Research paper

COVID-19 pandemic impact on mental health in a large representative sample of older adults from the Lombardy region, Italy

Andrea Amerio [a,b], Chiara Stival [c], Alessandra Lugo [c], Tiziana Fanucchi [d], Luca Cavalieri d'Oro [e], Licia Iacoviello [f,g], Anna Odone [h,i,*], David Stuckler [j], Alberto Zucchi [k], Gianluca Serafini [a,b], Silvano Gallus [c], the "LOST in Lombardia" Study Investigators

[a] Department of Neuroscience, Rehabilitation, Ophthalmology, Genetics, Maternal and Child Health (DINOGMI), Section of Psychiatry, University of Genoa, Genoa, Italy
[b] IRCCS Ospedale Policlinico San Martino, Genoa, Italy
[c] Department of Environmental Health Sciences, Istituto di Ricerche Farmacologiche Mario Negri IRCCS, Milan, Italy
[d] SOD Alcologia - Centro Alcologico Regionale Toscano, Azienda Ospedaliero-Universitaria Careggi, Florence, Italy
[e] ATS Brianza, Monza, Italy
[f] School of Medicine, University of Insubria, Varese, Italy
[g] IRCCS Neuromed, Pozzilli, Italy
[h] Department of Public Health, Experimental and Forensic Medicine, University of Pavia, Pavia, Italy
[i] School of Medicine, Vita-Salute San Raffaele University, Milan, Italy
[j] Department of Social Sciences and Politics, Bocconi University, Milan, Italy
[k] ATS Bergamo, Bergamo, Italy

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ABSTRACT

Background: We aimed to assess the prevalence of depressive and anxiety symptoms, hopelessness and insomnia in the older adults before and during the COVID-19 pandemic identifying subgroups at higher risk of mental distress.

Methods: Within the Lost in Lombardy project, a web-based cross-sectional study was conducted on a representative sample of 4400 older adults aged 65 years or more from the Lombardy region recruited between November 17th and 30th 2020.

Results: The prevalence of depressive symptoms increased by +112 % during the pandemic, anxiety symptoms by +136 %, insufficient sleep by +12 %, unsatisfactory sleep by +15 %. Feelings of hopelessness were more frequent among women compared to men and increased with increasing age. A worsening in each of the four specific mental health outcomes was more frequently observed in women (OR = 1.50, depression; OR = 1.31, anxiety; OR = 1.57, sleep quality; OR = 1.38, sleep quantity), in subjects who decreased their physical activity during the pandemic (OR = 1.64, depression; OR = 1.48, anxiety; OR = 2.05, sleep quality; OR = 1.28, sleep quantity), and with increasing number of pre-existing chronic diseases. The use of at least one psychotropic drug – mostly antidepressants/anxiolytics – increased by +26 % compared to pre-pandemic.

Limitations: Pre-pandemic symptoms were retrospectively reported during the Covid pandemic. Potential information and recall bias should not be ruled out.

Conclusions: If confirmed by future longitudinal studies, our findings could support evidence-based health and welfare policies on responding to this pandemic and on how to promote mental health and wellbeing, should future waves of infection emerge.

* Corresponding author at: Department of Public Health, Experimental and Forensic Medicine, University of Pavia, Via Forlanini 2, 27100 Pavia, Italy.
E-mail addresses: andrea.amerio@unige.it (A. Amerio), chiara.stival@marionegri.it (C. Stival), alessandra.lugo@marionegri.it (A. Lugo), fanucchit@aou-careggi.toscana.it (T. Fanucchi), luca.cavalieridoro@ats-brianza.it (L.C. d'Oro), licia.iacoviello@uninsubria.it (L. Iacoviello), anna.odone@unipv.it (A. Odone), david.stuckler@unibocconi.it (D. Stuckler), alberto.zucchi@ats-bg.it (A. Zucchi), gianluca.serafini@unige.it (G. Serafini), silvano.gallus@marionegri.it (S. Gallus).

1. Introduction

Italy was the first country to be hit by the 2019 coronavirus disease (COVID-19) in Europe holding one of the highest clinical burden (Onder et al., 2020). On March 2020, Italy was also the first country to impose a nation-wide stay-at-home order to curb the COVID-19 spread, confining over 60 million people inside their homes for almost three months (Paterlini, 2020).

Social distancing and confinement measures promoted pervasive feelings of loneliness, hopelessness, despair in the general population, and led to marginalization and segregation (Amerio et al., 2021). Increased levels of stress and worry concerning personal health and economic consequences, combined with a reduction in alternative positive activities, impacted on people's lifestyle habits with particular regard to vulnerable subgroups such as older adults (Lugo et al., 2021; Carreras et al., 2021; Odone et al., 2020a; Amerio et al., 2020a).

Indeed, older adults are those paying the highest price for the COVID-19 emergency: they hold the highest risk of developing severe and deadly forms of COVID-19, with 25 % case fatality rate in subjects aged >80 years, as compared <1 % in subjects younger than 50 years (Wang et al., 2020), and the risk of death increasing with increasing number of concomitant chronic diseases (Li et al., 2020). Moreover, the older adults are also likely to have experienced unmet non-COVID-19 healthcare needs during the acute phase of the outbreak when health services were stretched to capacity with COVID-19 clinical management (Grasselli et al., 2020; Ambrosetti et al., 2021).

In pandemic times, prejudices and stigma towards vulnerable individuals may be further reinforced by social deprivation, uncertainty, inadequate supplies and information, and could lead to marginalization, segregation, increased institutionalization of these people, reducing individual autonomy and self-dignity that play a key role in resilience for any age group (Banerjee, 2020; Branca et al., 2021).

To the best of our knowledge (Odone et al., 2020b), most of the original studies investigating different mental health effects of COVID-19 on older adults are descriptive studies mainly conducted on convenience samples (Dziedzic et al., 2021; Qi and Dada, 2021). Data on the issue from representative samples are still scant as well as data focusing on the role of hopelessness in this segment of population (Weitzel et al., 2021; Zaninotto et al., 2022; Durmuş and Öztürk, 2022).

To date, the most consistent representative findings come from older adults participating in the English Longitudinal Study of Aging and in the Longitudinal Aging Study Amsterdam, respectively (Zaninotto et al., 2022; van den Besselaar et al., 2021). From the one hand, levels of depression, loneliness, and poor quality of life significantly increased during June and July 2020 compared with pre-pandemic levels and continued to deteriorate during the second national lockdown in November and December 2020 (Zaninotto et al., 2022). Women, individuals living alone, and those with less wealth have experienced greater deterioration in mental health.

From the other hand, data from the Longitudinal Aging Study Amsterdam, an ongoing prospective cohort study initiated in 1992 based on a representative sample of older adults aged 55–84 years in the Netherlands, reported a slight increase in depressive and anxiety symptoms, and mastery during the COVID-19 compared to previous years (van den Besselaar et al., 2021). In particular, older adults with functional limitations or with frailty showed a smaller increase in feelings of mastery during the first COVID-19 wave.

As part of the project LOckdown and lifeSTyle IN LOMBARDY ('Lost in Lombardy'), we conducted a cross-sectional multi-disciplinary study on a representative sample of the Lombardy region population (aged 65 or more), the Italian region with the highest number of inhabitants, to assess the impact of COVID-19 pandemic on selected mental health outcomes, exploring its determinants and mediators.

2. Methods

Between November 17th and 30th 2020, we conducted a large cross-sectional telephone-based survey in collaboration with Doxa, the Italian branch of the worldwide independent network/Gallup International Association, and other Italian universities and research institutes. The present analysis is based on a representative sample of 4400 individuals aged 65 years or more from the Lombardy region. Details on sampling methodology are available elsewhere (Stival et al., 2022).

The selection procedure followed a rigorous method: we considered, as the universe of reference, the registers of 30,000 households, representative of the families from Lombardy region, by province and size of municipality. Within the registers, participants were selected randomly by an automatic system. The structure of the sample was defined in advance, using quotas for gender by age and province by municipality size. Throughout the survey process, the system checked for sampling structure and closed quotas when completed. Response rate was of 42.5 %. The protocol of the study was approved by the ethics committee of the coordinating group (Ethics Committee of Fondazione IRCCS Istituto Neurologico Carlo Besta, File number 76, October 2020). All the participants provided their informed consent for the participation to the study. The study was performed in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki).

Participants provided information on demographic and socio-economic characteristics such as age, sex, level of education, perceived economic status, province of residence, and if they lived in a main town (capital city). Level of education was based on the highest degree obtained and was categorized in low (no degree and elementary school diploma), intermediate (middle and high school diploma) and high (university degree). Self-reported economic status was assessed by asking participants to report their perception on whether their household family economic status was above, in line, or below that of the average Italian population. Participants were also asked to report whether they have been diagnosed with selected common chronic diseases among a list including diabetes, hypertension, other cardiovascular diseases, cancer, osteoarthritis/arthritis, osteoporosis, chronic kidney disease, asthma, chronic bronchitis/emphysema, and headache/migraine, along with the year of diagnosis. From this information, we derived the number of concomitant chronic diseases they had. Subjects also reported the average number of hours per week of moderate (e.g. fast walking, cycling) or intense (e.g. swimming, running) physical activity they performed. In order to evaluate any change in physical activity, the average number of hours per week of physical activity were reported twice, referring to the moment of the interview (reference time: November 2020) and one year before (reference time: November 2019).

