Mental health status of Italian elderly subjects during and after quarantine for the COVID-19 pandemic: a cross-sectional and longitudinal study

Gianpaolo MAGGI, Ivana BALDASSARRE, Andrea BARBARO, Nicola Davide CAVALLO, Maria CROPANO, Raffaele NAPPO and Gabriella SANTANGELO

Department of Psychology, University of Campania “Luigi Vanvitelli”, Caserta, Italy

Correspondence: Prof. Gabriella Santangelo PhD, Department of Psychology, University of Campania “Luigi Vanvitelli”, Caserta, Viale Ellittico 31, 81100, Italy. Email: gabriella.santangelo@unicampania.it

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INTRODUCTION

The pandemic caused by the novel coronavirus disease (COVID-19) caused an unprecedented social and health crisis all over the world. In addition to fear and suffering caused by the pandemic, the stay-at-home restrictions, quarantines, and lockdowns imposed by governments of different countries to control the spread of the virus could negatively impact the mental health status of individuals.¹

A recent review¹ exploring the psychological impact of quarantine during previous outbreaks showed more severe post-traumatic stress (PTS) symptoms, depression, anger, and emotional exhaustion in individuals who were quarantined compared to those not quarantined.²⁻⁶
As for the psychological response to the COVID-19 pandemic, in China where the outbreak started, 53.8% of respondents in an online survey reported moderate to severe psychological impact, including moderate to severe depressive symptoms (16.5%), anxiety (28.8%), and stress levels (8.1%). Moreover, the prevalence of anxiety and depressive symptoms in people affected by quarantine was double compared to unaffected individuals.

Concomitantly with the spread of the COVID-19, psychological symptoms were reported also in European populations. More specifically, more severe depressive and anxiety symptoms and higher stress levels were reported in Italian, Spanish, Turkish, and UK general populations. However, while the above-mentioned studies explored the psychological consequences of the outbreak and quarantine/self-isolation on the general population, the effects on the mental health status of more vulnerable groups such as the elderly population in particular deserves to be investigated. Indeed, elderly people are characterised by unique physical, psychosocial, and environmental vulnerabilities and they may be more at risk from COVID-19 than people of other ages due to a fragile immune system and chronic comorbidities. Therefore, the elderly population needs to practice social distancing limiting their interactions even with family members, and this could increase the loneliness and anxiety due to quarantine/self-isolation and the uncertainty and fear due to the outbreak. Thus, restrictive measures could contribute to the rise of psychological symptoms such as depression, anxiety, anger, and subjective cognitive failures.

Previously, Meng et al. explored the psychological impact of COVID-19 outbreak amongst the elderly population in China, revealing that 37.1% of participants experienced depression and anxiety. Moreover, the authors suggested focusing on female elderly, low educated elderly, those who are living alone, and those having mental health issues, recommending the implementation of psychological interventions to control the severity of their psychological symptoms.

Further, some studies investigating the psychological consequences of the COVID-19 pandemic and self-isolation measures through follow-up methodologies have broadly explored individuals’ mental health status during the early phase and the peak of the COVID-19 outbreak or at the start and the end of the lockdown. Otherwise, Zhou et al. recruited participants from Wuhan for surveys before and after the lockdown was lifted revealing a slight improvement of individuals’ mental health after the end of the lockdown. Until now, however, no study has explored the long-term psychological consequences of the COVID-19 outbreak and self-isolation measures in Italian older adults.

Taking into account the above-mentioned background, our main objective was to identify the impact of the pandemic and a long period (>1 month) of quarantine on the psychological and cognitive health status in a sample of Italian elderly, and determine which factors of the quarantine/self-isolation were mostly associated with the occurrence of psychological symptoms. Particularly, we hypothesised that older people might experience psychological symptoms (e.g., depression and anxiety) and cognitive failures. Also, some variables related to the pandemic and the quarantine (e.g., the number of people they lived with and the number of outings in the last week) could be identified as risk factors for the development of psychological and cognitive symptoms, whereas personal resilience and adopting coping strategies might represent protective factors.

Moreover, we aimed to track longitudinal changes in their mental health status two months after the end of the lockdown and the factors associated with the development of PTS symptoms. We hypothesised a reduction of psychological symptoms after the end of the quarantine, but we expected to detect the presence of PTS symptoms.

**MATERIALS AND METHODS**

**Participants**

This study involved a subgroup of participants (individuals aged 60 or older) to a previous cross-sectional survey performed to assess the psychological response of the Italian population during the quarantine/self-isolation. In that study, an online questionnaire was created on a virtual platform of Google Moduli and shared in social networks (i.e., Facebook, Whatsapp, and social virtual groups) by friends, colleagues, and acquaintances via a snowball sampling strategy to recruit a large Italian sample of people living in different Italian regions. Study methods are extensively described in the above-mentioned study.
The data collection of the first wave (T0) was carried out from 4 April to 26 April 2020 (i.e., during the period in which quarantine was imposed by the Italian Government), whereas the second wave (T1) of data was obtained two months after the end of the quarantine and lockdown measures (i.e., from 20 July to 7 October). The study was approved by the Ethics Committee of University of Campania “Luigi Vanvitelli” and conformed to the principles embodied in the Declaration of Helsinki.

Survey structure
The questionnaire included the following components.

1 A device for informed consent statement.

2 Queries about sociodemographic data and characteristics related to the pandemic and the quarantine/self-isolation, namely age, gender, education, marital status, living status, household size, employment status, and previous psychiatric illnesses. Moreover, participants were asked to indicate how many days they have been in quarantine/self-isolation, housing features (i.e., density, number of rooms, windows, and outdoor spaces), the number of people they lived with, the number of outings in the previous week. Additionally, they were asked to rate the frequency of feeling boredom, frustration, and fear of getting infected with COVID-19, and to indicate if they had been admitted to hospital in the previous month and had been tested for COVID-19, and if they had direct or indirect contacts with individuals with confirmed COVID-19.

3 The Perceived Memory and Attentional Failures Questionnaire (PerMAFaQ) to assess subjective cognitive complaints. The tool consists of 9 items assessing perceived memory and attentional failures in everyday life activities performed at home (i.e., difficulty remembering the location of objects, difficulty remembering the content of a text, difficulty concentrating on the news of television or radio broadcasts, difficulty watching a movie until the end, difficulty concentrating while talking to someone else). Each item was to be rated on a 5-point Likert scale ranging from 1 (never) to 5 (very often). The total score ranges from 5 to 45 with higher scores indicating a higher propensity to cognitive failures.

4 The Italian version of the Patient Health Questionnaire-9 (PHQ-9), a self-report 9-item inventory to evaluate symptoms of a major depressive episode according to the DSM-5. Each item is rated on a 4-point Likert scale ranging from 0 (not at all) to 3 (nearly every day). The total score ranges from 0 to 27; cut-off points of 5, 10, 15, and 20 indicate mild, moderate, moderately severe, and severe levels of depressive symptoms.

5 The 7-item Generalized Anxiety Disorder scale (GAD-7) to assess the DSM-IV symptoms for Generalized Anxiety Disorder was employed to evaluate anxiety. Each item is rated on a 5-point Likert scale ranging from 0 (never) to 3 (nearly every day). The total score ranges from 0 to 21; GAD is indicated by a score equal to or greater than 10, whereas cut-off points of 5, 10, and 15 indicate mild, moderate, and severe levels of anxiety.

6 The DSM-5 Level 2-Anger-Adult measure (DSM-5-Anger), a 5-item version of the PROMIS Anger Short Form, to assess the severity of anger symptoms during the past 7 days. Each item is rated on a 5-point Likert scale ranging from 1 (never) to 5 (always). The total score ranges from 5 to 25; a higher total score indicates greater anger severity. The raw scores have to be converted to T-scores which are interpreted in the following way: less than 55 = none to slight; 55.0–59.9 = mild; 60.0–69.9 = moderate; 70 and over = severe anger.

7 The Italian translation of the Brief Resilience Scale (BRS) to assess Resilience, which consists of 6 items. Each item is rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Items are formulated either positively (Items 1, 3, 5) or negatively (Items 2, 4, 6). The total score ranges from 6 to 30; a higher total score indicates the self-referred ability to produce a positive adaptation response when facing adverse situations.

8 The Italian translation of the Coping Scale to assess the cognitive, emotional, and behavioural way of dealing with problems. This is a self-report questionnaire consisting of 13 items. Each item is rated on a 4-point Likert Scale ranging from 1 (not true about me) to 4 (mostly true about me). The total score ranges from 13 to 62; a higher total score indicates the use of adaptive coping strategies.

Finally, in the second wave (T1), the Italian version of the Impact of Event Scale-Revised (IES-R) was employed to evaluate the long-term impact of the traumatic experience. This is a self-report 22-item scale comprising three subscales: intrusion (8 items), avoidance (8 items), and hyperarousal (6 items). Each item is rated on a 5-point Likert scale ranging from 0
(not at all) to 4 (extremely) with higher scores indicating more severe post-traumatic stress (PTS) symptomatology. The total score is interpreted in the following way: 0–8 = subclinical; 9–25 = mild; 26–43 = moderate; 44 and over = severe.

The references for the original tools are reported in Appendix S1 in the Supporting Information.

**Statistical analysis**

Descriptive statistics were calculated for sociodemographic data, characteristics related to the pandemic and the quarantine/self-isolation, and variables assessing cognitive failures, depressive symptoms, anxiety, anger, personal resilience, and the coping style of respondents.

Simple linear regression analyses were carried out to evaluate the relationships between depression, anxiety, and anger and the following: (i) sociodemographic characteristics such as age, sex, and educational level; (ii) characteristics related to the pandemic and the quarantine/self-isolation such as duration of the quarantine/self-isolation, number of people/children per house, number of rooms in the house, number of outings from home in a week, indirect contact with people affected by COVID-19, fear of getting infected with COVID-19; and (iii) coping style and personal resilience. Moreover, multiple regression analyses were performed entering mental health status as dependent variables along with the variables found to be significant predictors from the simple linear regression analyses.

The same analyses were performed to investigate the relationship between subjective cognitive failures and the above-mentioned variables, with the addition of depression, anxiety, and anger as independent variables.

To investigate if and how resilience mediated the relationship between the fear of getting infected and mental health status, mediation analyses were carried out entering the fear of getting infected as the independent variable, mental health status variables as dependent variables, and resilience as the mediator.

The significance level was set at 0.05, and all statistical analyses were performed using SPSS Statistic 26.0.

**RESULTS**

**First wave results**

The sample of the first wave consisted of 334 elderly participants (196 females) (Table 1). The mean duration of quarantine/self-isolation was 31.48 (SD: 4.7) days.

**Depression**

Depressive symptomatology, evaluated by PHQ-9, was absent or minimal in 153 (46%) respondents, mild in 125 (37%), moderate in 41 (12%), moderately severe in 13 (4%), and severe in 2 (1%) subjects. The mean score of the PHQ-9 was 5.61 (SD: 4.23).

Simple regression analyses revealed that depression was significantly and negatively related to age, and scores on the BRS and Coping Scale, whereas a significant and positive relationship was found with the fear of getting infected (Table 2). To identify the most influential predictors of the PHQ-9 score we carried out a multiple regression analysis where significant factors from simple regression analyses were entered as independent variables, particularly, entering age in block 1, scores on BRS and Coping Scale in block 2, and the fear of getting infected in block 3. This analysis revealed that a higher score on the PHQ-9 was significantly related to younger age, a lower score on the BRS, and more fear of getting infected (Table 2).

**Anxiety**

An absence of anxious symptomatology as evaluated by the GAD-7 was reported for 39% (131) of the participants.
respondents, whereas anxiety for 45% (151) was mild, for 11% (37) was moderate, and for 5% (15) was severe. The mean score of the GAD-7 was 5.79 (SD: 4.05).

Simple regression analyses revealed that higher anxiety scores were significantly related to female gender, lower scores on the BRS and Coping Scale, and more fear of getting infected (Table 3). A multiple regression analysis entering sex in block 1, scores on the BRS and Coping Scale in block 2, and fear of getting infected in block 3 revealed that a higher score on the GAD-7 was significantly related to a lower score on the BRS and more fear of getting infected (Table 3).

Anger

Anger evaluated by the DSM-5-Anger was absent or minimal in 262 (78%) respondents, mild in 50 (15%), moderate in 19 (6%), and for 3 (1%) it was severe.
The mean score of the DSM-5-Anger was 45.35 (SD: 9.27).

Simple regression analyses revealed that a higher anger score was significantly and negatively related to age, and scores on the BRS and Coping Scale, whereas a significant and positive relationship was found with the fear of getting infected and female gender (Table 4). Multiple regression analysis entering age and sex in block 1, scores on the BRS and Coping Scale in block 2, and fear of getting infected in block 3 revealed that a higher score on the anger scale was significantly related to female gender, a low score on the BRS, and more fear of getting infected (Table 4).

**Mediation analyses**

Taking into account the above-mentioned results from multiple regression analyses, we designed a mediation model to test the mediator effect of resilience (BRS) on the relationship between the fear of

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**Table 2** Results for regression analyses with PHQ-9 score computed as dependent variable

|                        | Simple regression analyses | 95% confidence limits | Multiple regression analysis | 95% confidence limits |
|------------------------|---------------------------|-----------------------|-----------------------------|-----------------------|
|                        | Beta                      | t                     | p                            | Beta                  | t                     | p                    | Lower    | Upper    | Lower    | Upper    |
| Age                    | -0.166                    | -3.063                | 0.002                        | -0.255                | -0.056                | -0.135               | -2.843   | 0.005    | -0.214   | -0.039   |
| Sex                    | -0.081                    | -1.472                | 0.142                        | -1.612                | 0.232                 |                       |          |          |          |          |
| Level of education     | 0.045                     | 0.830                 | 0.407                        | -0.380                | 0.933                 |                       |          |          |          |          |
| Days of self-isolation | 0.053                     | 0.968                 | 0.334                        | -0.050                | 0.146                 |                       |          |          |          |          |
| Number of people per household | -0.057                  | 1.031                 | 0.303                        | -0.815                | 0.254                 |                       |          |          |          |          |
| Number of children per household | -0.035                  | -0.645                | 0.519                        | -1.140                | 0.577                 |                       |          |          |          |          |
| Number of rooms in the house | -0.089                  | -1.635                | 0.103                        | -0.887                | 0.082                 |                       |          |          |          |          |
| House density          | 0.013                     | 0.225                 | 0.822                        | -1.371                | 1.725                 |                       |          |          |          |          |
| Number of outings      | 0.015                     | 0.277                 | 0.782                        | -0.441                | 0.586                 |                       |          |          |          |          |
| Resilience             | -0.451                    | -9.207                | <0.001                       | -0.588                | -0.381                | -0.388               | -7.862   | <0.001   | -0.522   | -0.313   |
| Coping                 | -0.205                    | -3.822                | <0.001                       | -0.258                | -0.083                | -                       |          |          |          |          |
| Infected people        | 0.097                     | 1.783                 | 0.076                        | -0.021                | 0.431                 |                       |          |          |          |          |
| Fear                   | 0.323                     | 6.216                 | <0.001                       | 0.941                 | 1.812                 | 0.200                | 4.035    | <0.001   | 0.437    | 1.267    |

Bold value indicates P values. PHQ-9, Patient Health Questionnaire-9.

**Table 3** Results for regression analyses with GAD-7 score computed as dependent variable

|                        | Simple regression analyses | 95% confidence limits | Multiple regression analysis | 95% confidence limits |
|------------------------|---------------------------|-----------------------|-----------------------------|-----------------------|
|                        | Beta                      | t                     | p                            | Beta                  | t                     | p                    | Lower    | Upper    | Lower    | Upper    |
| Age                    | -0.107                    | -1.968                | 0.050                        | -0.193                | 0.000                 |                       |          |          |          |          |
| Sex                    | -0.139                    | -2.556                | 0.011                        | -2.021                | -0.263                | -                       |          |          |          |          |
| Level of education     | -0.073                    | -1.325                | 0.186                        | -1.052                | 0.205                 |                       |          |          |          |          |
| Days of self-isolation | 0.046                     | 0.839                 | 0.402                        | -0.054                | 0.134                 |                       |          |          |          |          |
| Number of people per household | 0.035                   | 0.632                 | 0.528                        | -0.349                | 0.678                 |                       |          |          |          |          |
| Number of children per household | 0.016                   | 0.289                 | 0.773                        | -0.703                | 0.945                 |                       |          |          |          |          |
| Number of rooms in the house | -0.060                   | -1.102                | 0.271                        | -0.726                | 0.205                 |                       |          |          |          |          |
| House density          | 0.071                     | 1.276                 | 0.203                        | -0.527                | 2.471                 |                       |          |          |          |          |
| Number of outings      | -0.043                    | -0.782                | 0.435                        | -0.688                | 0.297                 |                       |          |          |          |          |
| Resilience             | -0.460                    | -9.428                | <0.001                       | -0.573                | -0.375                | -0.355               | -7.475   | <0.001   | -0.462   | -0.269   |
| Coping                 | -0.236                    | -4.431                | <0.001                       | -0.272                | -0.105                | -                       |          |          |          |          |
| Infected people        | 0.060                     | 1.089                 | 0.277                        | -0.097                | 0.338                 |                       |          |          |          |          |
| Fear                   | 0.448                     | 9.135                 | <0.001                       | 1.439                 | 2.228                 | 0.339                | 7.154    | <0.001   | 1.006    | 1.769    |

Bold value indicates P values. GAD-7, 7-item Generalized Anxiety Disorder scale.

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getting infected and the mental health status variables. More fear of getting infected was related to poorer resilience ($B = -1.145$; $P < 0.001$). Subsequently, poorer resilience was related to more depressive symptoms ($B = -0.419$; $P < 0.001$), more anxiety ($B = -0.371$; $P < 0.001$), and more anger ($B = -0.862$; $P < 0.001$).

The bias-corrected 95% CI based on 5000 bootstrap samples revealed that the indirect effects of the fear of getting infected on depressive symptoms (estimate effect: 0.480; 95% CI: 0.266–0.735), anxiety (estimate effect: 0.425; 95% CI: 0.248–0.625), and anger (estimate effect: 0.986; 95% CI: 0.558–1.472) through resilience abilities were all significant, indicating mediation of resilience for all relationships between the fear of getting infected and mental health status (Fig. 1).

Subjective cognitive failures
Subjective cognitive failures occurred in 32% of the respondents, and the mean score on the PerMAFaQ was 18.32 (SD: 6.43). The most frequent cognitive failures were about ‘remembering where you left things’ (47%) and ‘forgetting the reason why you went from one part of the house to another’ (50.9%), whereas ‘to have trouble focusing while talking to someone’ (21%) was the less frequent cognitive complaint (Appendix S2). Simple regression analyses...
revealed that the PerMAFaQ score was significantly and negatively related to scores on the BRS and Coping Scale, and significantly and positively related to female gender, scores on the PHQ-9, GAD-7, and DSM-5-Anger, and fear of getting infected (Table 5). A multiple regression analysis entering sex in block 1, depression, anxiety, and anger scores in block 2, scores on the BRS and Coping Scale in block 3, and fear of getting infected in block 4 revealed that a higher score on the PerMAFaQ was significantly related to female gender, a lower score on the BRS, and higher scores on the PHQ-9 and DSM-5-Anger (Table 5).

Second wave results
Fifty participants (29 females) completed the second wave survey. The mean age was 64.94 (SD: 4.23).

