

Self-perceived general and ear-nose-throat symptoms related to the COVID-19 outbreak: a survey study during quarantine in Italy

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Abstract

Objective: To survey perceived general and ear-nose-throat (ENT) symptoms of COVID-19 in relation to psychological impact, mental health, perception of information and demographic characteristics in quarantined subjects during a lockdown period in Italy.

Methods: Participants were 1380 respondents who completed an online survey. A logistic regression model was used to evaluate the association between the independent variables and perceived symptoms.

Results: Participants reported different prevalences of perceived ENT and general symptoms. Coryza, cough, sore throat and tinnitus were the most common symptoms, and there was a low prevalence of anxiety, depression and stress compared with the psychological impact of the symptom. Comparison of the two symptom groups demonstrated a common need for updates, their relationship with the media and correct information about the route of transmission.

Conclusions: The health information provided during a disease outbreak must be grounded in evidence. This would help to prevent adverse psychological reactions and somatization symptoms that can engulf healthcare systems, especially in clinical areas like ENT, which frequently treat airway problems.

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Keywords

COVID-19, ear-nose-throat, survey, quarantine, healthcare system, somatization, Italy, mental health

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Introduction

The SARS-CoV-2 virus and the related disease coronavirus disease 2019 (COVID-19) has rapidly spread worldwide.^{1,2} Since its first known manifestation in humans on 8 December 2019,¹ over 160 countries and all 50 states of the USA have confirmed cases at the time of writing.³ Italy is the worst affected country in Europe; it has more than 4636 cases, reaching a peak of 778 cases in 1 day, and 197 deaths.⁴ The symptoms of COVID-19 are similar to those seen in other upper respiratory infections that involve ear-nose-throat (ENT) symptoms; they include fever (43%–98%), cough (68%–82%), fatigue (38%–44%), sore throat (13.9%–17.4%), dry cough (59.4%), chills, cough, coryza, congestion (4.8%), rhinorrhoea (4%), sputum production (28%–33%), dysosmia and dysgeusia.^{3,5–7} Mortality is higher in the presence of co-existing conditions such as hypertension, diabetes and age over 60 years.⁶ Although the overall mortality rate is estimated as between 1.7% and 4.5%, this varies substantially by age, ranging from zero in children under 9 years to 14.8% in individuals aged over 80 years.^{3,8}

In light of these factors and the high rate of human-to-human transmissibility,⁹ the COVID-19 outbreak was defined as an international public health emergency on 30 January 2020.¹⁰ Because of an outbreak in the northeast of Italy, and in line with China's efforts to contain the spread of the virus,¹¹ a lockdown was imposed in Italy on 12 March 2020; this involved

travel restrictions, stay-at-home measures and social isolation to prevent infection.¹² As the COVID-19 outbreak has caused widespread anxiety, a prompt assessment of the population's psychological condition is required.¹³ Previous research indicates that during an epidemic, a wide range of psychosocial burdens may affect people at multiple levels.¹¹ Individual burdens involve the fear of falling sick or dying, experiencing helplessness, and stigma.¹⁴ During one outbreak of influenza, approximately 10% to 30% of people reported fear of the likelihood of contracting the virus.¹⁵ Additionally, the lockdown of educational and commercial institutions worsens individuals' negative feelings.^{11,16}

Previous studies have surveyed the psychological status of healthy subjects under preventive quarantine in the initial phase of the COVID-19 outbreak in China or during the SARS epidemic.^{17,18} More than 50% of the surveyed participants showed a moderate-to-severe psychological impact, and one-third had anxiety, indicating that perceived physical symptoms were associated with higher levels of stress, anxiety and depression,^{11,17,18} and that quarantine periods can cause post-traumatic stress disorder.¹⁹ Interestingly, previous studies show that quarantined subjects also tend to become distressed, especially when experiencing physical symptoms potentially related to the infection.²⁰ Such anxiety may continue to affect psychological status for a long time.^{21,22} Furthermore, such psychological consequences are amplified when

quarantined participants perceive information from public health authorities as stressful^{21,23–25} or confusing (owing to ambiguity in various official and unofficial health messages).²⁴ This results in an ‘infodemic’, and excessive and erroneous engagement with the healthcare system.¹⁹

The aim of the present study was to survey the somatically perceived general and ENT symptoms of COVID-19 in a large sample of quarantined subjects. Data were collected on psychological impact, mental health, perception of information and demographic characteristics during 8 days of COVID-19 lockdown in Italy. It is hoped that the findings could help healthcare institutions and workers to improve the psychophysical status of the population, prevent the healthcare system being engulfed by erroneous referrals and control the infodemic during the current (and possible future) COVID-19 outbreak in Italy, Europe and many other countries.

Materials and methods

Setting and participants

We conducted a cross-sectional survey to evaluate the short-term psychological status of respondents during the COVID-19 outbreak using an anonymous online questionnaire. A snowball sampling strategy was used to engage the general public living in Italy in the context of the COVID-19 outbreak. The online survey was initially sent to volunteers of a local longitudinal cohort study and they were encouraged to forward it to other participants.

Procedure

As the Italian authorities had urged citizens to limit face-to-face interactions and stay at home, the respondents recruited other potential respondents via social media, messaging platforms and emails. Respondents

completed the questionnaires in Italian using the online survey platform SurveyMonkey®, San Mateo, CA, USA). The study was approved by the university hospital institutional review board (approval number 35/17 on 13 April 2017, with a subsequent amendment in 2020 for the purpose of the present study). The study adhered to the principles of the Declaration of Helsinki and all respondents provided online informed consent after reading information about the study. Data collection took place over 8 days (23–30 March 2020) after the COVID-19 outbreak had been defined as an international public health emergency and the Italian government had drafted the national lockdown legislation (12 March 2020).