A specific section of the questionnaire was focused on mental health outcomes. Quality and quantity of sleep were investigated using 2 items of the Pittsburgh Sleep Quality Index (Buysse et al., 1989). Information on sleep quality was obtained through the question: "How would you rate your sleep quality overall?" (PSQI item #9). Possible answers were: (1) very good; (2) quite good; (3) quite bad (4) very bad. Unsatisfactory sleep (poor sleep quality) was defined if the participant reported a quite bad or very bad quality of sleep. Sleep quantity was assessed in hours of sleep per night as a continuous measure (integer number), using the question: "How many hours of actual sleep did you get at night? (this may be different than the number of hours spent in bed)" (PSQI item #4). Insufficient sleep was determined if the participant reported to sleep on average 6 or less hours per night. Anxiety symptoms and depressive symptoms were also investigated, using the short versions of the Generalized Anxiety Disorder (GAD-2) and Patient Heath Questionnaire (PHQ-2) scales (Kroenke et al., 2003; Kroenke et al., 2017). A score of GAD-2 $\geq$ 3 indicated the presence of anxiety symptoms and a score of PHQ-2 $\geq$ 3 indicated the presence of depressive symptoms (Staples et al., 2019). Using the short version of Beck Hopelessness (BHS-4) scale (Perczel Forintos et al., 2013), participants' feelings of hopelessness were also determined. A score of BHS-4 $\geq$ 6 indicated the

presence of feelings of hopelessness.

Information on the use of psychotropic drugs was also collected. Participants were asked to report their use of selected categories of psychotropic drugs: i) "antidepressants (e.g. Sertraline, Citalopram, Paroxetine)"; ii) "anxiolytics/benzodiazepine (e.g., Lorazepam, Alprazolam, Delorazepam)"; iii) "hypnotics (e.g., Zolpidem, Lormetazepam, Triazolam)"; iv) "antipsychotics (e.g., Risperidone, Olanzapine, Quetiapine)"; and v) "mood stabilizers (e.g., Lithium, Valproate)". Participants reporting the use of at least one of these drugs were classified as "users of psychotropic drugs".

In order to evaluate any changes in mental health and in the use of psychotropic drugs during the pandemic, questions on quality and quantity of sleep, anxiety and depressive symptoms and psychotropic drugs were asked twice, referring to the moment of the interview (reference time: November 2020) and to the year before (reference time: November 2019). For each participant, we defined a worsening in: i) sleep quality, if the participant reported any decrease in the sleep quality score; ii) sleep quantity, if the participant referred a decrease in the average hours per day slept; iii) depressive symptoms, if the participant reported any increase in PHQ-2 scale; and iv) anxiety symptoms, if the participant reported any increase in GAD-2 scale.

2.1. Statistical analysis

Separate multiple logistic regression models, after adjustment for sex, age category (65–69, 70–74, 75–79, 80–84, 85+ years) and level of education (low, intermediate, high) were performed to derive odds ratios (OR), and corresponding 95 % confidence intervals (CI), for a worsening in sleep quality and quantity, and depressive and anxiety symptoms.

A statistical weight was applied to all the analyses to guarantee the representativeness of the sample in terms of sex, age, socio-economic status, and province of residence. All statistical analyses were performed using SAS 9.4 (Cary, North Carolina, USA).

3. Results

The prevalence of reported depressive and anxiety symptoms, and sleep characteristics in the study population before and during the COVID-19 pandemic is reported in Fig. 1. Among 4400 Italian adults aged 65+ years, compared to the time period before the pandemic, those reporting depressive and anxiety symptoms during the pandemic increased by +112 % (from 7.8 % to 16.5 %) and by +136 % (from 11.5 % to 27.1 %), respectively. Also, unsatisfactory sleep and insufficient
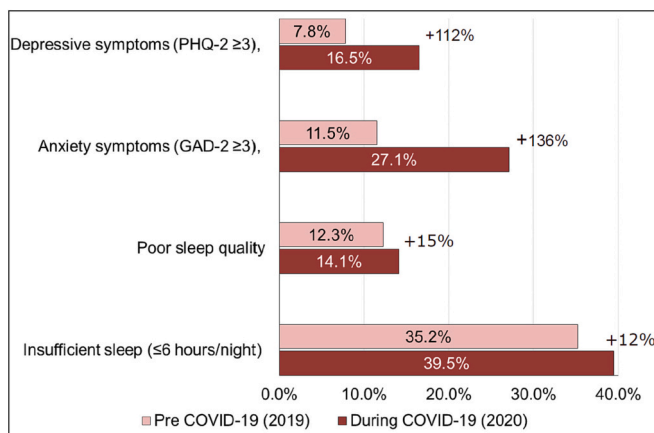
sleep increased during the pandemic by +15 % (from 12.3 % to 14.1 %) and + 12 % (from 35.2 % to 39.5 %), respectively. Findings by sex and age group are shown in Supplementary Table 1.

The prevalence of reported feelings of hopelessness in the study population during the COVID-19 pandemic, overall and by sex and age group, is shown in Fig. 2. Overall, 13.0 % of the Italian adults aged 65+ years reported feelings of hopelessness. This condition was more frequent among women compared to men (15.1 % vs. 10.4 %) and increased with increasing age (from 9.9 %, age group 65–69 years, up to 20.6 %, age group 85+).

Table 1 shows the prevalence and corresponding ORs, of subjects worsening their mental health status during the COVID-19 pandemic, in the total sample and by selected demographic and socio-economic characteristics. Overall, 29.1 % (N = 1280) of the Italian older adults reported an increase in depressive symptoms during the pandemic, 37.7 % (N = 1658) reported an increase in anxiety symptoms, 9.2 % (N = 406) and 9.9 % (N = 436) reported a decrease in sleep quality and quantity, respectively. A worsening in each of the five specific mental health outcome was more frequently reported in women compared to men (OR = 1.50; 95 % CI: 1.31–1.72 for depression; OR = 1.31; 95 % CI: 1.16–1.49 for anxiety; OR = 1.57; 95 % CI: 1.27–1.96 for sleep quality; OR = 1.38; 95 % CI: 1.12–1.70 for sleep quantity). A worsening in sleep quality was less frequently reported with increasing age (OR = 0.65; 95 % CI: 0.52–0.81 in participants aged 70+ compared to those aged 65–69; data not shown in table). Increased level of education was related to a worsening in depressive symptoms (p for trend = 0.008). Compared to people living in main towns, those from the outskirt less frequently reported a worsening in anxiety symptoms (OR = 0.86; 95 % CI: 0.74–1.00) and in sleep quality (OR = 0.78; 95 % CI: 0.62–0.99). A worsening in anxiety symptoms (OR = 1.35; 95 % CI: 1.03–1.76) and in sleep quantity (OR = 3.33; 95 % CI: 2.12–5.24) was more frequently observed in subjects with a socio-economic status below the mean, compared to those with a socio-economic status above the mean.

As reported in Table 2, a worsening in each of the five specific mental health outcomes was more frequently reported in those who decreased their physical activity during the pandemic (OR = 1.64; 95 % CI: 1.43–1.89 for depression; OR = 1.48; 95 % CI: 1.29–1.68 for anxiety; OR = 2.05; 95 % CI: 1.67–2.53 for sleep quality; OR = 1.28; 95 % CI: 1.04–1.58 for sleep quantity) and with increasing number of pre-existing chronic diseases (p for trend < 0.001 for depression and anxiety; p for trend = 0.010 for sleep quality; p for trend = 0.012 for sleep quantity). Feelings of hopelessness were related to a worsening in each specific mental health outcome: depressive symptoms (OR = 1.93; 95 % CI: 1.60–2.31), anxiety symptoms (OR = 1.60; 95 % CI: 1.34–1.91), sleep quality (OR = 2.70; 95 % CI: 2.11–3.46) and sleep quantity (OR = 3.52; 95 % CI: 2.80–4.44). Participants reporting an increase in their use of psychotropic drugs during the pandemic, more frequently reported a worsening in anxiety symptoms (OR = 3.33; 95 % CI: 2.33–4.74) and in sleep quantity (OR = 8.34; 95 % CI: 5.84–11.9), compared to those not increasing their use.

The presence of increased depressive and anxiety symptoms and a reduction of sleep quality and quantity during the pandemic were related to a worsening in each of the four specific mental health outcomes (Supplementary Table 2).

During the COVID-19 pandemic, the prevalence of older adults using at least one psychotropic drug increased by +26 % compared to pre-pandemic (from 9.5 % to 12.0 %). The highest relative increase in use was observed for antidepressants (percent increase by +55 %: from 3.1 % to 4.8 %), followed by anxiolytics/benzodiazepine (percent increase by +41 %: from 5.1 % to 7.2 %), hypnotics (percent increase by +13 %: from 1.6 % to 1.8 %) and mood stabilizers (percent increase by +10 %: from 1.0 % to 1.1 %; Fig. 3).

Fig. 1. Overall distribution of 4400 Italian individuals aged 65+ years according to psychological characteristics (depression and anxiety) and sleep characteristics before and during the Covid-19 pandemic. Lombardy region, Italy, 2020.

4. Discussion

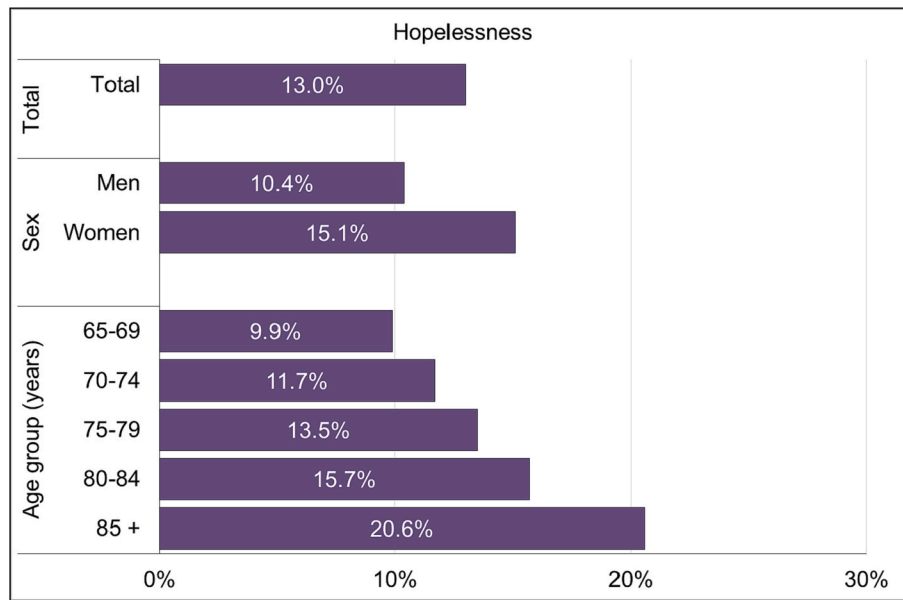During the COVID-19 pandemic, in Lombardy region, prevalence of

Fig. 2. Distribution of 4400 Italian individuals aged 65+ years according to feelings of hopelessness (BHS-4 scale), overall and by sex and age group. Lombardy region, Italy, 2020.

Table 1
Distribution of 4400 Italian individuals aged 65+ years having worsened their depressive symptoms, anxiety symptoms, sleep quantity and sleep quality during the Covid-19 pandemic, according to selected demographic and socio-economic features. Corresponding odds ratios (OR) and 95 % confidence intervals (CI). Lombardy region, Italy, 2020.

Characteristics	N	Increase in depressive symptoms during pandemic		Increase in anxiety symptoms during pandemic		Decrease in sleep quality during pandemic		Decrease in sleep quantity during pandemic	
		%	OR (95 % CI)	%	OR (95 % CI)	%	OR (95 % CI)	%	OR (95 % CI)
Total	4400	29.1		37.7		9.2		9.9	
Sex									
Men	1902	24.7	1.00[a]	34.0	1.00[a]	7.3	1.00[a]	8.4	1.00[a]
Women	2498	32.4	**1.50 (1.31–1.72)**	40.5	**1.31 (1.16–1.49)**	10.7	**1.57 (1.27–1.96)**	11.0	**1.38 (1.12–1.70)**
Age group									
65–69	1289	30.5	1.00[a]	38.8	1.00[a]	12.2	1.00[a]	11.0	1.00[a]
70–74	838	29.3	0.99 (0.82–1.20)	36.6	0.92 (0.76–1.10)	6.3	**0.51 (0.36–0.70)**	8.5	0.79 (0.58–1.07)
75–79	1188	29.4	0.96 (0.81–1.15)	39.2	1.00 (0.85–1.18)	9.3	**0.75 (0.58–0.98)**	9.6	0.89 (0.68–1.15)
80–84	739	26.8	0.85 (0.69–1.05)	36.8	0.88 (0.73–1.07)	8.6	**0.70 (0.51–0.96)**	10.6	1.02 (0.75–1.37)
85+	346	27.4	0.88 (0.67–1.15)	32.7	**0.72 (0.56–0.94)**	6.6	**0.53 (0.33–0.85)**	8.7	0.83 (0.55–1.27)
P for trend			0.130		0.051		**0.008**		0.739
Level of education									
Low	788	27.4	1.00[a]	39.7	1.00[a]	7.2	1.00[a]	8.0	1.00[a]
Intermediate	3168	28.8	1.11 (0.92–1.33)	36.5	0.87 (0.74–1.03)	9.6	1.31 (0.96–1.78)	10.3	**1.39 (1.03–1.86)**
High	444	34.4	**1.45 (1.12–1.88)**	42.4	1.12 (0.88–1.43)	9.9	1.33 (0.87–2.03)	10.3	1.38 (0.91–2.09)
P for trend			**0.008**		0.694		0.153		0.079
Municipality of residence									
Most populated town	991	30.9	1.00[a]	40.7	1.00[a]	10.9	1.00[a]	10.2	1.00[a]
Less populated town	3409	28.6	0.93 (0.80–1.09)	36.8	**0.86 (0.74–1.00)**	8.7	**0.78 (0.62–0.99)**	9.8	0.99 (0.78–1.26)
Socio-economic status									
Above the mean	391	29.7	1.00[a]	33.2	1.00[a]	9.3	1.00[a]	6.8	1.00[a]
Average	3304	29.5	1.00 (0.79–1.27)	37.9	**1.27 (1.01–1.59)**	8.8	0.91 (0.63–1.32)	8.5	1.31 (0.86–2.00)
Below the mean	705	26.7	0.89 (0.67–1.18)	39.0	**1.35 (1.03–1.76)**	11.4	1.29 (0.84–1.97)	18.3	**3.33 (2.12–5.24)**
P for trend			0.311		0.052		0.076		**<0.001**

* Estimated by unconditional multiple logistic regression models after adjustment for sex, age and education level; estimates in bold are those statistically significant at 0.05 level.

[a] Reference category.

depressive and anxiety symptoms have more than doubled, getting to affect 16.5 % and 27.1 % of adults aged 65+ years, respectively, and the use of at least one psychotropic drug – mostly antidepressants/anxiolytics – increased by +26 %. A worsening in each of the five specific mental health indicators was more frequently observed in women, in subjects who decreased their physical activity during the pandemic, and with increasing number of pre-existing chronic diseases. A worsening in depressive symptoms was more frequently observed in more educated

subjects, while a worsening in anxiety symptoms in subjects living in main towns compared to outskirt with an economic status below the mean. Feelings of hopelessness were more common among women, increased with increasing age and were related to a worsening in each of the five mental health outcomes.

Our findings should be interpreted in light of the pervasive impact that the COVID-19 pandemic have had on lifestyles, physical and mental health especially in vulnerable subgroups of population. As recently

Table 2

Distribution of 4400 Italian individuals aged 65+ years having worsened their depressive symptoms, anxiety symptoms, sleep quantity and sleep quality during the Covid-19 pandemic, according to selected lifestyle habits and other individual-level characteristics. Corresponding odds ratios[*] (OR) and 95 % confidence intervals (CI). Lombardy region; Italy, 2020.

Characteristics	N	Increase in depressive symptoms during pandemic		Increase in anxiety symptoms during pandemic		Decrease in sleep quality during pandemic		Decrease in sleep quantity during pandemic	
		%	OR (95 % CI)	%	OR (95 % CI)	%	OR (95 % CI)	%	OR (95 % CI)
Decrease in physical activity during pandemic									
No	3018	25.6	1.00[a]	44.3	1.00[a]	13.8	1.00[a]	11.6	1.00[a]
Yes	1382	36.7	**1.64 (1.43–1.89)**	34.7	**1.48 (1.29–1.68)**	7.1	**2.05 (1.67–2.53)**	9.1	**1.28 (1.04–1.58)**
Chronic diseases									
No	852	24.8	1.00[a]	33.6	1.00[a]	8.1	1.00[a]	7.7	1.00[a]
1	1260	28.8	**1.25 (1.03–1.53)**	35.8	1.11 (0.93–1.34)	9.3	1.24 (0.90–1.69)	8.7	1.17 (0.85–1.61)
2	1403	28.6	**1.27 (1.04–1.55)**	38.2	**1.26 (1.05–1.52)**	8.4	1.14 (0.83–1.57)	12.6	**1.80 (1.33–2.44)**
3+	884	34.3	**1.65 (1.33–2.05)**	43.4	**1.55 (1.27–1.90)**	11.6	**1.65 (1.18–2.30)**	9.5	1.30 (0.92–1.83)
P for trend			**<0.001**		**<0.001**		**0.010**		**0.012**
Increase in use of psychotropic drugs during pandemic									
No	4260	29.1	1.00[a]	36.8	1.00[a]	9.2	1.00[a]	8.8	1.00[a]
Yes	140	27.7	0.96 (0.66–1.40)	64.5	**3.33 (2.33–4.74)**	10.6	1.23 (0.71–2.14)	43.8	**8.34 (5.84–11.9)**
Hopelessness									
No	3827	27.2	1.00[a]	36.2	1.00[a]	7.9	1.00[a]	7.9	1.00[a]
Yes	573	41.7	**1.93 (1.60–2.31)**	47.5	**1.60 (1.34–1.91)**	18.2	**2.70 (2.11–3.46)**	23.0	**3.52 (2.80–4.44)**

[*] Estimated by unconditional multiple logistic regression models after adjustment for sex, age and education level; estimates in bold are those statistically significant at 0.05 level.
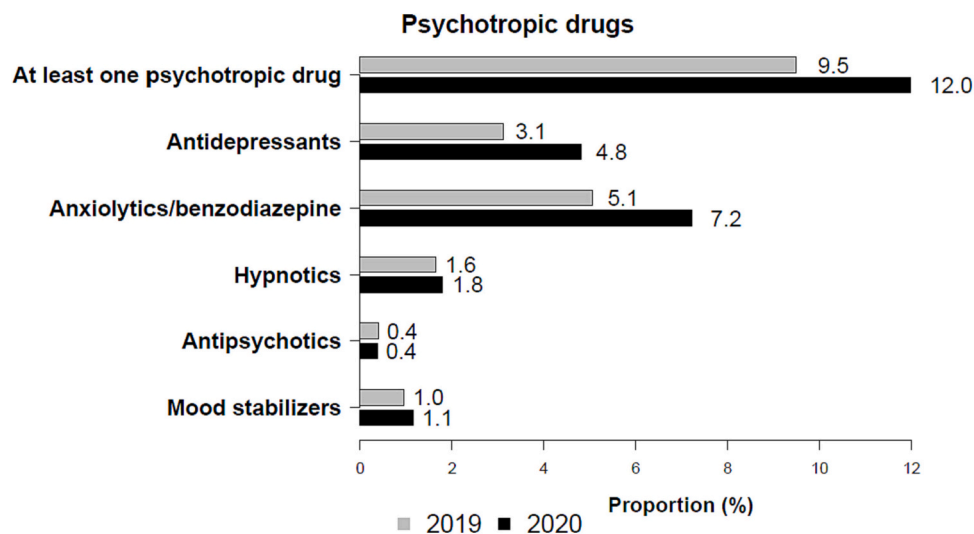
[a] Reference category.

Fig. 3. Distribution of 4400 Italian individuals aged 65+ years according to their use of psychotropic drugs before (November 2019) and during Covid-19 pandemic (November 2020). Lombardy region, Italy, 2020.

suggested, the pandemic seems to have affected older adults' subjective views of their own aging strengthening feelings of negative self-perception and decreasing positive ones (Seifert, 2021). If confirmed, these findings could help to illustrate both the increased prevalence of depressive and anxiety symptoms and the increased use of at least one psychotropic, mostly antidepressants and anxiolytics, we found.

In line with current COVID-19 literature, women experienced worse changes in mental health status compared to men with a greater risk of developing depressive, anxiety and post-traumatic stress symptoms (Zaninotto et al., 2022). Data from a representative survey conducted in German individuals aged 65 years and older in April 2020 supported a greater vulnerability in women with lower resilience rates compared to men (Weitzel et al., 2021).

Subjects practising more physical activity before the pandemic have suffered more from social distancing and confinement measures in terms of lifestyle habits, with ultimate consequences on their mental health (Nie et al., 2021).

As the COVID-19 pandemic focused medical attention on treating COVID-19 positive patients and protecting others from infection, older adults with more chronic diseases were faced reconsideration of usual standards of care and protocol modifications. Therefore, a worsening in each of the five specific mental health indicators was more frequently

observed in this segment of population, who have held the highest risk of developing severe and deadly forms of COVID-19 (Tisminetzky et al., 2020).

A worsening in depressive symptoms was more likely observed in more educated subjects who might be more aware of the public health emergency and associated risks.

In line with expectations, subjects living in main towns with a socio-economic status below the mean reported a higher worsening of anxiety symptoms (Zaninotto et al., 2022). Despite a better access to health care and other commodities, living in cities exposes people to risk factors originating from the urban social or physical environment, contributing to increased stress, which negatively impacts mental health. Unsurprisingly, due to the potential financial impact of the pandemic, older adults with a socio-economic status below the mean were subjected to higher levels of stress (Delmastro and Zamariola, 2020).

In the late eighties, Abramson, Metalsky, and Alloy theorized a specific subtype of depression, called hopelessness depression, assuming that depressive symptoms seem to be more likely to occur when vulnerable individuals experience negative environmental circumstances (Abramson et al., 1989). They referred the concept of vulnerability to individuals with a pessimistic explanatory style, interpreting the cause of negative events as something that cannot be changed (stable attribution) and affecting their whole life (global attribution) (Schneider et al., 2012). In pandemic time, the risk of developing severe and deadly forms of COVID-19, financial insecurity and an uncertain future fostered feelings of hopelessness in older adults leading to a worsening in mental health status (Bavel et al., 2020). As reported in our study, feelings of hopelessness were related to a worsening in each of the five mental health outcomes and were more common among women.

In our study, although feelings of hopelessness increased with increasing age, the worsening of depressive symptoms did not follow this trend. As recently published in the literature, older adults may have traits of resilience that have enabled them to withstand COVID-19 stress and protected them from depressive symptoms, especially wisdom, compassion and a tendency to value the quality of a few close relationships over having many more superficial relationships (Vahia et al., 2020).

This study needs to be interpreted in the light of several strengths and limitations. Among its strengths, the large sample size and the use of validated evidence-based psychiatric assessment tools. Limitations of our study include the possible information bias due to the self-reported responses and a possible recall bias since, at the time of the interview, participants were asked to report their habits and psychophysical indicators also before the pandemic. Moreover, the nature of the survey and the telephone interview modality did not make feasible the use of more sophisticated instruments. Only two items of the PSQI scale, and not the complete questionnaire, were used to assess sleep behaviours in our population. The PHQ-2, GAD-2 and BHS-4 scales used to assess depression, anxiety and feelings of hopelessness only represent a first step screening and not a clinical evaluation with the potential risk of overestimating changes in symptoms. Using questionnaires with more items capturing the broader and more nuanced range of symptoms associated with depression, anxiety and feelings of hopelessness, there is actually a higher chance that specific symptoms will be stable rather than changing. However, this was not among the aims of the present survey and the length of the questionnaire did not allow any deeper investigation. Furthermore, the study was conducted in two specific weeks in November 2020, when Lombardy was classified as a high risk area, and consequently restaurants, bars and other commercial activities, besides essential ones, were closed. In such time, the SARS-CoV-2 infection rate was 1.0 % in Lombardy region, higher than in the whole Italian population (i.e., 0.7 %). We could have obtained different results if the study was conducted in another period, given the dynamic situation regarding the COVID-19 pandemic. In addition, the study is representative only of the older population from Lombardy region, and cannot derive any conclusion at national level, also in light of the

COVID-19 pandemic which may have exhibited large differences between regions. Last, as this is a cross-sectional study, it is not possible to establish any causal relationship. Although the adopted study design allowed us to simulate a pre-post analysis in the context of a cross-sectional study, our results should be therefore confirmed by longitudinal studies assessing medium- and long- term effects of COVID-19 emergency on psychological symptoms.

The WHO proposition that there can be "no health without mental health" is valid for everybody, but even more so for fragile groups, as the older adults (Prince et al., 2007). The protection of the mental health status of this vulnerable segment of population needs to be recognized as a real public health priority. A careful and comprehensive analysis of risk and protective factors in the individual and environmental context should be performed in order to early detect peculiar needs of care as well as plan and implement appropriate and targeted interventions centred on older adults (Amerio et al., 2020b). If confirmed by future studies with longitudinal design, extended to national samples, and reproduced in other time periods, our findings could support evidence-based health and welfare policies on responding to this pandemic and on how to promote mental health and wellbeing, should future waves of infection emerge.

Ethical standards

CRediT authorship contribution statement

All authors conceptualized and designed the study. CS analysed the data under the supervision of AL and SG. AA, CS, TF, AO and GS wrote the first draft of the manuscript. LI, LCD, DS and AZ provided important contributions for the interpretation of findings. GS, AO and SG provided important intellectual supports in various steps of the study. All authors carefully revised the final version of the manuscript. All authors have read and approved the last version of the manuscript.

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Conflict of interest

Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

Availability of data and materials

Data that support the findings of this study and materials are available from the corresponding author, AO, upon request.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jad.2023.01.006.

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