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Mental Health and Its Psychosocial Predictors during National Quarantine in Italy against the  
Coronavirus Disease 2019 (COVID-19)

### Abstract

**Background and Objectives:** This research aimed at investigating the psychological impact of national quarantine in Italy, and the psychosocial factors that may influence this impact. **Methods:** A convenience sample of 1569 people living in Italy responded to an online survey using virtual snowball sampling. The questionnaire included measures of mental health symptoms, well-being, worry about the epidemic of COVID-19, perceived likelihood of infection, perceived coping efficacy, trust in the institutional response to the epidemic of COVID-19, financial loss, perceived house size, and media exposure to COVID-19 outbreak. **Results:** Gender (women), lower age, occupational status (employed), lower media exposure, higher worry, lower coping efficacy, lower trust in institutions, and negative attitudes toward quarantine measures predicted mental health symptoms. In addition, results showed that gender (men), higher age, socioeconomic status, occupational status (unemployed), higher coping efficacy and trust in institutions, and positive attitudes toward quarantine measures predicted well-being. The estimated prevalence of common mental disorders was 31.7% among men and 52.3% among women. The scores on well-being were significantly lower in the current study than in a previous validation study. **Conclusion:** The results of the study provided both theory and practical implications in understanding mental health and its psychosocial predictors during national quarantine.

*Keywords:* COVID-19, mental health, lockdown, cross-sectional survey, well-being

Mental Health and Its Psychosocial Predictors during National Quarantine in Italy against the  
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On March 11, 2020, the World Health Organization (WHO) has declared the novel coronavirus (COVID-19) outbreak a global pandemic (WHO, 2020b). At the time of writing, Italy is one of the most affected countries around the world (WHO, 2020a). Italy is currently experiencing an epidemic of COVID-19, and, according to the Istituto Superiore di Sanità (the leading scientific technical body of the Italian National Health Service), as of May 1, 2020, Italy has had 204.576 cases of COVID-19 and 26.049 associated deaths (Istituto Superiore di Sanità, 2020). To contain the coronavirus disease 2019 (COVID-19) epidemic, on March 10, 2020, the Italian government extended the lockdown measures to the whole country. These measures were without precedent and were effective until at least May 3, 2020. The movement of individuals in the whole Italian national territory has been severely limited. This government-imposed state of emergency lockdown has made the examination of the effects on mental health and well-being imperative. A previous systematic review revealed that the highest prevalence of anxiety and depression among the general population during the COVID-19 outbreak was reported in Italy (Luo et al., 2020; Xiong et al., 2020). Specifically, relatively high rates of symptoms of depression (14.6% to 48.3%) and anxiety (6.33% to 50.9%) were found among in the general population in different countries around the world (i.e., China, Denmark, Iran, Italy, Nepal, Spain, Turkey, and the U.S.) during the COVID-19 pandemic (Xiong et al., 2020). However, evidence on general mental health symptoms and the estimation of potential cases was scarce in Italy. Moreover, research on positive mental health during the government-imposed state of emergency lockdown in Italy is lacking (Luo et al., 2020; Salari et al., 2020; Vindegaard & Benros, 2020; Xiong et al., 2020). According to the two-continua model of mental health (Keyes, 2005), positive mental health is related to, but different from, mental illness.

In their review of the evidence on the psychological impact of quarantine, Brooks et al. (2020) found that concerns about the infection is an important stressor during quarantine. Concerns about the

novel coronavirus may refer to both fear about becoming infected and worry about the epidemic of COVID-19. Perceptions of SARS-related risks were significantly positively associated with mental health symptoms (Wu et al., 2009). Although the epidemic of COVID-19 can be perceived as a threatening situation, if people confront this threat in a way that restores a sense of control this may alleviate stress reactions and, ultimately, mental health and well-being. According to social cognitive theory (Bandura, 1997), perceived coping efficacy (e.g., the perception that one is able to control or cope with the threat) plays a central role in successful adaptation.

Financial loss and trustworthiness of public health authorities are considered important factors for mental health during quarantine (Brooks et al., 2020). During quarantine, people are unable to work, and such interruption usually does not allow advanced planning. Financial loss did predict mental health symptoms among people isolated for 2-week due to having contact with Middle East respiratory syndrome patients (Jeong et al., 2016). The temporary loss of income has a greater impact on the mental health of well-being of people with lower incomes or socioeconomic status (Hawryluck et al., 2004). Although there is preliminary evidence that income losses caused by the COVID-19 pandemic may play a role in mental health (Li et al., 2020), further research is required. In addition, during quarantine, the separation and restriction of movement of people falls under the mandate of government and public health authorities. Therefore, trust in the judgments of government and public health authorities can have important consequences on the mental health and well-being of people under quarantine. There is evidence that during a period of individual self-isolation during the COVID-19 virus epidemic in central China, increased social trust reduced anxiety and stress (Xiao et al., 2020).

Finally, three additional variables may affect psychological outcomes of people during national quarantine: house size, media exposure, and attitudes toward quarantine measures. There is some evidence concerning the link between housing condition and mental health (e.g., G. W. Evans et al., 2003). In a situation of national quarantine where citizens are required to spend their time at home, the

influence of house size psychological outcomes assumes critical importance. Concerning media exposure, findings from several experimental studies revealed that media exposure to disasters can cause mental health symptoms (Hopwood & Schutte, 2017). Garfin et al. (2020) hypothesized that media exposure to public health crises (i.e., Ebola and H1N1 outbreaks) may have an impact on mental health and well-being of citizens. Indeed, there is an urgent need for research to address the impact of repeated media consumption about COVID-19 on mental health during the coronavirus disease 2019 (Holmes et al., 2020). Regarding attitudes toward quarantine measures, there is evidence that a proportion of quarantined people do not hold favorable attitudes toward such measures (Teh et al., 2012). It is possible to hypothesize that people holding negative attitudes toward quarantine measures are more likely to report negative mental health outcomes because they are requested to follow quarantine restrictions with which they disagree.