Survey development

Previous studies evaluating the psychological burden of SARS and influenza outbreaks via surveys were reviewed,^{11,15,18,26,27} and additional COVID-19 outbreak questions were developed. Taking into account the criteria for screening suspected, probable and confirmed cases of COVID-19²⁸ and the study aim to evaluate the self-perception of COVID-19 related symptoms,²⁹ the survey inclusion criteria were no fever in the last 14 days and (for subjects who been tested) a negative COVID-19 test result. The survey consisted of questions assessing the following: (1) demographic data; (2) perceived physical manifestations in the last 14 days, with particular focus on ENT; (3) awareness and worries about COVID-19; (4) preventive measures against COVID-19 in the last 14 days; (5) desire for more knowledge about COVID-19; (6) psychological effects of the COVID-19 outbreak; and (7) mental health status. Gender, age, educational level, residential location in the past 14 days, parental status, employment status and household size were also evaluated.

Respondents also self-assessed their health status and were asked about possible chronic diseases. Self-perceived physical symptoms in the past 2 weeks were assessed in terms of general (chills, headache, myalgia, difficulty in breathing, burning eyes, shiny eyes) and ENT (vertigo/dizziness, cough, disequilibrium, coryza, earache, sore throat, burning tongue, tinnitus, dysosmia, dysgeusia and ear fullness) symptoms.

Awareness about COVID-19 consisted of understanding transmission routes, degree of confidence in its diagnosis, degree of satisfaction about COVID-19 health information, the evolution of the outbreak, and possible therapies for the disease related to COVID-19 infection. Respondents were asked to specify their information sources and their knowledge of the national number of confirmed COVID-19 cases and deaths evaluated within the context of data published daily by the Istituto Superiore di Sanità (<seurld><https://www.epicentro.iss.it/></seurld>). Concerns about COVID-19 included respondents' worries about themselves and their family contracting COVID-19 and the possibility of surviving in the case of infection. Precautionary measures against COVID-19 variables included avoiding sharing cutlery during meals with others; covering the mouth when coughing and sneezing; washing hands with soap immediately after coughing, sneezing, rubbing the nose and after touching possibly contaminated objects; and wearing a mask regardless of the manifestation or not of symptoms. Respondents were asked to indicate the average number of hours spent at home each day to prevent COVID-19 transmission, and whether they had been excessively worried about COVID-19. Additional information about COVID-19 comprised clinical manifestations after COVID-19 infection, transmission routes, therapy, preventive measures adopted to avoid the spread of COVID-19, local

outbreaks, travel advice, and other provisions implemented by other countries. The psychological effects of COVID-19 were evaluated using the Impact of Event Scale-Revised (IES-R). This is a self-administered scale that measures the magnitude of psychological burden related to a public health event, and has been strongly validated for the Italian population.³⁰ It consists of three subscales: avoidance, intrusion, and hyperarousal.³¹ The total IES-R score was categorized as indicating normal (0–23), mild (24–32), moderate (33–36) and severe (>37) psychological impact.³² Mental health status was evaluated using the validated Italian version of the Depression, Anxiety and Stress Scale (DASS-21).³³ The DASS-21 has been used in previous research on the SARS and COVID-19 outbreaks^{11,34} and scores were calculated based on previous work.³⁵ Questions 3, 5, 10, 13, 16, 17 and 21 constitute the depression subscale. This subscale score was split into normal (0–9), mild (10–12), moderate (13–20), severe (21–27) and extremely severe depression (28–42). Questions 2, 4, 7, 9, 15, 19 and 20 constitute the anxiety subscale, the total score of which was split into normal (0–6), mild (7–9), moderate (10–14), severe (15–19) and extremely severe anxiety (20–42). Questions 1, 6, 8, 11, 12, 14 and 18 comprise the stress subscale, the total score of which was categorized as indicating normal (0–10), mild (11–18), moderate (19–26), severe (27–34) and extremely severe stress (35–42).

Data handling and statistical analysis

The data were statistically described according to sociodemographic traits, physical manifestations and variables related to the use of health services, awareness and worry-related variables, preventive measure variables, and desire for more health information. Response percentages for items were calculated according to the number

of respondents per response out of the total responses for that item. The IES-R and DASS-21 subscale results were summarized for the respective score ranges. We used a generalized linear model to evaluate the associations between sociodemographic characteristics, variables related to the use of health services, awareness and concerns, preventive measures, desire for more health information, IES-S score, DASS-21 subscale scores, and perceived general and ENT symptoms. The data were used to estimate two models: one for perceived general symptoms and the other for perceived ENT symptoms. All the variables included in the databases, including the dependent variables, were qualitative, so were treated as dummy variables.³⁶ The categories within each variable were grouped to obtain a sufficient sample size. Because the grouping procedure dichotomized the dependent variables, a logistic regression model was used

with a stepwise procedure to select the explanatory variables based on the Akaike information criterion.³⁶ All tests were two-tailed, with a significance level of $p < 0.05$. Statistical analysis was performed using MATLAB R2019a (The MathWorks Inc., Natick, Massachusetts, USA).

Results

Development of the COVID-19 epidemic in Italy from February to April 2020

Figure 1 shows the progression of the COVID-19 epidemic in Italy between January and April 2020. After a national outbreak was declared in Italy on 31 January 2020, the number of confirmed, suspected and recovered cases, as well as deaths related to COVID-19 infection, progressively increased until the end of March 2020.

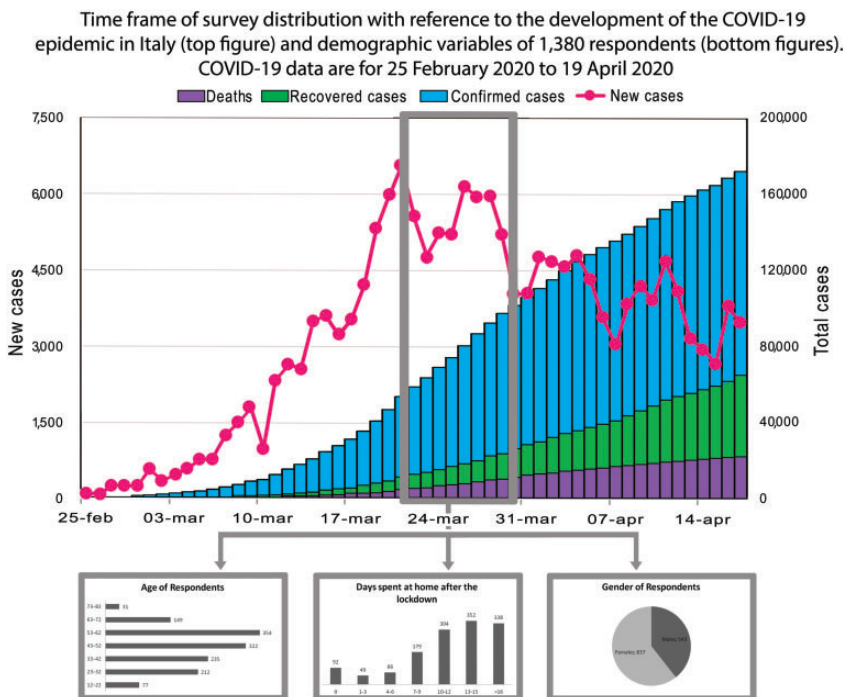


Figure 1. Time frame of survey distribution with reference to the development of the COVID-19 epidemic in Italy (top figure) and demographic variables of 1380 respondents (bottom figures). COVID-19 data are for 25 February 2020 to 19 April 2020.

Survey responses

Sociodemographic variables, perceived symptoms and psychological impact. As shown in Figure 1, we received 1380 complete responses from 1510 respondents, 130 of whom did not complete the questionnaires (completion rate: 91.4%). The 1380 respondents were from 61 different provinces in Italy, and 357, 291, 214, 172, 102, 98, 76 and 70 respondents submitted the questionnaires on 23, 24, 25, 26, 27, 28, 29 and 30 March, respectively, after a period of 12 to 18 days spent at home in quarantine. Figure 1 and Table 1 depict the sociodemographic characteristics of the sample.

In brief, there were 543 (39.3%) men and 837 (60.6%) women. The sample was age-balanced across the range of 23 to 72 years. A total of 212 participants (15.3%) were aged 23 to 32 years, 235 (17%) were 33 to 42 years, 322 (23.3%) were 43 to 52 years, 354 (25.6%) were 53 to 62 years and 149 (10.7%) were 63 to 72 years. A total of 585 (42.3%) respondents stated they had no children and 518 (37.5%) that they had a child older than 16 years. Many respondents were married ($n=616$, 44.6%) but cohabiting ($n=224$, 16.2%) and single ($n=368$, 26.6%) individuals were also well represented. Household size was three to five people in 814 (58.9%) cases and two people in 371 (26.8%) cases. Employed ($n=920$, 66.6%) and unemployed ($n=191$, 13.8%) were the most common employment categories. Most respondents had an upper secondary school (611, 44.2%) or university (430, 31.1%) level of education. Self-rated overall health status was average, good, and very good in 283 (20.5%), 734 (53.1%) and 336 (24.3%) cases, respectively, and this was confirmed by the absence of ascertained chronic illness in 1093 (79.2%) respondents. At the time of the survey, most respondents had spent more than 6 days at home, as all respondents were under mass quarantine following

the national lockdown legislation (complete details are reported in Table 1).

Regarding ENT symptoms, of 1380 respondents 257 (18.6%) perceived that they had experienced cough, 86 (6.2%) vertigo/dizziness, 87 (6.3%) disequilibrium, 354 (25.6%) coryza, 114 (8.2%) earache, 244 (17.6%) sore throat, 33 (2.3%) burning tongue, 144 (10.4%) tinnitus, 33 (2.3%) dysosmia, 31 (2.2%) dysgeusia and 119 (8.6%) ear fullness (Figure 2). For reported general physical symptoms 176 (12.7%) respondents perceived that they had chills, 459 (33.2%) headache, 308 (22.3%) myalgia, 58 (4.2%) difficulty in breathing, 250 (18.1%) burning eyes and 215 (15.5%) shiny eyes (Figure 2).

The psychological impact of the COVID-19 outbreak was evaluated using the IES-R scale, and the sample mean score was 21.64 (standard deviation [SD]=14.09). Of all respondents, 806 (58.4%) reported low psychological impact; 276 (20%) mild psychological impact; 87 (6.3%) moderate impact and 211 (15.2%) severe impact (Figure 3). Participants' depression, anxiety and stress were evaluated using the DASS-21. The sample mean DASS-21 score was 9.45 (SD=7.77). For the depression subscale, 1312 (95.07%) respondents had a normal score; 41 (2.9%) had mild depression; 27 (1.9%) moderate depression; and no respondents had severe or extremely severe depression. For the anxiety subscale, 1,323 (95.8%) respondents had a normal score (score: 0–6); 38 (2.7%) had mild anxiety (score: 7–9); 16 (1.1%) had moderate anxiety (score: 10–14); 3 (0.2%) had severe anxiety (score 15–19); and no respondents had extremely severe anxiety (score >20). For the stress subscale, 1303 (94.4%) respondents had a normal score (score: 0–10); 76 (5.5%) had mild stress (score: 11–18); 1 (0.07%) had moderate stress (score: 19–26); and no respondents had severe or

Table 1. Sociodemographic characteristics of 1,380 survey respondents.

Gender	Men		Women	
	543 (39.34)	837 (60.65)	33-42	43-52
Age (years)	12-22	23-32	53-62	63-72
	77 (5.57)	212 (15.36)	354 (25.65)	149 (10.79)
		235 (17.02)	322 (23.33)	31 (2.24)
Parental status	No children	Has a child older than 16 years	Has a child 16 years or under	
	585 (42.39)	518 (37.53)	277 (20.07)	
Marital status	Single	Married	Divorced/separated	Widowed
	368 (26.66)	616 (44.63)	140 (10.14)	32 (2.31)
Household size	Six people or more	Three to five people	Two people	One person
	16 (1.15)	814 (58.98)	371 (26.88)	179 (12.97)
Employment status	Unemployed	Employed	Retired	Student
	191 (13.84)	920 (66.66)	160 (11.59)	109 (7.89)
Educational level	None	Lower secondary school	Upper secondary school	University, master's
	0 (0)	132 (9.56)	430 (31.15)	University, doctorate
	11 (0.79)	611 (44.27)	430 (31.15)	57 (4.13)
Current self-rated health status	Very poor	Poor	Average	Good
	0 (0)	27 (1.95)	283 (20.53)	734 (53.18)
Diagnosed chronic illness	No	Yes →	Cardiovascular	Neurological
	1093 (79.21)	287 (20.79) →	69 (33.8)	18 (6.27)
Days spent at home after the lockdown	0	1-3	4-6	7-9
	92 (6.66)	49 (3.55)	66 (4.78)	179 (12.97)
			304 (22.02)	352 (25.53)
				338 (24.49)
				Other > 1 comorbidity

Number of respondents and relative percentages (in parentheses) related to sociodemographic characteristics.

Self-perceived Ear-Nose-Throat symptoms (top-left) and general symptoms (top-right) and duration range (bottom)

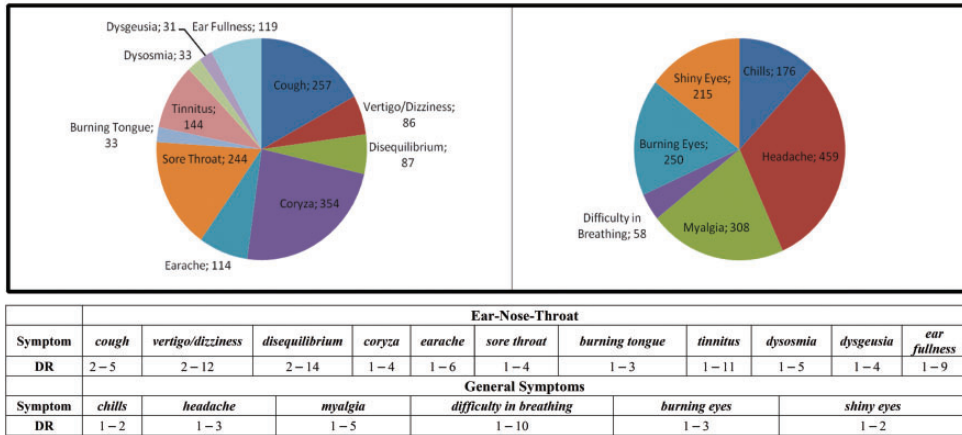


Figure 2. Self-perceived ear-nose-throat symptoms (top-left) and general symptoms (top-right). Symptom duration range (DR, in days) is shown below.

Number of respondents reporting a psychological impact of COVID-19, anxiety, depression and stress

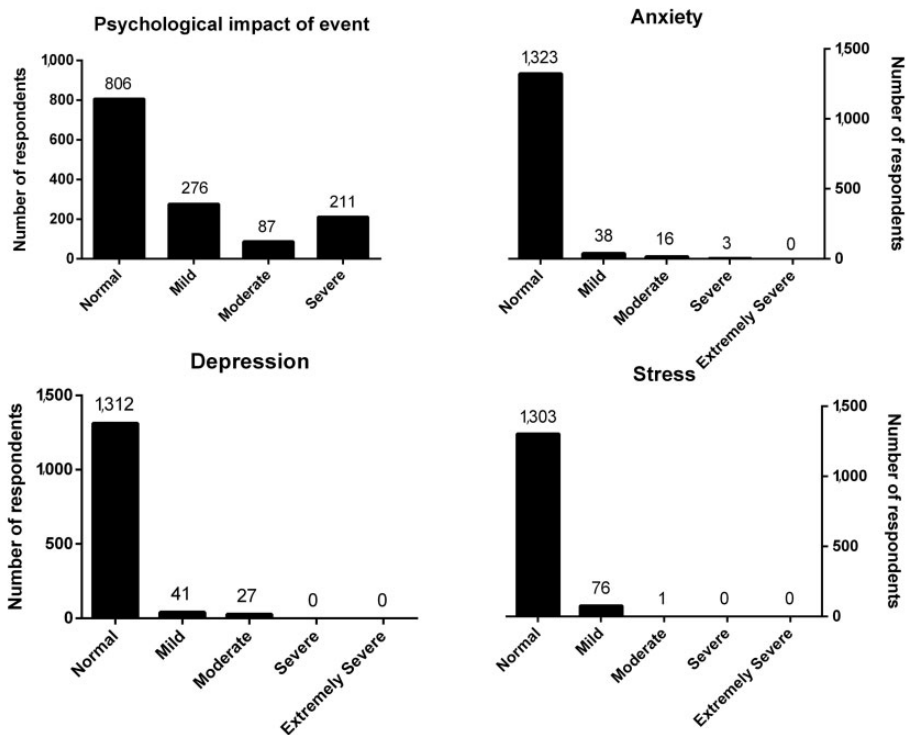


Figure 3. Number of respondents reporting a psychological impact of COVID-19, anxiety, depression and stress.

extremely severe stress (score >27) (complete details are reported in Figure 3).

Concerns, precautionary measures, COVID-19 knowledge and information requirements. Regarding concerns about COVID-19, more than 74% of respondents were very worried or somewhat worried that family members might contract the disease. More than 37% did not have children, and approximately 40% of participants said they were very worried or somewhat worried about a child younger than 16 years having COVID-19 symptoms. Approximately 66.3% of participants had a high level of confidence in their doctor's ability to diagnose or identify COVID-19, and less than 30% considered the possibility of contracting COVID-19 during the outbreak as likely or somewhat likely. More than 70% of respondents judged that they would be very likely or somewhat likely to survive COVID-19 if infected (Table 2).

Table 2 also shows the precautionary measures employed in the last 14 days by the respondents, approximately 95% of whom were spending more than 10 hours per day at home to avoid COVID-19. The reported level of compliance was moderate to high. More than 94% of respondents always or mostly washed their hands after touching contaminated objects; more than 56% always or mostly wore a mask even if they had no symptoms; more than 98% always or mostly covered their mouth when coughing and sneezing; approximately 99% always or mostly washed their hands with soap; more than 73% always or mostly washed their hands immediately after coughing, sneezing, or rubbing their nose; and approximately 90% always or mostly avoided sharing utensils (e.g. chopsticks) during meals.