Longitudinal changes in mental health status
No significant difference was found on Boredom, Frustration, and Fear of getting infected items (Table 6).

Table 5
Results for regression analyses with PerMAFaQ score computed as dependent variable

|                      | Simple regression analyses |                          |                          | Multiple regression analysis | 95% confidence limits | 95% confidence limits | 95% confidence limits | 95% confidence limits |
|----------------------|---------------------------|--------------------------|--------------------------|-----------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                      | Beta t p                  | Lower Upper              | Beta t p                 | Lower Upper                 |                       |                       |                       |                       |
| Age                  | -0.058 -1.062 0.289       | -0.236 0.071             | -0.898 -2.023 0.044      | -2.280 -0.033              |
| Sex                  | -0.169 -3.132 **0.002**   | -3.595 -0.821            | -0.812 1.186              |
| Level of education   | 0.020 0.368 0.713         | -0.812 1.186             |
| Days of self-isolation | -0.065 -1.181 0.238     | -0.237 0.059             |
| Number of people per household | -0.047 -0.863 0.389 | -1.171 0.457             |
| Number of children per household | 0.032 0.586 0.558 | -0.917 1.695             |
| Number of rooms in the house | -0.040 -0.737 0.462 | -1.016 0.462             |
| House density        | -0.086 -1.549 0.122      | -4.198 0.499             |
| Number of outings    | -0.055 -1.006 0.315      | -1.81 0.381              |
| Resilience           | -0.425 -8.582 <0.001     | -0.855 -0.535            |
| Coping               | -0.135 -2.477 0.014      | -0.305 -0.035            |
| Infected people      | 0.085 1.558 0.120        | -0.072 0.618             |
| Fear                 | 0.235 4.412 <0.001       | 0.846 2.207              |
| PHQ-9                | 0.574 12.769 <0.001      | 0.739 1.008              |
| GAD-7                | 0.419 8.406 <0.001       | 0.509 0.820              |
| DSM-5-Anger          | 0.515 10.960 <0.001      | 0.293 0.422              |

Bold value indicates P values. PerMAFaQ, Perceived Memory and Attentional Failures Questionnaire; PHQ-9, Patient Health Questionnaire-9; GAD-7, 7-item Generalized Anxiety Disorder scale; DSM-5-Anger, DSM-5 Level 2-Anger-Adult measure.

Table 6
Comparison of the mental health status scores during and after the quarantine

|                      | During the quarantine (T0) | After the quarantine (T1) | Z    | p    |
|----------------------|---------------------------|---------------------------|------|------|
|                      | Mean ± SD                 | Mean ± SD                 |      |      |
| Boredom              | 2.08 ± 0.97               | 1.90 ± 0.89               | -1.235 | 0.217 |
| Frustration          | 2.12 ± 1.08               | 1.98 ± 0.94               | -0.862 | 0.388 |
| Fear of getting infected | 2.48 ± 0.86             | 2.24 ± 0.89               | -1.935 | 0.053 |
| PHQ-9                | 6.04 ± 4.26               | 6.56 ± 4.77               | -0.883 | 0.377 |
| GAD-7                | 5.12 ± 3.91               | 6.10 ± 4.34               | -1.995 | 0.046 |
| DSM-5-Anger          | 50.42 ± 9.37              | 51.91 ± 9.74              | -1.406 | 0.160 |
| PerMAFaQ             | 19.08 ± 6.58              | 19.38 ± 6.61              | -0.509 | 0.611 |
| BRS                  | 20.22 ± 4.24              | 20.96 ± 3.89              | -1.418 | 0.156 |
| Coping scale         | 33.94 ± 5.57              | 32.98 ± 5.38              | -1.984 | 0.047 |

SD, standard deviation; BRS, Brief Resilience Scale; GAD-7, 7-item Generalized Anxiety Disorder scale; DSM-5-Anger, DSM-5 Level 2-Anger-Adult measure; PHQ-9, Patient Health Questionnaire-9; PerMAFaQ, Perceived Memory and Attentional Failures Questionnaire. Significant difference after Bonferroni correction (0.05/9 = 0.005).
Moreover, no significant difference was found for mental health (i.e., depression, anxiety, and anger) and cognitive status, nor on resilience and coping scores after Bonferroni’s correction (Table 6).

Post-traumatic stress disorder

Post-traumatic stress disorder, evaluated by the IES-R, was subclinical or absent for 8% of respondents, whereas for 72% it was mild, for 16% it was moderate, and for 4% it was severe. The mean score of IES-R was 19.90 (SD: 10.55).

Simple regression analyses revealed that the development of post-traumatic stress symptoms at T1 was significantly and positively related to more fear of getting infected, more cognitive failures, and more severe depression, anxiety, and anger symptoms measured at T0 (Table 7). To identify the most influential predictors of the IES-R score we carried out a multiple regression analysis where significant factors from the simple regression analyses were entered as independent variables, particularly, entering depression, anxiety, anger, and cognitive failures in block 1 and the fear of getting infected in block 2. This analysis revealed that a higher score on the IES-R at T1 was significantly related to more severe depressive symptoms evaluated through the PHQ-9 at T0 (Table 7).

DISCUSSION

The present study investigated the mental health status of an Italian elderly sample during COVID-19 quarantine/self-isolation, revealing that 54% of the elderly experienced mild depressive symptoms and 17% reported moderate to severe depression, whereas the 45% of the participants reported mild anxiety, 11% had moderate anxiety, and 5% reported severe anxiety. As for anger, 22% of respondents felt angry during this period. These prevalence rates seem to be in line with those provided by Meng et al.,16 who reported that 37.1% of a Chinese elderly sample experienced depression and anxiety during COVID-19. These results indicate that elderly people are vulnerable to experiencing psychological symptoms, and thus need online psychological interventions to reduce the long-term consequences on mental health caused by the crisis.

When investigating the factors associated with psychological symptoms, we found an association of more severe depressive symptoms with younger age,
poorer resilience and coping strategies, and more fear of getting infected. Moreover, more anxiety was associated with female gender, poorer resilience and coping strategies, and more fear of getting infected; whereas higher anger levels were related to younger age, female gender, poorer resilience and coping strategies, and more fear of getting infected.

The above-mentioned findings support previous results of a strong relationship between psychological symptoms and the female gender both in the elderly\textsuperscript{16} and in the general population.\textsuperscript{9,10,19–21} Furthermore, we found that younger age was associated with more depressive symptoms and more anger. Taking into account that in our sample we enrolled only respondents who were at least 60 years old, in this range a younger age was related to altered mental status since the stay-at-home restrictions and the quarantine may impact daily routine and habits of ‘young elderly’ rather than of ‘older’ ones.

The most influential predictors of mental health status from the multiple regression analyses were resilience abilities and the fear of getting infected. More specifically, poorer resilience abilities and more fear of getting infected were related to more severe depression, anxiety, and anger. The fear of COVID-19, probably due to its novelty and the uncertainties about the course and end of the pandemic has led to the use of the term ‘coronaphobia’.\textsuperscript{22} Several psychological vulnerability factors such as perceived vulnerability to disease, a tendency to worry, intolerance of uncertainty, and other individual variables may be predictive factors for coronaphobia.\textsuperscript{23} In this regard, our findings of a strong relationship between fear of getting infected and the mental health status (i.e., depressive symptoms, anxiety, and anger) may suggest that perceived vulnerability to COVID-19 plays a crucial role in the development of psychological symptoms in elderly.

We also found that resilience, rather than adaptive coping strategies, seems to be a protective factor amongst the development of psychological symptoms in advanced age confirming the findings of a previous study\textsuperscript{24} where personal resilience emerged as a crucial factor of psychological functioning during the COVID-19 pandemic. It was observed that resilience abilities counter the detrimental effects of various demographic and health-related variables attenuating their impact on mental health.\textsuperscript{24}

To evaluate the protective effect of resilience abilities on elderly mental health status against the fear of getting infected, we performed several mediation analyses. We found that resilience was a significant mediator in the relationship between the fear of getting infected and the mental health status of elderly. These results further support the conceptualization of resilience as a personal trait that protects individuals against the impact of traumatic and stressful life events,\textsuperscript{26} suggesting the implementation of psychosocial and cognitive-training interventions to enhance the resilience\textsuperscript{26} of individuals who are at risk for stress-induced psychological symptoms.

Finally, 32\% of the respondents reported subjective cognitive failures. These prevalence rates seem to be slightly higher than those reported in a previous study conducted during the COVID-19 quarantine for the Italian general population (27.5\%)\textsuperscript{19} and support previous findings of an age-related decline in subjective cognitive functioning which could start at the age of 50 and steadily increase afterward.\textsuperscript{27} We identified female gender, poorer resilience, and more severe depressive and anger symptoms as factors associated with subjective cognitive failures. These findings confirm an impact of mental health status on complaints of attentive and memory difficulties in elderly people as reported in our previous study on the Italian general population\textsuperscript{19} and are in line with studies on the relationship between depression and cognitive deficits\textsuperscript{28} in elderly people. Taken together, our results strengthen the idea of the need to support vulnerable groups of elderly to reduce possible long-term cognitive consequences due to self-isolation/quarantine.

Moreover, we tracked longitudinal changes in participants’ mental health two months after the end of the lockdown. We did not find any significant difference in mental health scores reported during and after the quarantine. This result further supports the idea of long-term psychological consequences due to the outbreak since no reduction was observed in depressive, anxiety, and anger scores despite the hot phases of the pandemic were elapsed.

Otherwise, the slight increase in anxiety score, although not significant after the correction application, may suggest that elderly subjects, as a vulnerable group, perceived as dangerous the end of self-restriction measures since this could represent a risk for the virus spread and thus for their health.
As for PTS symptoms, 20% of participants reported moderate to severe symptomatology at follow-up evaluation, and we found that depressive symptoms turned out to be the most influential predictive factor in the development of PTS symptoms. Taking into account that significant PTS symptoms can evolve into PTS disorder and that its symptoms tend to be related to significant physical and psychological impairments, it is essential to develop timely intervention programs to reduce the impact of traumatic experience on individuals’ mental health and to identify early people at high risk of developing PTS disorder.

Accordingly, the rise in psychological symptoms observed throughout the COVID-19 outbreak was unlikely to be due to seasonality or year-to-year variation, and should be taken into account since the concomitant presence of severe psychological symptoms and traumatic life events should be considered a warning sign for suicidal behaviour in elderly and more vulnerable groups.

The present study is characterised by some limitations: (i) a snowball strategy not balanced on an a-priori basis was employed to recruit the respondents and this fact could limit generalization of the results since the representativeness of the sample could not be guaranteed; (ii) the limited number of participants recruited after the end of self-restriction measures, primarily due to the difficulty in recruiting older people through online surveys; (iii) the use of a unique item and not a validated scale to evaluate the fear of getting infected. Thus, our results should be confirmed by further studies.

In conclusion, the fear of getting infected, probably due to a perceived vulnerability to disease, seems to play a crucial role in the development of psychological symptoms in the elderly. Nevertheless, resilience seems to reduce psychological symptoms, mediating the impact of fear. Finally, our findings from the longitudinal analysis suggest the presence of long-term psychological consequences and the possible risk of developing PTS disorder in elderly.

Therefore, targeted interventions to reduce psychological symptoms, especially in elderly who are most at risk for COVID-19, are needed in order to mitigate possible long-term consequences such as more severe cognitive impairment and PTS disorder.

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AUTHOR CONTRIBUTIONS
G.M. contributed substantially to the conception or design of the work, carried out the analysis and interpretation of the work’s data and wrote the draft; I.B., A.B., N.D.C., M.C., and R.N. contributed substantially to the execution of the study and carried out the analysis and interpretation of the work’s data; G.S. critically reviewed it for its important intellectual content.

All authors have approved the final article.

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