The aim of the current study was to explore the psychological impact of quarantine (i.e., the estimated prevalence of common mental disorders as well as the levels of well-being) and the psychosocial factors that are expected to contribute to, or mitigate, this impact. Specifically, among the psychosocial factors that are expected to play a significant role are worry about the epidemic of COVID-19, perceived likelihood of infection, perceived coping efficacy, trust in the institutional response to the epidemic of COVID-19, financial loss, perceived house size, media exposure to COVID-19 outbreak, and attitudes toward quarantine measures. Both mental health symptoms and psychological well-being were chosen according to the two-continua model of mental health (Keyes, 2005). Finally, because previous research demonstrated that gender, age, socioeconomic status, and occupational status are significant risk factors for developing symptoms of mental disorders during the COVID-19 pandemic (Xiong et al., 2020), the current study controlled for all of these variables.

## **Method**

### **Participants**

In this study 1569 people living in Italy were involved. The majority of participants were women ( $n = 1278$ , 81.5%). The age range was from 18 years to 72 years ( $M = 31.30$ ,  $SD = 12.42$ ). Almost half of the participants reported having a job ( $n = 730$ , 46.5%), while perceived household economic resources in the last 12 months were: excellent (11.9%), adequate (73.5%), scarce (13.8%), or absolutely insufficient (0.8%). About one out of 20 participants was born in another country ( $n = 70$ , 4.5%). Participants' perceived house size was small (16.6%), medium (54.3%), or large (29.2%). Concerning any serious financial problems or difficulties as a result of the government-imposed state of emergency lockdown, participants reported the following responses: not at all (13.6%), to a small extent (35.7%), to a moderate extent (32.5%), or to a great extent (18.2%).

### **Measures**

Participants completed a questionnaire asking about socio-demographic details including age, sex, socioeconomic status, occupation status (employed vs. others), financial loss, and perceived house size (*small, medium, or large*). Socioeconomic status was assessed using as a proxy indicator perceived household economic resources in the last 12 months (four response options: absolutely insufficient, scarce, adequate, or excellent). Financial loss was measured by asking participants whether they suffered any serious financial problems or difficulties as a result of the government-imposed state of emergency lockdown?" (four response options: *not at all, to a small extent, to a moderate extent, or to a great extent*). The questionnaire also included the following measures.

### **Well-Being**

The Italian version of the Mental Health Continuum–Short Form was used (MHC–SF; Keyes, 2006; Keyes et al., 2008; Lamers et al., 2011; Petrillo et al., 2015). Participants were asked to rate the frequency of every feeling in the past month on a 5-point scale ranging from 0 (*never*) to 5 (*always*). The MHC–SF evaluates positive mental health and provides a total score for well-being ( $\alpha = .89$ ). Responses were averaged to derive a mean–item score. Higher scores indicate greater well-being.

***Mental Health***

To measure mental health symptoms, the Italian version of the 12-item General Health Questionnaire was employed (GHQ-12; Goldberg et al., 1997; Piccinelli et al., 1993). Participants were asked to indicate the frequency of mental health symptoms occurring during the past few weeks. Participants were asked to respond using a 4-point scale (from 0 to 3). A mean score was calculated such that high scores represent greater mental health symptoms. Cronbach's alpha was satisfactory ( $\alpha = .86$ ). GHQ-12 for bimodal scoring (0-0-1-1) in the bivariate analyses and ANCOVA the Likert-type scoring (0-1-2-3) was used. To classify participants as potential cases, the 3/4 threshold, using the bimodal scoring (0-0-1-1), was chosen as the screening criteria (Goldberg et al., 1997; Piccinelli et al., 1993).

***Trust in the Institutional Response to the Epidemic of COVID-19***

A four-item measure of trust in the institutional response to the epidemic of COVID-19 was derived from previous studies concerning the pandemic influenza H1N1 2009 (Prati et al., 2011a, 2011b). An example item is "Do you think the authorities are doing a good job of dealing with the epidemic of COVID-19?". Ratings on these items were provided using a 10-point scale (1 = *not at all*, 10 = *extremely*). A mean score was calculated such that high scores reflect greater trust in the institutional response to the epidemic of COVID-19. Cronbach's alpha was satisfactory ( $\alpha = .86$ ).

***Worry About the Epidemic of COVID-19***

Feelings of worry about the epidemic of COVID-19 were measured using a two-item index derived from previous research on the pandemic influenza H1N1 2009 (Prati et al., 2011a, 2011b). The wording of the two items was as follows: "To what extent do you currently worry about the epidemic of COVID-19?" and "Do you feel scared about the epidemic of COVID-19?". Participants responded using a 10-point Likert-type scale (1 = *not at all*, 10 = *extremely*). The (Pearson) correlation between the two items was high (.77). Responses were averaged to derive a mean-item score. Higher scores indicate greater worry about the epidemic of COVID-19.



***Perceived Coping Efficacy***

A one-item measure of perceived coping efficacy was derived from previous research on the pandemic influenza H1N1 2009 as well as on Ebola outbreak (Prati & Pietrantonio, 2016; Prati et al., 2011b). The wording of the item is as follows “How well do you think you would be able to cope with the risks posed by the novel coronavirus?”. Ratings on this item were provided using a 10-point scale (1 = *not at all*, 10 = *extremely*).