Table 3 shows the additional health information that respondents felt they needed. More than half of participants wanted more information about COVID-

19, particularly regarding the route of transmission (70.2%), the supply and the efficacy of medicines/vaccines (84.9%), constant updates on the latest information about COVID-19 (77.8%), advice on COVID-19 treatment (70.3%) and information for people who may need more customized information (74%). More than 65% of respondents were satisfied or somewhat satisfied about the amount of COVID-19 health information they had; 45.5% and 43% used television and the Internet as their main sources of information, respectively. Approximately 90% of respondents felt they had enough information about recovered individuals, COVID-19 deaths, infected cases and COVID-19 transmission routes (complete details are reported in Table 3).

Stepwise regression. The following regression equation was used for the perceived general symptom score:

$$X = 1 - 0.40376x_1 - 0.44169x_2 + 0.43707x_3 + 0.90987x_4 + 1.02136x_5 + 0.78436x_6 + 1.63224x_7 + 0.84567x_8 + 1.70712x_9,$$

where x_1 is diagnosed chronic illness, x_2 is the level of confidence in own doctor's ability to diagnose or identify COVID-19, x_3 is the response to the question "Have you heard that the number of infected COVID-19 individuals has increased?", x_4 is the DASS-21: depression score, x_5 is gender 'and' current self-rated health status, x_6 is age 'and' route of COVID-19 transmission: airborne, x_7 is age 'and' likelihood of contracting COVID-19 during the current outbreak, x_8 is the current self-rated health status 'and' need for updates on how other countries are managing the COVID-19 outbreak and x_9 is the route of COVID-19 transmission: droplets 'and' IES-R score. Partial correlation coefficients are shown in Table 4. The results showed that

Table 2. COVID-19 concerns and prevention measures for 1,380 survey respondents.

	Very worried	Somewhat worried	Not very worried	Not worried at all	No children
Concerns about a child younger than 16 years getting COVID-19 infection	235 (17.02)	327 (23.69)	245 (17.75)	59 (4.27)	514 (37.24)
Concerns about other family members getting COVID-19 infection	489 (35.43)	535 (38.76)	293 (21.23)	51 (3.69)	No family members
Likelihood of surviving if infected with COVID-19	Very likely	Somewhat likely	Not very likely	Not likely at all	Do not know
Likelihood of contracting COVID-19 during the current outbreak	375 (27.17)	593 (42.97)	110 (7.97)	23 (1.66)	279 (20.21)
Level of confidence in own doctor's ability to diagnose or recognize COVID-19	Very likely	Somewhat likely	Not very likely	Not likely at all	Do not know
Satisfaction with the amount of health information available about COVID-19	97 (7.02)	267 (19.34)	591 (42.82)	256 (18.55)	169 (12.24)
Average number of hours staying at home per day to avoid COVID-19	Very confident	Somewhat confident	Not very confident	Not at all confident	Do not know
Feeling that too much unnecessary worry has been generated about the COVID-19 outbreak	217 (15.72)	699 (50.65)	320 (23.18)	68 (4.92)	76 (5.53)
Washing hands after touching contaminated objects	Very satisfied	Somewhat satisfied	Not very satisfied	Not satisfied at all	Do not know
Wearing mask regardless of the presence or absence of symptoms	230 (16.66)	673 (48.76)	327 (23.69)	124 (8.98)	26 (1.88)
	0-9 hours	10-19 hours	20-24 hours		
	78 (5.65)	238 (17.24)	1064 (77.11)		
	Always	Most of time	Sometimes	Occasionally	Never
	59 (4.27)	182 (13.18)	243 (17.63)	240 (17.39)	656 (47.53)
	977 (70.79)	326 (23.62)	59 (4.27)	14 (1.01)	4 (0.28)
	493 (35.72)	292 (21.15)	132 (9.56)	175 (12.68)	288 (20.86)
	557 (40.36)	464 (33.62)	182 (13.18)	103 (7.46)	74 (5.36)

(continued)

Table 2. Continued.

Washing hands immediately after coughing, rubbing nose or sneezing	1210 (87.68)	155 (11.23)	10 (0.72)	5 (0.36)	0 (0)
Washing hands with soap and water	1063 (77.02)	186 (13.47)	28 (2.02)	32 (2.31)	71 (5.14)
Avoiding sharing of utensils (e.g. chopsticks) during meals	1239 (89.78)	117 (8.47)	10 (0.72)	6 (0.43)	8 (0.57)
Covering mouth when coughing or sneezing					

Number of respondents and relative percentages (in parentheses) related to COVID-19 concerns and prevention measures.

perception of general symptoms was negatively associated with x_1 (diagnosed chronic illness, $p = 0.016$) and x_2 (level of confidence in own doctor’s ability to diagnose or identify COVID-19, $p = 0.002$), and positively associated with x_3 (response to the question “Have you heard that the number of infected COVID-19 individuals has increased?”, $p = 0.004$), x_4 (DASS-21: depression score, $p = 0.003$), x_5 (gender ‘and’ current self-rated health status, $p = 0.003$), x_6 (age ‘and’ route of COVID-19 transmission: airborne, $p = 0.021$), x_7 (age ‘and’ likelihood of contracting COVID-19 during the current outbreak, $p = 0.012$), x_8 (current self-rated health status ‘and’ need for updates on how other countries are managing the COVID-19 outbreak, $p = 0.016$) and x_9 (route of COVID-19 transmission: droplets ‘and’ IES-R score, $p = 0.016$).

The following regression equation was used for the perceived ENT symptom score:

$$\begin{aligned}
 X = & 1 + 0.44143_{x1} - 0.31461_{x2} - 0.78133_{x3} \\
 & - 0.44453_{x4} - 0.51697_{x5} + 0.39252_{x6} \\
 & + 0.35831_{x7} - 1.01273_{x8} + 1.02804_{x9} \\
 & + 0.56178_{x10},
 \end{aligned}$$

where x_1 is parental status, x_2 is educational level, x_3 is current self-rated health status, x_4 is route of COVID-19 transmission: airborne, x_5 is route of COVID-19 transmission: droplet, x_6 is route of COVID-19 transmission: contact via contaminated objects, x_7 is the need for updates on how other countries are managing the COVID-19 outbreak, x_8 is the DASS-21: depression score, x_9 is the DASS-21: anxiety score and x_{10} is the likelihood of contracting COVID-19 during the current outbreak ‘and’ IES-R score. Partial correlation coefficients are shown in Table 5. The results showed that perception of ENT symptoms was positively associated with x_1 (parental status, $p = 0.001$), x_6 (route of COVID-19 transmission: contact via contaminated objects,

Table 3. COVID-19 knowledge and information requirements for 1,380 survey respondents.

Main source of health information	Internet	Television	Radio	Family members	Friends	Healthcare professionals	Other
Have you heard that the number of individuals that have recovered from COVID-19 infection has increased?	594 (43.04)	628 (45.50)	11 (0.79)	10 (0.72)	6 (0.43) Heard	95 (6.88) Not heard	36 (2.64)
Have you heard that the number of COVID-19 deaths has increased?					1,326 (96.08) Heard	54 (3.91) Not heard	
Have you heard that the number of infected COVID-19 individuals has increased?					1,329 (95.57) Heard	61 (4.42) Not heard	
Route of COVID-19 transmission: airborne	Agree				1,324 (95.94) Disagree	56 (4.05) Do not know	
Route of COVID-19 transmission: droplets	1,236 (89.56) Agree				40 (2.89) Disagree	104 (7.53) Do not know	
Route of COVID-19 transmission: contact via contaminated objects	1,284 (93.04) Agree				18 (1.31) Disagree	78 (5.65) Do not know	
Need for further health information about the COVID-19 infection	877 (63.55)				215 (15.57) Yes	288 (20.86) No	
Need for advice on treatment of the COVID-19 infection					801 (58.04)	579 (41.95)	
Need for advice on prevention of the COVID-19 infection					971 (70.36)	409 (29.63)	
Need for updates on how other countries are managing the COVID-19 outbreak					768 (55.65)	612 (44.34)	
Need for updates on the transmission routes of COVID-19					742 (53.76)	638 (46.23)	
Need for travel advice for the COVID-19 epidemic					970 (70.28)	410 (29.71)	
Need for the latest updates on the number of people infected by COVID-19 and their location					760 (55.07)	620 (44.92)	
Need for information on the availability and effectiveness of medicines/vaccines for the COVID-19 infection					795 (57.61)	585 (42.39)	
Need for advice for people who may need more tailored information, such as those with pre-existing illnesses					1,172 (84.92)	208 (15.07)	
Need for regular updates for latest information about the COVID-19 infection					1,022 (74.05)	358 (25.94)	
Number of respondents and relative percentages (in parentheses) related to COVID-19 knowledge and information requirements.					1,074 (77.82)	306 (22.17)	

Table 4. Stepwise regression model of perceived general symptoms in relation to significant variable answers in 1,380 survey respondents.

	Coefficient	Std. Err.	t	p-value	CL -95%	CL +95%
Intercept	0.958	0.419	2.282	0.022	-0.124	2.040
Diagnosed chronic illness	-0.403	0.167	-2.408	0.016	-0.836	0.028
Yes						
Level of confidence in own doctor's ability to diagnose or recognize COVID-19	-0.441	0.143	-3.071	0.002	-0.812	-0.070
<i>From not very confident to not confident at all</i>						
Have you heard that the number of infected COVID-19 individuals has increased?	0.437	0.152	2.857	0.004	0.042	0.831
<i>Heard</i>						
DASS-21: Depression	0.909	0.306	2.966	0.003	0.118	1.701
<i>Normal (0-9)</i>						
Gender 'and' Current self-rated health status	1.021	0.351	2.903	0.003	0.113	1.928
<i>Male 'and' from very poor to average</i>						
Age 'and' Route of COVID-19 transmission: airborne	0.784	0.342	2.291	0.021	-0.098	1.667
<i>12-32 years 'and' agree</i>						
Age 'and' Likelihood of contracting COVID-19 during the current outbreak	1.632	0.652	2.502	0.012	-0.050	3.314
<i>>63 years 'and' from very to somewhat likely</i>						
Current self-rated health status 'and' Need for updates on how other countries handle the COVID-19 outbreak	0.845	0.351	2.403	0.016	-0.062	1.753
<i>From very poor to average 'and' yes</i>						
Route of COVID-19 transmission: droplets 'and' IES-R	1.707	0.713	2.391	0.016	-0.133	3.548
<i>Agree 'and' moderate psychological impact (33-36)</i>						

Stepwise regression results of perceived general symptoms in relation to significant variable (in bold) answers (in italic) in 1380 survey respondents. IES-R, Impact of Event Scale-Revised; DASS-21, Depression, Anxiety Stress Scale-21; Std. Err., standard error; CL, confidence limit.

p=0.015), x_7 (the need for updates on how other countries are managing the COVID-19 outbreak, p=0.010), x_9 (DASS-21: anxiety score, p=0.001) and x_{10} (the likelihood of contracting COVID-19 during the current outbreak 'and' IES-R score, p=0.044), and negatively

associated with x_2 (educational level, p=0.016), x_3 (current self-rated health status, p<0.001), x_4 (route of COVID-19 transmission: airborne, p=0.004), x_5 (route of COVID-19 transmission: droplet, p=0.015) and x_8 (DASS-21: depression score, p=0.031).

Table 5. Stepwise regression model of perceived ear-nose-throat symptoms in relation to significant variable answers in 1,380 survey respondents.

	Coefficient	Std.Err.	t	p-value	CL -95%	CL +95%
Intercept	0.604	0.412	1.464	0.143	-0.459	1.668
Parental status	0.441	0.141	3.125	0.001	0.077	0.805
<i>Has a child older than 16 years</i>						
Educational level	-0.314	0.130	-2.402	0.016	-0.652	0.023
<i>University or higher</i>						
Current self-rated health status	-0.781	0.147	-5.298	1.165×10^{-7}	-1.161	-0.400
<i>From very poor to average</i>						
Route of COVID-19 transmission: airborne	-0.444	0.156	-2.842	0.004	-0.847	-0.041
<i>Agree</i>						
Route of COVID-19 transmission: droplet	-0.516	0.213	-2.421	0.015	-1.067	0.033
<i>Agree</i>						
Route of COVID-19 transmission: contact via contaminated objects	0.392	0.162	2.417	0.015	-0.026	0.811
<i>Agree</i>						
Need for updates on how other countries handle the COVID-19 outbreak	0.358	0.139	2.559	0.010	-0.002	0.719
<i>Yes</i>						
DASS-21: Depression	-1.012	0.471	-2.148	0.031	-2.228	0.203
<i>Moderate (13-20)</i>						
DASS-21: Anxiety	1.028	0.330	3.109	0.001	0.175	1.880
<i>Normal (0-6)</i>						
Likelihood of contracting COVID-19 during the current outbreak 'and' IES-R	0.561	0.279	2.009	0.044	-0.159	1.282
<i>from very to somewhat likely 'and' normal (0-23)</i>						

Stepwise regression results for perceived ear-nose-throat symptoms in relation to significant variable (in bold) answers (in italic) in 1,380 survey respondents. IES-R, Impact of Event Scale-Revised; DASS-21, Depression, Anxiety Stress Scale-21; Std. Err., standard error; CL, confidence limit.

Discussion

Although often used interchangeably, especially in public communications,³⁷ isolation and quarantine refer to different processes. The former is the separation of individuals who have been recognized as having a contagious disease from those who are not sick. The latter is the separation and limited circulation of people who have potentially been subjected to a contagious illness to establish if they become unwell and thus

limit the risk of them infecting others.¹⁹ The COVID-19 outbreak has led to many communities in Italy and Europe being placed under mass quarantine and many citizens returning home from foreign countries to isolate themselves at home.¹⁹

Similar measures have been imposed in the past (for example in China and Canada during the 2003 SARS outbreak),^{11,17} but there is no current information about the effect of psychological/mental health, socio-demographic variables, and concerns and

demands for information on perceived symptoms of the population during the peak of the COVID-19 outbreak. This is particularly relevant in relation to the uncertainty surrounding such a large epidemic. To the best of our knowledge, most previous studies related to COVID-19 have focused on identifying the epidemiology and clinical features of infected patients,^{7,38} the genomic characteristics of the virus,³⁹ challenges for global health governance¹⁵ or only the psychological impact of the outbreak.¹¹

Perceived symptoms and psychological effects during the COVID-19 outbreak

The first interesting finding from this study is the percentage of perceived physical symptoms reported by respondents over the 8-day period of the survey. Respondents reported a greater prevalence of some perceived symptoms than reported in previous similar studies (i.e. headache, myalgia, chills).¹¹ However, as the study focused on the ENT symptoms that are commonly present in COVID-19, the levels of reported perceived otorhinolaryngological symptoms were different than in previous studies. In particular, coryza, cough, sore throat and tinnitus were frequently reported.

Furthermore, the respondents reported a lower prevalence of anxiety, depression and stress, assessed using the DASS-21, compared with the psychological impact of the outbreak (as measured by the IES-R). Several factors could explain this difference, one of which is that the IES-R specifically assessed the psychological burden from the COVID-19 epidemic, whereas the DASS-21 was not designed to investigate this type of event.¹¹ However, the Italian system, sampled population and the way the survey was administered may have contributed to this difference. Indeed (possibly because of the snowball sampling strategy), the population tended to show homogeneously

different 'protective' factors against the development of mental illness: a higher level of education, no children in more than 40% of cases, employed in about 70% of cases, married in about 45% of cases, with a good level of self-rated health status and a low degree of chronic illness.⁴⁰⁻⁴² The percentage data on anxiety and depression are not very different from those of other studies,^{11,43,44} including previous online surveys in Italy. Such surveys indicate that higher education, as well as cultural, social and health care system differences between Italy and other countries (especially China), are associated with better outcomes and could explain the differences in reported mental health outcomes.⁴⁵ Furthermore, previous work shows that anxiety, psychological distress and (particularly) fear have increased as the pandemic has progressed.⁴⁰ The population in the present study may have shown low levels of anxiety and depression owing to the relative proximity of the Italian lockdown and the onset of COVID-19 in Europe. This, together with a moderate level of fear and a good level of confidence in the authorities and public messages, may have resulted in a lack of substantial increase in the perception of symptom severity and susceptibility.⁴⁶

These findings, especially when compared with previous similar research, are in line with a particular behavioural pattern found in the present population.^{11,27} The study population was similar to previous study populations in terms of gender balance (more women than men), household size, marital status and self-reported general health status. However, our subjects had a slightly higher educational level, more employment, fewer were under 30 years old and more were over 45 years old. Overall, the respondents had confidence in the ability of healthcare professionals, and in their ability to avoid, or survive, a possible COVID-19 infection. This confident behaviour was also reflected by the

number of hours the subjects spent at home after the lockdown and their adherence to the precautionary measures requested by the national authorities. This aspect is relevant because approximately one-third of respondents reported that most of the time or sometimes they felt unnecessarily concerned about the COVID-19 epidemic, and many expressed a desire for their knowledge about the evolution of the COVID-19 outbreak and the transmission route to be constantly updated (Table 2 and 3). This is of interest considering that the demand for more information was mostly high and that television and the Internet were the main sources of information (Table 3). This behaviour, together with more than 90% of subjects in previous studies having identified the Internet as the main source of information,^{11,27} suggest that it was not a lack of clarity but, on the contrary, an overwhelming flow of information from the main sources of information that prevented citizens from fearing the worst or feeling lonely.⁴⁷ Although these findings tend to differ somewhat from some previous study findings, possibly owing to cross-cultural and political differences, they are in line with other studies in which participants have reported worries about their own health or infecting others, including a greater perceived likelihood of infecting family members rather than infecting other individuals not under quarantine.

Association between variables and perceived general and ENT symptoms

In line with previous findings, the present results showed that respondents' perception of general symptoms related to COVID-19 was associated with male gender, poor or average level of self-rated health status, young age (in terms of knowledge about the principal route of transmission) and older age (in terms of the likelihood of contracting COVID-19). Furthermore, that

greater self-perception of general symptoms was associated with normal levels of depression, demands for updates on how foreign countries are managing the COVID-19 epidemic and a moderate psychological impact suggest that an overwhelming flow of information generated a self-perception of systemic symptoms in the general population. This may also reflect this group of respondents' good knowledge of the increase in the number of infected subjects and of the route of transmission, which was clearly learned via the main information sources (television and the Internet, as described above). Interestingly, the low level of confidence in doctors' ability to diagnose and treat the illness, as well as the presence of previous diagnosed illnesses, were negatively associated with self-perception of systemic symptoms. This may reflect an association between experiences with the healthcare system and frustration related to self-rated health status, which subjects may associate with the inadequacy of the healthcare system. These findings are in line with previous studies evaluating people's fears of infecting others during quarantine,^{20,22,23,25,43,48-50} and suggest further attention should be paid to ENT symptoms related to the COVID-19 outbreak. Some factors previously found to be associated with fear of infection, such as the presence of children, knowledge of the debate about transmission routes and the demand for the government to use approaches adopted by other countries, were positively linked to an increase in self-perceived ENT symptoms in the present sample. In contrast, self-perception of ENT symptoms was negatively associated with a high level of education, a low self-perception of health status, correct knowledge of the route of transmission, a moderate level of depression (possibly inducing a focus on previous symptoms or self-isolation) and correct knowledge of transmission routes. Although correlations between depression

and somatic symptoms have been previously reported,⁵¹ these associations seem especially evident for common pain, insomnia, fatigue and neurovegetative symptoms in primary care practice and where a diagnosis of depression is conducted during clinical assessment.⁵² In the present study, generic depressive symptoms were screened using an online questionnaire, so the negative correlation between depression and perceived ENT symptoms may be related to the unique behaviour of these respondents. Indeed, during outbreaks, less active individuals who have a limited perception of their surroundings cope worse with the mental consequences of isolation and have fewer connections with others and the media.⁵³ It has long been established that depression induces feelings of sadness and a loss of interest in activities and information.⁵⁴ It is this process that may ultimately lead to self-isolation and greater focus on remote problems,⁵⁴ rather than health information prompting individuals to overreact by overexposure to infodemic cues and erroneous symptom perception.^{27,55}

A comparison of the two perceived symptom models showed that perceived general symptoms were more associated with age and gender, whereas perceived ENT symptoms were related to parental status and self-reported health status. This suggests that different variables were important in the two symptom perception models. However, both models generally had common variables associated with the need for updates, a relationship with the media and knowledge of the correct route of transmission. People under quarantine are often worried about being infected or infecting others. They also often have catastrophic reactions to any physical manifestations experienced during the quarantine period. These concerns are common in subjects exposed to serious infectious disease and may be heightened by incorrect quantitative or qualitative knowledge.^{15,56} The

proliferation of fear resulting in erratic behaviour during infectious outbreaks is common, as anyone can be infected, regardless of gender and sociodemographic status.¹⁹ This is especially true for COVID-19, as there is much speculation about the mode and rate of transmission, the disease is spreading rapidly, and there is still no definitive treatment.^{19,57} Any emotions induced by quarantine at a community level may be amplified by pre-existing mental disorders. This can contribute to worries about contracting the disease, substantially change people's behaviour and social interactions, and induce specific health-seeking behaviour.⁵⁷

Future perspectives on the management of outbreak-related trauma and infodemics

There is evidence that correct and thorough health data, particularly about the number of recovered patients, is linked to lower levels of stress and greater knowledge about treatments/vaccines and transmission routes; additionally, appropriate estimates about the number of infected subjects and locations are associated with lower levels of anxiety.¹¹ However, some studies show that if the negative effects of a disease outbreak exceed psychological and emotional tolerance, they can indirectly lead to various psychological abnormalities⁵⁸ and vicarious traumatization (including fatigue, physical decline, irritability, inattention, fear of being infected or infecting others and despair).⁵⁹ Furthermore, in line with the stress theory⁶⁰ and perceived risk theory,⁶¹ public health emergencies provoke more negative feelings and have a greater impact on cognitive judgement. These negative emotions induce people to avoid potential pathogens when related to the disease, but in the long term may impair the balance of their normal physiological mechanisms.⁶² In addition, individuals may

overreact to any disease if they receive inappropriate guidance from authorities; this may result in excessively avoidant behaviour, blind conformity, fear of being infected and exposure to infodemic cues.^{27,55}

The present participants reported that the public health institutions left them uncertain about the nature of the risks they were facing and why they were being quarantined at all. Therefore, it is essential that quarantined subjects receive proper information about the disease and the reasons for the quarantine.¹⁹ It is also a priority for institutions to communicate in an understandable way with quarantined subjects if they do experience any symptoms. Smart services provided by healthcare personnel, specifically designed for people in quarantine, and providing clear guidelines in the case of physical manifestations of the illness, are needed. These would help to reassure people if they misperceived symptoms and, conversely, if they really did become ill.¹⁹ The advantages of such an approach have been poorly studied, but previous studies suggest that these measures may reduce feelings such as worry, anger, fear and catastrophic reactions to any physical manifestations perceived during quarantine.⁶³

This study has some important limitations. The reliance on social networks and snowball sampling may have introduced a selection bias. This may have excluded people not using social networks. Additionally, the limitations of snowball procedures include community bias (the first participants will have a strong effect on the sample), non-randomization, anchoring (lack of definite knowledge about whether the sample accurately represents the target population) and lack of control over the sampling method, which becomes mainly dependent on the original and subsequent subjects.⁶⁶ These limitations may also characterize other large web-based surveys in China and Italy.^{11,45,67} