contrast, individuals in five countries (Finland, Romania, Hungary, Israel, and Czech Republic) had lower risks of loneliness, and in nine countries (Germany, Austria, Switzerland, Luxembourg, Greece, Belgium, Denmark, Italy, and Slovenia) the risk of feeling lonely was higher during the pan-

Table 2
Multilevel logistic regression estimates of %-point changes and odds ratios (OR) for mental health problems from the SHARE Wave 8 (October 2019–March 2020) to the first SHARE Corona Survey (June–August 2020)

	Sad/depressed			Sleeping problems			Loneliness		
	%-point (95% CI)	OR (95% CI)	*P*[*]	%-point (95% CI)	OR (95% CI)	*P*[*]	%-point (95% CI)	OR (95% CI)	*P*[*]
Wave time (adjusted)[†]	−14.3 (−14.9; −13.7)	0.38 (0.37–0.40)	–	−9.9 (−10.4; −9.3)	0.48 (0.46–0.50)	–	1.18 (0.7 to 1.7)	1.11 (1.06–1.17)	–
Stringency index[‡]			.000			.465			.001
Low	−16.4 (−17.2; −15.6)	0.33 (0.32–0.35)		−10.4 (−11.2; −9.6)	0.47 (0.45–0.50)		0.32 (−0.4; 1.0)	1.03 (0.97–1.10)	
High	-12.1 (13; -11.3)	0.44 (0.42-0.47)		-9.3 (-10.1; -8.6)	0.49 (0.46-0.52)		2.08 (1.4; 2.8)	1.19 (1.12-1.27)	
Age groups			.001			.101			.123
50-64 years	−14.6 (−15.7; −13.6)	0.37 (0.34–0.39)		−10.1 (−11.1; −9.1)	0.45 (0.42–0.49)		0.83 (−0.1; 1.8)	1.08 (0.99–1.18)	
65-79 years	-14.5 (-15.3; -13.8)	0.37 (0.35-0.39)		-9.9 (-10.6; -9.1)	0.48 (0.45-0.51)		1.61 (0.9; 2.3)	1.16 (1.09-1.23)	
80+ years	-13.3 (-14.6; -11.9)	0.44 (0.41-0.48)		-9.6 (-10.9; -8.3)	0.52 (0.47-0.56)		0.44 (-0.8; 1.7)	1.04 (0.94-1.14)	
Sex			.186			.000			.000
Male	−12.1 (−12.9; −11.2)	0.40 (0.37–0.42)		−7.4 (−8.2; −6.7)	0.54 (0.50–0.57)		−0.42 (−1.2; 0.3)	0.96 (0.89–1.03)	
Female	−15.9 (−16.7; −15.2)	0.38 (0.36–0.39)		−11.6 (−12.3; −10.9)	0.45 (0.42–0.47)		2.30 (1.6; 3.0)	1.21 (1.14–1.27)	
Educational level			.000			.000			.508
Lower	−12.0 (−13.0; −11.0)	0.47 (0.44–0.50)		−8.9 (−9.9; −7.9)	0.53 (0.49–0.57)		1.00 (0.1; 1.9)	1.08 (1.01–1.16)	
Medium	−15.0 (−15.8; −14.1)	0.36 (0.34–0.38)		−10.0 (−10.8-; −9.2)	0.47 (0.44–0.50)		1.11 (0.4; 1.8)	1.11 (1.04–1.18)	
Higher	−16.2 (−17.4; −15.1)	0.32 (0.29–0.35)		−11.0 (−12.1; −9.9)	0.42 (0.39–0.46)		1.54 (0.6; 2.5)	1.16 (1.06–1.28)	
Household composition			.111			.020			.023
Living alone	−16.8 (−18; −15.6)	0.36 (0.33–0.39)		−10.4 (−11.5; −9.2)	0.49 (0.45–0.53)		1.70 (0.6; 2.8)	1.12 (1.04–1.21)	
Living with 1 person	13.6 (−14.3; −12.9)	0.39 (0.37–0.41)		−10.2 (−10.9; −9.5)	0.46 (0.43–0.49)		1.42 (0.8; 2.0)	1.15 (1.08–1.22)	
Living with 2 persons or more	−13.1 (−14.5; −11.8)	0.40 (0.37–0.45)		−7.9 (−9.2; −6.7)	0.54 (0.49–0.59)		−0.39 (−1.5; 0.8)	0.87 (0.87–1.08)	
Close social relations			.000			.000			.000
0-1 persons	−12.3 (−13.4; −11.2)	0.43 (0.40–0.47)		−8.0 (−9.1; −7.0)	0.54 (0.50–0.59)		−1.90 (−2.9; −0.9)	0.86 (0.79–0.93)	
2 persons or more	-15.1 (-15.9; -14.4)	0.37 (0.35-0.39)		-10.6 (-11.2; -9.9)	0.46 (0.44-0.48)		2.33 (1.8; 2.9)	1.23 (1.17-1.30)	
Employment status			.000			.017			.167
Employed	−14.5 (−15.8; −13.3)	0.34 (0.31–0.37)		−9.4 (−10.6; −8.2)	0.46 (0.41–0.51)		0.05 (−1.0; 1.1)	1.01 (0.90–1.12)	
Retired	-14.5 (-15.2; -13.9)	0.38 (0.36-0.40)		-10.3 (-10.9; -9.6)	0.47 (0.45-0.49)		1.43 (0.8; 2.0)	1.13 (1.07-1.19)	
Not working	-12.8 (-14.5; -11.1)	0.46 (0.42-0.51)		-8.4 (-10; -6.9)	0.55 (0.50-0.62)		1.41 (-0.1; 2.9)	1.12 (1.00-1.25)	
Infection/hospitalization COVID-19			.851			.094			.015
No	−14.3 (−14.9; −13.7)	0.38 (0.37–0.40)		−9.7 (−10.3; −9.2)	0.48 (0.46–0.51)		1.01 (0.5; 1.5)	1.09 (1.04–1.14)	
Yes	−15.0 (−17; −12.9)	0.38 (0.33–0.43)		−11.4 (−13.3; −9.5)	0.43 (0.37–0.49)		3.08 (1.4; 4.8)	1.35 (1.15–1.59)	
Limitations in activity due to health			.000			.056			.301
No	−11.2 (−11.9; −10.4)	0.43 (0.40– 0.45)		−8.1 (−8.8; −7.4)	0.50 (0.47–0.53)		1.31 (0.7; 2.0)	1.14 (1.07–1.21)	
Yes	−17.7 (−18.6; −16.8)	0.35 (0.33– 0.37)		−11.7 (−12.6; −10.9)	0.46 (0.44–0.49)		1.03 (0.3; 1.8)	1.09 (1.02–1.15)	

Subgroup estimates are based on interactions between wave and each covariate.
P = *P*-values. Estimates are controlled for all characteristics presented.
CI = confidence interval; COVID-19, coronavirus disease 2019.
[*] Tested for interaction using Wald tests.
[†] Time between interview in SW8 (pre-pandemic) and SCS-1 (summer 2020).
[‡] High stringency index ≥ 46.1 (median score).

Table 3
Number of participants in the 27 countries and their Stringency Index mean score

Countries	*Participants (%)*	*Stringency Index mean*
Lithuania	1120 (3.1)	29.7
Luxembourg	747 (2.1)	30.0
Finland	1026 (2.8)	36.2
Estonia	2767 (7.6)	36.5
Czech Republic	2103 (5.8)	37.1
Austria	1356 (3.7)	37.6
Bulgaria	687 (1.9)	37.8
Malta	682 (1.9)	38.3
Slovakia	860 (2.4)	39.7
Switzerland	1694 (4.6)	40.4
Slovenia	2187 (6.0)	43.3
Romania	1155 (3.2)	43.9
Netherlands	522 (1.4)	44.7
Poland	1713 (4.7)	**46.1**[c]
Croatia	1114 (3.1)	46.2
Greece	2764 (7.6)	49.3
Latvia	680 (1.9)	49.5
Cyprus	393 (1.1)	51.6
France	1791 (4.9)	52.2
Belgium	1731 (4.8)	53.3
Hungary	513 (1.4)	54.8
Spain	1100 (3.0)	56.5
Italy	1946 (5.3)	56.9
Denmark	1489 (4.1)	57.0
Germany	2426 (6.7)	58.7
Sweden	1155 (3.2)	59.3
Israel	757 (2.1)	67.3
All 27 countries	36,478 (100)	46.9