***Perceived Likelihood of Infection***

Participants were asked the following question derived from previous studies (Prati & Pietrantonio, 2016; Prati et al., 2011b): “Do you think you are at risk of catching the novel coronavirus?”. This item was rated using a 10-point scale (1 = *not at all*, 10 = *extremely*).

***Attitudes toward Quarantine Measures***

A list of eight quarantine measures (e.g., ban of non-essential travel, limitation of free movement, shutdown of all non-essential businesses and industries, ban of all outdoor physical activity). For each measure, participants were asked to rate their agreement on a 4-point Likert-type scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). A mean score was calculated such that high scores reflect greater agreement with the quarantine measures. Cronbach’s alpha was satisfactory ( $\alpha = .87$ ).

***Media Exposure***

Prior exposure to media reports of the COVID-19 pandemic was measured with one item inquiring about the amount of time spent watching news on television, newspaper, and Internet each day in the last week. Responses options were (1) less than 30 minutes; (2) 31-60 minutes; (3) 1–2 hours; (4) 2-3 hours; (5) 3 or more hours.

***Procedure***

Ethical approval and permission to conduct the study was obtained from the Ethical Committee of the University of Bologna (Italy). To be eligible, participants had (1) to report living in Italy and (2) to

be 18 years old or older. A self-administered online anonymous questionnaire was used to collect data. Before conducting the research, an informed consent form was obtained from each participant. Participation was voluntary and without any compensation. Data collection occurred in April 2020. Participants were recruited through virtual snowball sampling (Baltar, 2012). A virtual snowball sampling was used because the lockdown measures severely limited the mobility of researchers. The use of virtual networks in non-probabilistic samples has the advantage of increasing the sample size (Baltar, 2012; J. R. Evans & Mathur, 2005). Moreover, the use of online surveys is associated with higher item completion rate than mail surveys (J. R. Evans & Mathur, 2005). A link to the questionnaire was sent to potential participants via email, websites, and social media. The use of an online link precluded the calculation of the response rate. Completion rate (number of completed surveys / number of respondents who entered the survey) was 67.0%.

### **Statistical Analysis**

Missing analysis revealed that the proportion of missing data was low (< 5%) and, therefore, we used a complete case analysis. To account for the overrepresentation of women in the sample, a sample weighting procedure was applied to bivariate analyses and ANCOVA to approximate the population gender distribution of equal men and women. The Spearman correlation was used to determine the relationships between study variables. An analysis of variance (ANOVA) with summary statistics as input (Larson, 1992) was used to compare mean scores obtained in the current study and those of previous studies. To investigate whether the proportions of GHQ-12 high-scorers in two samples (the sample used in the current study and another sample of a previous study) are different, the '*N*-1' chi-squared test (Campbell, 2007; Richardson, 2011) was used. The analysis of covariance (ANCOVA) which includes regression analysis and analysis of variance for multiple dependent variables by more factor variables and covariates was performed. Parameter estimates with robust or heteroskedasticity-consistent standard errors (using a HC3 estimator) and confidence intervals that use the robust standard errors

were calculated. For quantitative or dummy variables, a regression coefficient was reported, while for ordinal variables, a polynomial trend analysis was reported. Specifically, when a significant main effect was found for socioeconomic status, financial loss, perceived house size, and media exposure, a polynomial trend analysis was conducted to test whether a linear pattern best captured the effect of these factors. A priori power analysis was used to determine how many participants should be included in the present study. Using G\*Power 3.1 (Faul et al., 2009), with alpha set at .05 and power (1 – beta) set at .80, a sample size of at least 1369 participants was needed to detect a small effect ( $f = .10$ ). As a measure of effect size, partial eta squared (partial  $\eta^2$ ) was used. Cohen (1988) had suggested values of  $f$  that resemble values of partial  $\eta^2$  of .01, .06, and .14 (rounded to two decimal places) to represent small, medium, or large effects, respectively. The conventional thresholds proposed by Cohen (1988) were also used to interpret the magnitude of  $R^2$  coefficients: .02 = small, .13 = medium, .26 = large.

## Results

### Psychosocial Predictors of Mental Health during National Quarantine

Table 1 displays correlations and descriptive statistics for the study variables. Well-being was significantly related to gender (women), age, socioeconomic status, occupational status (unemployed), financial loss, media exposure, worry, coping efficacy, trust in the institutional response, and mental health symptoms. Mental health symptoms correlated with gender (women), age, socioeconomic status, occupational status (employed), house size, financial loss, media exposure, worry, likelihood of infection, coping efficacy, trust in the institutional response, and well-being.

Table 2 reports the results of ANCOVA. These regression models explained approximately 17% and 18% of the variability in mental health symptoms and well-being, respectively. Mental health symptoms were predicted by gender (women), lower age, occupational status (employed), lower media exposure, higher worry, higher likelihood of infection, lower coping efficacy, and lower trust in the institutional response. Socioeconomic status did not predict mental health symptoms. Polynomial

contrasts revealed a significant linear trend for perceived house size, contrast estimate = -0.80,  $SE = 0.28$ , 95% CI [-1.34, -0.25],  $p = .004$ , media exposure contrast estimate = 1.89,  $SE = 0.59$ , 95% CI [0.74, 3.05],  $p = .001$ , and financial loss, contrast estimate = 1.22,  $SE = 0.33$ , 95% CI [0.57, 1.87],  $p < .001$ , indicating that as the perceived house size was smaller and media exposure and financial loss increased, mental health symptoms increased proportionally.

Well-being was predicted by gender (men), higher age, socioeconomic status, occupational status (unemployed), higher coping efficacy and trust in the institutional response. Perceived house size, financial loss, media exposure, worry, and likelihood of infection did not predict well-being. Polynomial contrasts revealed a significant linear trend for socioeconomic status, contrast estimate = 0.77,  $SE = 0.33$ , 95% CI [0.46, 1.08],  $p < .001$ , indicating that as socioeconomic status increased, well-being increased proportionately.

### **The Psychological Impact of National Quarantine**

Table 3 displays the mean scores (and  $SD$ ) of well-being and GHQ-12 and the percentage of GHQ-12 high-scorers. Data from the present sample were compared with data available from previous studies conducted in Italy. The estimated prevalence of common mental disorders according to GHQ-12 ( $\geq 4$  score) was 53.1% among women and 31.7% among men. There were no significant differences in the estimated prevalence of common mental disorders for men,  $\chi^2(2) = 0.04$ ,  $p = .842$ ,  $\phi = .01$ , and women,  $\chi^2(2) = 0.51$ ,  $p = .476$ ,  $\phi = .02$ , between the present sample and the sample of the study of Ferrara et al. (2004). An ANOVA with summary data was conducted to test the difference in (a) GHQ-12 scores between the current study and the study of Giorgi et al. (2014); (b) well-being scores between the current study and the validation study of the Italian version of Mental Health Continuum–Short Form (Petrillo et al., 2015). Results revealed that (a) the scores on GHQ-12 were significantly higher in the current study compared to the study of Giorgi et al. (2014),  $F(1,3118) = 141.834$ ,  $p < .001$ ,  $d = .43$ , suggesting a medium effect size; (b) the scores on well-being were significantly lower in the current

study compared to the validation study,  $F(1,3002) = 587.915$ ,  $p < .001$ ,  $d = .89$ , suggesting a large effect size.

### Discussion

The aim of the current research was to examine the psychological consequences (i.e., mental health symptoms and psychological well-being) of a national quarantine and to explore the influence of a set of psychosocial factors. The results showed that the mean score on well-being appeared to be lower compared to that of the validation study, while prevalence of common mental disorders was slightly higher than that of previous study among the general population (Lattanzi et al., 1988). In addition, worry about the epidemic of COVID-19, perceived likelihood of infection, perceived coping efficacy, trust in the institutional response to the epidemic of COVID-19, attitudes toward quarantine measures, financial loss, perceived house size, media exposure to COVID-19 outbreak, and socioeconomic status did predict at least one of the psychological outcomes (i.e., mental health symptoms and/or psychological well-being). R-squared values suggest a medium to large degree of explained variance in both models.

Results revealed that coping efficacy and trust in the institutional response to the epidemic of COVID-19 were significant predictors of both mental health symptoms and well-being. Worry and trust in the institutional response to the epidemic of COVID-19 had a small to medium effect on mental health symptoms and well-being, respectively. Worry may be the results of media content which stressed the seriousness of health threats. Although worry may be related to compliance with health-related recommendations during the pandemic influenza H1N1 2009 (e.g., Prati et al., 2011a, 2011b), the present findings revealed that worry may play a role in citizens' mental health symptoms. According to the extended parallel process model (Witte, 1992), high levels of worry lead to protective behavior when perceived efficacy is high. However, during a pandemic influenza, efficacy information tends to be far less prevalent than threat information (Klemm et al., 2016). Therefore, the findings of the present

study suggest that active collaboration between public health authorities and media in keeping a balance of threat and efficacy messages plays a significant role in citizens' mental health. Efficacy messages should focus on how people perceive themselves as able to cope with the threat (i.e., perceived coping efficacy) and on the level of preparedness of institutions (i.e., trust in the institutional response to the epidemic of COVID-19).

Positive attitudes toward quarantine measures predicted less symptoms of mental ill health and higher well-being. Although previous research revealed that people on quarantine may hold different attitudes toward quarantine measures (Teh et al., 2012), to date, no study has investigated the effect of attitudes toward quarantine measures on (positive and negative) mental health of people on quarantine. The theoretical implication of this finding is that models of mental health during quarantine should incorporate the role of how people on quarantine evaluate quarantine measures. These findings may have practical implications for health professionals in discussing the perception of quarantine measures among people on quarantine to promote their mental health.

Contrary to the expectations, the effect of likelihood of infection on well-being was not significant, while the effect size of the relationship between likelihood of infection and mental health symptoms was very small. Although previous studies have found that concerns about the infection can be considered an important stressor during quarantine (Brooks et al., 2020), the findings of the present study suggest that perceived likelihood of infection may be less relevant for citizens' well-being during a national quarantine which do not involve only small groups of people.

As predicted, house size, financial loss, and media exposure were associated with mental health symptoms. The present study helped close a gap of knowledge about the potential impact of repeated media consumption about COVID-19 on mental health (Holmes et al., 2020). However, house size, financial loss, and media exposure were not associated with positive mental health (i.e., well-being). Therefore, media consumption about COVID-19, perceived small house, and the degree of financial loss

may elicit negative emotional responses that increase the risk of experiencing symptoms of psychopathology but do not affect positive mental health. In one study conducted in China (Wang, Pan, Wan, Tan, Xu, Ho, et al., 2020), household size was not associated with mental health symptoms. However, in their study, Wang, Pan, Wan, Tan, Xu, Ho, et al. (2020) involved the general public in China. A national quarantine was not imposed in China and, therefore, the discrepancy between the findings from the present study and those from Wang, Pan, Wan, Tan, Xu, Ho, et al. (2020) may be explained by the fact that the role of household size may be important during a quarantine rather than during a pandemic (without a national quarantine). The findings of the present study are in line with those of previous research demonstrating an association between media use and psychological distress during a pandemic (Chao et al., 2020). The present study adds to the literature on the subject by demonstrating an association between the role of media exposure and mental health during a national quarantine and not only during a pandemic. Health professionals might consider discussing the impact of financial loss, house size, and media consumption with their clients to determine the extent to which these factors may be a source of distress during a quarantine.

The test of the difference in well-being scores between the current study and the validation study of the Italian version of Mental Health Continuum–Short Form (Petrillo et al., 2015) revealed that the scores on well-being were significantly lower in the current study. The effect size of this difference was large. Therefore, the findings of the present study suggest that a national quarantine is likely to affect the positive mental health of a population which indicates the capacity to have a fruitful, productive, and actualized life.

The estimated prevalence of common mental disorders was 31.7% among men and 52.3% among women. Such estimated prevalence of common mental disorders as well as such gender differences are similar to that obtained in previous studies conducted in Italy among patients attending a general practice (Bellantuono et al., 1987; Ferrara et al., 2004). A higher prevalence of psychiatric

morbidity among people who consult a general practitioner might be expected. Although previous research indicated that the highest prevalence of anxiety and depression among the general population during the COVID-19 outbreak was found in Italy (Luo et al., 2020), the findings of the present study suggest that the impact of the epidemic of COVID-19 as well as of the national quarantine on the Italian general population was not so strong. Indeed, the findings of the present study support the idea that the mental health impact of COVID-19 pandemic is heterogeneous with most people reporting patterns of resilience (e.g., few mental health symptoms and a stable pattern of positive functioning; Mancini, 2020).

Several potential limitations need to be pointed out. First, the design of the study is cross-sectional and, therefore, limits the ability to make causal inferences. Nevertheless, the hypothesized relationships were based on theory and prior research. A previous longitudinal study conducted in China revealed that there were no significant longitudinal changes in stress, anxiety and depression levels during the COVID-19 pandemic (Wang, Pan, Wan, Tan, Xu, McIntyre, et al., 2020). However, more empirical evidence is needed to investigate the longitudinal changes in mental health symptoms and well-being during a national quarantine. Second, potential self-selection bias should be acknowledged. The magnitude and direction of attitudes toward COVID-19 surveys may have induced or discouraged participation in the survey resulting from interest in COVID-19 surveys. Women were overrepresented. It may be that men were less likely to participate because of a lower interest in COVID-19 surveys. However, it should be noted that a sample weighting procedure was applied to the bivariate analyses and ANCOVA. Moreover, in ANCOVA, the effect of gender was controlled for. Third, although the cut-off point used to determine the GHQ-12 high-scorers reduces the risk of false-positives (Piccinelli et al., 1993), the levels of psychiatric morbidity may be overestimated. It is important to highlight that the sensitivity and specificity of the GHQ-12 were found to be 83% and 66%, respectively (Piccinelli et al., 1993). Finally, cross validation of results without a sample weighting procedure (results are available



upon request via email to the corresponding author) yielded essentially identical findings. Therefore, it seems likely that the sample's gender composition did not compromise the internal validity of the study. Notwithstanding, further replications of these results with a more equal gender distribution are needed to clarify the extent to which these findings may generalize to the broader population. In addition, the use of an online survey limited the participation of people who have little or no access to the Internet. Due to the gap in technology ownership and access, the sample cannot be regarded as representative. While informative, this was an exploratory and opportunistic study that was conducted during a nationwide quarantine. When the study was planned and carried out, the time-course of COVID-19 outbreak and restrictions were unpredictable.

In conclusion, the results corroborate the large scientific literature providing evidence that nationwide quarantine can lead to negative mental health consequences in terms of well-being and, to a lesser extent, to the estimated prevalence of common mental disorders. Moreover, the present findings suggest that worry about the epidemic of COVID-19, perceived coping efficacy, trust in the institutional response to the epidemic of COVID-19, financial loss, perceived house size, and media exposure to COVID-19 outbreak may play a role in predicting citizens' positive and negative mental health. The results highlight that interventions targeting and strengthening perceived coping efficacy, trust in the institutional response to the epidemic of COVID-19, and positive attitudes toward quarantine measures might constitute important preventive measures.

## References

- Baltar, F. (2012). Social research 2.0: Virtual snowball sampling method using Facebook. *Internet Research*, 22(1), 57-74. <https://doi.org/10.1108/10662241211199960>
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. Freeman.
- Bellantuono, C., Fiorio, R., Zanutelli, R., & Tansella, M. (1987). Psychiatric screening in general practice in Italy. *Social Psychiatry*, 22(2), 113-117. <https://doi.org/10.1007/BF00584015>
- Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *The Lancet*, 395(10227), 912-920. [https://doi.org/10.1016/S0140-6736\(20\)30460-8](https://doi.org/10.1016/S0140-6736(20)30460-8)
- Campbell, I. (2007). Chi-squared and Fisher–Irwin tests of two-by-two tables with small sample recommendations. *Statistics in Medicine*, 26(19), 3661-3675. <https://doi.org/10.1002/sim.2832>
- Chao, M., Chen, X., Liu, T., Yang, H., & Hall, B. J. (2020). Psychological distress and state boredom during the COVID-19 outbreak in China: the role of meaning in life and media use. *European Journal of Psychotraumatology*, 11(1), 1769379. <https://doi.org/10.1080/20008198.2020.1769379>
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (second ed.). Erlbaum.
- Evans, G. W., Wells, N. M., & Moch, A. (2003). Housing and mental health: A review of the evidence and a methodological and conceptual critique. *Journal of Social Issues*, 59(3), 475-500. <https://doi.org/10.1111/1540-4560.00074>
- Evans, J. R., & Mathur, A. (2005). The value of online surveys. *Internet Research*, 15(2), 195-219. <https://doi.org/10.1108/10662240510590360>
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G\*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149-1160. <https://doi.org/10.3758/brm.41.4.1149>

- Ferrara, M., Meloni, D., Caira, D., Magherini, F., Maglietta, M., & Baldasseroni, A. (2004). Indagine sul disagio psichico in medicina generale: prevalenza e determinanti della positività al test GHQ-12 [Common mental disorders in primary care: Prevalence and determinants of general health questionnaire as screening tool]. *Epidemiologia & Prevenzione*, *28*(6), 338-345.
- Garfin, D. R., Silver, R. C., & Holman, E. A. (2020). The novel coronavirus (COVID-2019) outbreak: Amplification of public health consequences by media exposure. *Health Psychology*, *39*(5), 355-357. <https://doi.org/10.1037/hea0000875>
- Giorgi, G., Leon-Perez, J. M., D'Antonio, A. C., Perez, F. J. F., Arcangeli, G., Cupelli, V., & Mucci, N. (2014). The general health questionnaire (GHQ-12) in a sample of italian workers: Mental health at individual and organizational level. *World Journal of Medical Sciences*, *11*(1), 47-56. <https://doi.org/10.5829/idosi.wjms.2014.11.1.83295>
- Goldberg, D. P., Gater, R., Sartorius, N., Ustun, T. B., Piccinelli, M., Gureje, O., & Rutter, C. (1997). The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychological Medicine*, *27*(1), 191-197. <https://doi.org/10.1017/S0033291796004242>
- Hawryluck, L., Gold, W. L., Robinson, S., Pogorski, S., Galea, S., & Styra, R. (2004). SARS control and psychological effects of quarantine, Toronto, Canada. *Emerging Infectious Diseases*, *10*(7), 1206-1212. <https://doi.org/10.3201/eid1007.030703>
- Holmes, E. A., O'Connor, R. C., Perry, V. H., Tracey, I., Wessely, S., Arseneault, L., Ballard, C., Christensen, H., Cohen Silver, R., Everall, I., Ford, T., John, A., Kabir, T., King, K., Madan, I., Michie, S., Przybylski, A. K., Shafran, R., Sweeney, A., Worthman, C. M., Yardley, L., Cowan, K., Cope, C., Hotopf, M., & Bullmore, E. (2020). Multidisciplinary research priorities for the COVID-19 pandemic: A call for action for mental health science. *The Lancet Psychiatry*. [https://doi.org/10.1016/S2215-0366\(20\)30168-1](https://doi.org/10.1016/S2215-0366(20)30168-1)

- Hopwood, T. L., & Schutte, N. S. (2017). Psychological outcomes in reaction to media exposure to disasters and large-scale violence: A meta-analysis. *Psychology of Violence, 7*(2), 316-327. <https://doi.org/10.1037/vio0000056>
- Istituto Superiore di Sanità. (2020). *Integrated surveillance of COVID-19 in Italy* <https://www.iss.it/covid-19-integrated-surveillance>
- Jeong, H., Yim, H. W., Song, Y. J., Ki, M., Min, J. A., Cho, J., & Chae, J. H. (2016). Mental health status of people isolated due to Middle East Respiratory Syndrome. *Epidemiology and Health, 38*, e2016048. <https://doi.org/10.4178/epih.e2016048>
- Keyes, C. L. M. (2005). Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of Consulting and Clinical Psychology, 73*(3), 539-548. <https://doi.org/10.1037/0022-006x.73.3.539>
- Keyes, C. L. M. (2006). The subjective well-being of America's youth: Toward a comprehensive assessment. *Adolescent & Family Health, 4*(1), 3-11.
- Keyes, C. L. M., Wissing, M., Potgieter, J. P., Temane, M., Kruger, A., & van Rooy, S. (2008). Evaluation of the Mental Health Continuum-Short Form (MHC-SF) in Setswana-speaking South Africans. *Clinical Psychology & Psychotherapy, 15*(3), 181-192. <https://doi.org/10.1002/cpp.572>
- Klemm, C., Das, E., & Hartmann, T. (2016). Swine flu and hype: Asystematic review of media dramatization of the H1N1 influenza pandemic. *Journal of Risk Research, 19*(1), 1-20. <https://doi.org/10.1080/13669877.2014.923029>
- Lamers, S. M. A., Westerhof, G. J., Bohlmeijer, E. T., ten Klooster, P. M., & Keyes, C. L. M. (2011). Evaluating the psychometric properties of the Mental Health Continuum-Short Form (MHC-SF). *Journal of Clinical Psychology, 67*(1), 99-110. <https://doi.org/10.1002/jclp.20741>
- Larson, D. A. (1992). Analysis of variance with just summary statistics as input. *The American Statistician, 46*(2), 151-152. <https://doi.org/10.1080/00031305.1992.10475872>

- Lattanzi, M., Galvan, U., Rizzetto, A., Gavioli, I., & Zimmermann-Tansella, C. (1988). Estimating psychiatric morbidity in the community Standardization of the Italian versions of GHQ and CIS. *Social Psychiatry and Psychiatric Epidemiology*, 23(4), 267-272.  
<https://doi.org/10.1007/BF01787831>
- Li, X., Lu, P., Hu, L., Huang, T., & Lu, L. (2020). Factors associated with mental health results among workers with income losses exposed to COVID-19 in China. *International Journal of Environmental Research and Public Health*, 17(15), 5627.  
<https://doi.org/10.3390/ijerph17155627>
- Luo, M., Guo, L., Yu, M., Jiang, W., & Wang, H. (2020). The psychological and mental impact of coronavirus disease 2019 (COVID-19) on medical staff and general public – A systematic review and meta-analysis. *Psychiatry Research*, 291, 113190.  
<https://doi.org/10.1016/j.psychres.2020.113190>
- Mancini, A. D. (2020). Heterogeneous mental health consequences of COVID-19: Costs and benefits. *Psychological Trauma: Theory, Research, Practice, and Policy*, 12(S1), S15-S16.  
<https://doi.org/10.1037/tra0000894>
- Petrillo, G., Capone, V., Caso, D., & Keyes, C. L. M. (2015). The Mental Health Continuum–Short Form (MHC–SF) as a measure of well-being in the Italian context [journal article]. *Social Indicators Research*, 121(1), 291-312. <https://doi.org/10.1007/s11205-014-0629-3>
- Piccinelli, M., Bisoffi, G., Bon, M. G., Cunico, L., & Tansella, M. (1993). Validity and test-retest reliability of the Italian version of the 12-item General Health Questionnaire in general practice: A comparison between three scoring methods. *Comprehensive Psychiatry*, 34(3), 198-205.  
[https://doi.org/10.1016/0010-440X\(93\)90048-9](https://doi.org/10.1016/0010-440X(93)90048-9)

- Prati, G., & Pietrantoni, L. (2016). Knowledge, risk perceptions, and xenophobic attitudes: Evidence from Italy during the Ebola outbreak. *Risk Analysis*, *36*(10), 2000-2010.  
<https://doi.org/10.1111/risa.12537>
- Prati, G., Pietrantoni, L., & Zani, B. (2011a). Compliance with recommendations for pandemic influenza H1N1 2009: The role of trust and personal beliefs. *Health Education Research*, *26*(5), 761-769.  
<https://doi.org/10.1093/her/cyr035>
- Prati, G., Pietrantoni, L., & Zani, B. (2011b). A social-cognitive model of pandemic influenza H1N1 risk perception and recommended behaviors in Italy. *Risk Analysis*, *31*(4), 645-656.  
<https://doi.org/10.1111/j.1539-6924.2010.01529.x>
- Richardson, J. T. E. (2011). The analysis of 2 × 2 contingency tables—Yet again. *Statistics in Medicine*, *30*(8), 890-890. <https://doi.org/10.1002/sim.4116>
- Salari, N., Hosseini-Far, A., Jalali, R., Vaisi-Raygani, A., Rasoulpoor, S., Mohammadi, M., Rasoulpoor, S., & Khaledi-Paveh, B. (2020). Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: A systematic review and meta-analysis. *Globalization and Health*, *16*(1), 57. <https://doi.org/10.1186/s12992-020-00589-w>
- Teh, B., Olsen, K., Black, J., Cheng, A. C., Aboltins, C., Bull, K., Johnson, P. D. R., Grayson, M. L., & Torresi, J. (2012). Impact of swine influenza and quarantine measures on patients and households during the H1N1/09 pandemic. *Scandinavian Journal of Infectious Diseases*, *44*(4), 289-296.  
<https://doi.org/10.3109/00365548.2011.631572>
- Vindegaard, N., & Benros, M. E. (2020). COVID-19 pandemic and mental health consequences: Systematic review of the current evidence. *Brain, Behavior, and Immunity*. Advance online publication. <https://doi.org/10.1016/j.bbi.2020.05.048>
- Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., & Ho, R. C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease

- (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health*, 17(5). <https://doi.org/10.3390/ijerph17051729>
- Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., McIntyre, R. S., Choo, F. N., Tran, B., Ho, R., Sharma, V. K., & Ho, C. (2020). A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. *Brain, Behavior, and Immunity*, 87, 40-48. <https://doi.org/10.1016/j.bbi.2020.04.028>
- WHO. (2020a). *Coronavirus disease (COVID-2019) situation reports - 104* <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/>
- WHO. (2020b). WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020.
- Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs*, 59(4), 329-349. <https://doi.org/10.1080/03637759209376276>
- Wu, P., Fang, Y., Guan, Z., Fan, B., Kong, J., Yao, Z., Liu, X., Fuller, C. J., Susser, E., Lu, J., & Hoven, C. W. (2009). The psychological impact of the SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk. *The Canadian Journal of Psychiatry*, 54(5), 302-311. <https://doi.org/10.1177/070674370905400504>
- Xiao, H., Zhang, Y., Kong, D., Li, S., & Yang, N. (2020). Social capital and sleep quality in individuals who self-isolated for 14 days during the coronavirus disease 2019 (COVID-19) outbreak in January 2020 in China. *Medical Science Monitor*, 26, e923921. <https://doi.org/10.12659/msm.923921>
- Xiong, J., Lipsitz, O., Nasri, F., Lui, L. M. W., Gill, H., Phan, L., Chen-Li, D., Iacobucci, M., Ho, R., Majeed, A., & McIntyre, R. S. (2020). Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *Journal of Affective Disorders*, 277, 55-64. <https://doi.org/10.1016/j.jad.2020.08.001>

Table 1

*Correlations (Spearman Coefficients) Among and Descriptive Statistics for Key Study Variables*

	<i>M (SD) or n (%)</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Gender (female)	1278 (81.5%)	—													
2. Age	31.30 (12.42)	-.17*	—												
3. Socioeconomic status	2.03 (0.53)	-.04*	-.09*	—											
4. Occupational status (employed)	730 (46.5%)	-.19*	.56*	-.01	—										
5. House size	2.12 (0.67)	.05*	-.04	.17*	-.04*	—									
6. Financial loss	2.55 (0.94)	.07*	.04*	-.24*	.03	-.05*	—								
7. Media exposure	2.02 (0.97)	-.01	.17*	.04	.08*	-.01	-.03	—							
8. Worry	7.25 (1.92)	.21*	.13*	-.04	.06*	-.02	.07*	.24*	—						
9. Likelihood of infection	5.36 (2.05)	.03	.10*	-.04	.11*	-.10*	.05*	.11*	.25*	—					
10. Coping efficacy	6.85 (2.04)	.03	.01	.05*	-.01	-.01	-.06*	.07*	.08*	-.04*	—				
11. Trust in institutions	5.51 (1.73)	-.06*	-.04*	.05*	-.07*	.02	-.21*	.04	.07*	.04	.24*	—			
12. Attitudes toward quarantine	3.51 (0.55)	.12*	.10*	-.04*	.03	-.03	-.08*	.09*	.29*	.06*	.15*	.18*	—		
13. Well-being	2.85 (0.98)	-.10*	.25*	.15*	.16*	.02	-.09*	.11*	.07*	.01	.18*	.20*	.15*	—	



14. Mental health symptoms (GHQ-12)	12.91 (6.18)	.23*	-.22*	-.07*	-.18*	-.08*	.11*	.07*	.24*	.08*	-.05*	-.06*	-.47*	.01	—
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*Note.* \*  $p < .05$ . Gender was coded 1 for men and 2 for women; occupational status occupational status was coded as 1 = not employed, 2 = employed.

Table 2

*Predictors of Mental Health Symptoms and Well-being (Analysis of Covariance)*

	<i>F</i>	<i>p</i>	$\eta^2$	<i>B</i>	<i>SE</i>	95% CI
Mental health symptoms <sup>a</sup>						
Gender	42.85	.000	.02	-1.81*	0.27	[-2.34, -1.28]
Age	71.57	.000	.03	-0.10*	0.01	[-0.12, -0.08]
Socioeconomic status	2.24	.082	.00	—	—	—
Occupational status	23.20	.000	.01	1.39*	0.29	[0.82, 1.96]
House size	4.09	.017	.00	—	—	—
Financial loss	3.73	.011	.01	—	—	—
Media exposure	4.87	.001	.01	—	—	—
Worry	76.62	.000	.04	0.68*	0.08	[0.52, 0.85]
Likelihood of infection	3.88	.049	.00	0.13*	0.07	[-0.01, 0.27]
Coping efficacy	4.09	.043	.00	-0.13*	0.07	[-0.26, 0.00]
Trust in institutions	4.95	.026	.00	-0.18*	0.09	[-0.35, -0.01]
Attitudes toward quarantine	12.93	.000	.01	-0.96*	0.30	[-1.55, -0.36]
Well-being <sup>b</sup>						

Gender	7.46	.006	.00	0.12*	0.04	[0.03, 0.20]
Age	110.41	.000	.05	0.02*	0.00	[0.02, 0.02]
Socioeconomic status	22.06	.000	.03	—	—	—
Occupational status	4.72	.030	.00	-0.10*	0.05	[-0.18, -0.01]
House size	0.41	.664	.00	—	—	—
Financial loss	0.99	.396	.00	—	—	—
Media exposure	1.60	.173	.00	—	—	—
Worry	0.26	.611	.00	-0.01	0.01	[-0.03, 0.02]
Likelihood of infection	0.33	.566	.00	-0.01	0.01	[-0.03, 0.01]
Coping efficacy	27.40	.000	.01	0.05*	0.01	[0.03, 0.07]
Trust in institutions	54.07	.000	.03	0.09*	0.01	[0.07, 0.12]
Attitudes toward quarantine	29.22	.000	.01	0.22*	0.04	[0.14, 0.31]

*Note.* \*  $p < .05$ . Gender was coded 1 for men and 2 for women; occupational status occupational status was coded as 1 = not employed, 2 = employed. <sup>a</sup> the R-squared for this model was .17; <sup>b</sup> the R-squared for this model was .18

Table 3

*Means and Standard Deviations (SD) of the Total MHC–SF Score and Percentage (%) of GHQ-12 High-Scorers and Comparison with Previous Studies*

MHC–SF score	<i>M (SD)</i>	<i>M (SD) in Petrillo et al. (2015)</i>	<i>Cohen's d</i>
Total sample	2.92 (0.97) <sup>a</sup>	3.73 (0.85)	0.89
GHQ-12		<i>M (SD) in Giorgi et al. (2014)</i>	
Total sample	12.91 (6.18) <sup>a</sup>	10.43 (5.42)	0.43
	<i>% GHQ-12 high-scorers</i>	<i>% GHQ-12 high-scorers in Ferrara et al. (2004)</i>	
Total sample	49.4%	44.1%	

*Note.* <sup>a</sup> *M* and *SD* were adjusted for gender.