Demographic characteristics on country-level based on data from the Oxford University Stringency Index
and mean Stringency Index score from the interview period in each country.
[c] Median Stringency Index score

demic (Table 4). However, no clear pattern between the Stringency Index level and the mental health change could be observed at the individual country level.

Sensitivity analyses in which Austria and the persons who were laid-off in the SCS-1 survey were excluded, did not demonstrate any differences in the results, and neither did the new categorisation of loneliness.

Discussion

In a longitudinal comparison of mental health data collected immediately before the COVID-19 pandemic (pre-COVID-19) and during the summer 2020 of the pandemic (COVID-19), participants had lower risks of feeling "sad or depressed" or having sleeping problems during COVID-19. In contrast, participants had a higher risk of feeling lonely. Moreover, regarding depressive symptoms or sleeping problems, individuals with the least improvements were men, those with a lower educational level, having 0–1 close social relations, not working, or not having limitations in activities due to health. People with the highest risk of loneliness during the pandemic were women, those living alone or with one person, having two or more close social relations and those who themselves or a close relative were infected or hospitalized with COVID-19. Lastly, a high Stringency Index score was negatively related to the improvements in feeling "sad or depressed" and increased the risk of feeling lonely. No association was found between Stringency Index and sleeping problems.

Our first hypothesis, that mental health declined from before to during COVID-19, was rejected. Even though loneliness slightly declined, our overall findings demonstrated improvements in mental health. These findings are in contrast with previous population-based observational [27,28,38] and longitudinal [29,39,40] COVID-19 studies, which found higher prevalence and increases in depressive symptoms during the COVID-19 amongst the older population. Regarding the influence of the socio-demographic factors on mental health, the same trend was demonstrated, since feeling "sad or depressed" and sleeping problems improved for the participants across all sociodemographic groups. Several studies demonstrate that populations younger than the SHARE population (<50 years) experience remarkably higher increases in mental health problems [21,22,41,42] during the pandemic. This is supported by a recent UK-based study showing that the COVID-19 lockdown was mentally harder for young adults aged 18–34 [42], while a qualitative study shows that many 70–90-year-old were resilient during the hardest lockdown, likely coping with the situation through e.g., adaptation to a slower pace of life and enjoying the reduced social and economic pressure[43]. We found no age differences, which may be due to most participants being in the age group 65–79 years. However, we found that women, and people with 2 or more close social contacts (pre-pandemic) were at higher risk of being lonely during COVID-19, which is in line with previous studies on COVID-19′s impact on loneliness in populations aged 50+ [20,24].

Regarding our second hypothesis, we found that individuals living in a country with a higher Stringency Index had less improvements regarding depressive symptoms and were at higher risk of feeling lonely, which indicates that the level of restriction measures adversely impacts mental health, as shown by others [27,28,44]. In contrast, no association between sleeping problems and Stringency Index was found. An explanation for the overall improvements in mental health may be that the average Stringency Index score of 46 was relatively low by the time of data collection for the SCS-1 in June–August 2020 when compared to the Stringency Index in the period from March to June 2020 [26,28,35]. The SCS-1 interviews were conducted several months after the primary outbreak in Europe and with no immediate signs of a future COVID-19 outbreak, which may thus explain the decline in feeling "sad or depressed" and sleeping problems, respectively. Also, several longitudinal studies show an initial increase (March–April/May 2020) in mental health problems and a later decrease (April/May 2020 onwards) [21,23,29,45], which suggests both an adaptation period and a fast recovery as the governments in several countries started to lift restrictions around May.

An additional possible explanation for the improvements in depressive symptoms and sleeping problems is social cohesion, which, through collective society adversities, has been connected to, firstly, decreased suicide rates in the US during the Spanish flu [46], and, secondly, although not directly comparable, declines in depressive symptoms during the financial crisis in 2008–2009 [47]. Conversely, decreases in social cohesion are associated with elevated depressive symptoms amongst the older population in Europe [48].

Our finding of increased loneliness is compatible with other studies [14,24]. Generally, loneliness is more common in populations at risk of isolation and separation, such as older individuals, who are more likely to live alone and tend to be more isolated from their friends and families [49]. To cope with loneliness, especially emotional loneliness, it is essential to have a significant other (e.g., a close friend or family member) who can provide emotional support [14,49,50]. This may have been especially important during the COVID-19, but at the same time the lockdown restricted this possibility, which is supported by the increased risk of loneliness amongst those having two or more close social relations, as these contacts may have been suddenly reduced or limited as a result of the lockdown. Those with 0–1 close relationships did not experience a similar substantial reduction in social contact during the pandemic, which may explain that there were no changes in feeling lonely from pre-COVID-19 to COVID-19. Another COVID-19-related study has shown similar results [24].

Table 4
Multilevel logistic regression estimates of %-point changes and ORs for mental health problems for each SHARE country comparing the SHARE Wave 8 (October 2019–March 2020) to the first SHARE Corona Survey (June–August 2020)

	Sad/depressed				Sleeping problems					Loneliness				
	%-point	95% CI	OR	95% CI		%-point	95% CI	OR	95% CI		%-point	95% CI	OR	95% CI
Country					*Country*					*Country*				
Hungary	4.4	−0.3; 9.1	1.33	0.97−1.84	Slovakia	1.7	−1.7; 5.1	1.15	0.87−1.51	Germany	5.9	4.2; 7.7	2.16	1.74−2.68
Greece	−0.4	−2.4; 1.5	0.96	0.82−1.12	Hungary	0.6	−4.0; 5.2	1.04	0.74 - 1.47	Austria	4.6	2.3; 6.8	1.74	1.32−2.31
Slovakia	−1.2	−4.5; 2.2	0.90	0.69−1.19	Bulgaria	0.5	−3.3; 4.3	1.03	0.80 - 1.33	Switzerland	4.2	2.2; 6.2	1.57	1.25−1.97
Italy	−2.9	−5.4; −0.3	0.84	0.72−0.98	Greece	−2.4	−4.1; −0.7	0.80	0.68 - 0.94	Luxembourg	4.1	0.7 7.4	1.47	1.07−2.03
Malta	−3.3	−7.5; 0.8	0.82	0.64−1.07	Cyprus	−2.7	−7.6; 2.1	0.80	0.53−1.20	Greece	4.0	2.0; 6.0	1.38	1.18−1.61
Bulgaria	−3.4	−7.3; 0.5	0.82	0.63−1.07	Croatia	−4.6	−7.7; −1.5	0.69	0.54−0.88	Latvia	3.7	−0.1; 7.6	1.31	0.98−1.74
Spain	−4.1	−7.5; −0.7	0.79	0.64−0.97	Malta	−5.6	−9.3; −1.9	0.67	0.50−0.89	Belgium	2.9	0.6; 5.3	1.34	1.08−1.66
Cyprus	−10.3	−15.6; −5.0	0.49	0.33−0.73	Spain	−5.6	−8.7; −2.5	0.68	0.55−0.86	Denmark	2.9	0.9; 4.8	1.60	1.19−2.17
Sweden	−13.4	−16.3; −10.3	0.33	0.33−0.52	Israel	−5.9	−9.8; −2.0	0.66	0.50−0.88	Italy	2.6	0.2; 4.9	1.18	1.00−1.38
Croatia	−13.4	−16.7; −10.1	0.41	0.33−0.52	Austria	−5.9	−8.7; −3.1	0.64	0.52−0.80	Sweden	2.2	−0.6; 4.9	1.25	0.95−1.65
Poland	−15.5	−18.3; −12.7	0.40	0.33−0.48	Italy	−5.9	−8.2; −3.6	0.65	0.54−0.77	Slovenia	2.1	0.2; 4.1	1.22	1.01−1.48
Belgium	−16.1	−18.7; −13.4	0.33	0.27−0.41	Poland	−8.3	−10.9; −5.6	0.59	0.49−0.70	Estonia	1.7	−0.1; 3.6	1.15	0.99−1.35
France	−16.4	−19.0; −13.7	0.35	0.29−0.42	Romania	−8.7	−11.8; −5.5	0.54	0.43−0.68	France	0.9	−1.4; 3.2	1.08	0.89−1.32
Luxembourg	−16.6	−20.7; −12.6	0.34	0.25−0.45	Latvia	−9.2	−13.2; −5.1	0.56	0.42−0.73	Bulgaria	0.8	−2.8; 4.4	1.06	0.80−1.39
Slovenia	−17.2	−19.4; −14.9	0.30	0.25−0.35	France	−10.8	−13.3; −8.3	0.45	0.38−0.55	Lithuania	0.8	−2.0; 3.6	1.07	0.84−1.36
Finland	−17.6	−20.9; −14.3	0.26	0.19−0.34	Czech Rep	−11.7	−14; −9.4	0.41	0.34−0.49	Poland	0.4	−1.9; 2.8	1.04	0.86−1.25
Lithuania	−17.7	−21.0; −14.4	0.34	0.27−0.43	Luxembourg	−11.8	−15.6; −7.9	0.42	0.31−0.56	Slovakia	0.2	−3.3; 3.6	1.01	0.79−1.29
Switzerland	−17.8	−20.3; −15.3	0.28	0.23−0.35	Belgium	−12.3	−14.8; −9.9	0.42	0.31−0.56	Croatia	0.0	−3.0; 3.1	1.00	0.80−1.25
Czech Rep	−17.8	−20.2; −15.5	0.27	0.22−0.32	Estonia	−12.6	−14.7; −10.5	0.41	0.35−0.48	Netherlands	−1.0	−5.1; 3.0	0.88	0.57−1.37
Denmark	−18.5	−21.0; −15.9	0.27	0.22−0.32	Lithuania	−12.8	−16.0; −9.5	0.39	0.30−0.50	Spain	−2.2	−5.1; 0.7	0.83	0.64−1.07
Romania	−18.7	−22.0; −15.5	0.29	0.23−0.36	Slovenia	−12.9	−15.1; −10.7	0.39	0.32−0.46	Cyprus	−2.2	−7.3; 2.8	0.86	0.60−1.24
Israel	−19.5	−23.5; −15.6	0.28	0.20−0.38	Germany	−13.8	−15.9; −11.7	0.33	0.28−0.39	Czech Rep	−2.2	−4.3; −0.1	0.82	0.68−0.99
Austria	−19.6	−22.6; −16.6	0.24	0.19−0.31	Finland	−14.8	−18; −11.6	0.33	0.25−0.43	Malta	−2.7	−6.4; 1.1	0.85	0.65−1.11
Estonia	−21.2	−23.3; −19.1	0.28	0.24−0.33	Switzerland	−15.0	−17.4; −12.7	0.27	0.21−0.34	Israel	−4.5	−8.2; −0.8	0.75	0.57−0.98
Netherlands	−22.2	−27.0; −17.4	0.17	0.11−0.27	Netherlands	−16.8	−21.1; −12.6	0.25	0.17−0.38	Hungary	−5.4	−9.6; −1.3	0.65	0.46−0.92
Germany	−23.7	−25.9; −21.4	0.20	0.17−0.24	Sweden	−18.1	−21.0; −15.2	0.22	0.16−0.29	Romania	−5.5	−8.4; −2.6	0.64	0.51−0.81
Latvia	−24.9	−29.0; −20.8	0.19	0.13−0.27	Denmark	−20.1	−22.6; −17.6	0.18	0.14−0.23	Finland	−7.7	−10.6; −4.9	0.46	0.34−0.61

All estimates are controlled for age, sex, educational level, household composition, close social relations, employment status, infection/hospitalization due to COVID-19 and limitations in activities due to health.
CI = confidence interval; COVID-19 = coronavirus disease 2019; OR = odds ratio.

Loneliness, depressive symptoms, and sleeping problems are usually positively correlated [16,19,51,52] and, therefore, our results are puzzling. Nonetheless, the pandemic did lead to increased loneliness amongst the participants, while the expected increase in depressive symptoms and sleeping problems may be delayed due to an increased social cohesion caused by the pandemic. However, it may be interesting for future studies to elaborate more on the associations between sleeping problems, depressive symptoms, and loneliness as well as potential differences in the cultural meaning of loneliness [53].

Strengths and limitations

The strengths of our study are the large and representative sample of adults aged 50+ years in 27 countries, and the standardised methods for data collection [32]. A particular strength is the longitudinal design using repeated measurements by which recall bias from retrospective questions in cross-sectional studies [27,28] is avoided. Furthermore, this is the first large-scale longitudinal European study to measure effects of the COVID-19 on mental health, while including the OxCGRT Stringency Index measure. Previous studies that have demonstrated a negative impact on mental health for the older population did not make comparisons across countries [29,39].

Limitations of this study include the self-reported nature of the survey, which could imply response bias. Furthermore, the data collection period of SW8 and SCS-1 data over several seasons, that is, during autumn and winter (October 2019–March 2020) and summer (June–August 2020), respectively, may have affected the responses to the mental health questions differently from north to south of Europe due to differences in climate and the number of hours with sunlight, as shown by another study [54].

Moreover, the different interview formats from the pre-pandemic face-to-face interview to the telephone interview during the pandemic may have introduced a mode effect on social desirability bias for some of the questions and could cause some degree of measurement invariance [55]. However, in general, the survey agencies used the same interviewers for the telephone interviews as for the previous face-to-face interviews, thereby relying on the built trust and confidentiality between interviewer and participant, which would also be an incentive for the participant to participate and not decline the invitation to SCS-1.

Also, the use of only two measurement times (one time pre-pandemic and one time during the pandemic) limits the ability to track a potential change in mental health during a longer lockdown period, but this may be further investigated when data from SHARE Wave 9 are released. Another important limitation is the use of single items to measure the mental health variables instead of using psychometrically sound instruments to cover the mental health constructs more extensively. It may be justified, however, to use the present measures, as psychometrically sound questionnaires would be too time consuming in a cross-disciplinary telephone survey. Furthermore, attrition between the SW8 and the SCS-1 may have led to selection of the healthier participants in SCS-1, possibly underestimating the associations found. Moreover, participants who were laid-off from their job due to the restrictions may have been more worried and more susceptible to developing mental health problems as compared to those still employed or not working (home makers, disabled, retired). However, sensitivity analyses did not change our results.

Conclusion

In conclusion, our findings showed that the older population became slightly lonelier, but at the same time they felt less depressed and had fewer sleeping problems in summer 2020 during the first COVID-19 outbreak in Europe, compared to before the outbreak. This indicates that middle-aged (50–64 years) and older populations (aged 65+) quickly adapted to and recovered from the first lockdown and thus seem more resilient than hypothesised. However, respondents were interviewed relatively late in the first outbreak, during a period with lower restriction levels due to an improving COVID-19 situation and no signs of future pandemic events, which may have caused a great relief for the majority of the respondents. But the risk of loneliness did in fact increase, and stricter policy measures attenuated the otherwise positive impact on depressive symptoms. Thus, as mental health problems are associated with substantial societal and economic consequences [56], it is crucial for future studies to examine the long-term impact of pandemic events on mental health to develop preventive initiatives, such as clinical guidelines on how to cope with the challenges during a lockdown and provide support during and after the outbreaks to those most at risk of developing mental health problems.

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Data availability statement

SHARE data is free of charge for scientific use globally http://www.share-project.org/data-access.html.

Declaration of Competing Interest

All authors declare to have no competing financial interests or personal relationships that could influence the work reported in this paper.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.annepidem.2022.05.010.

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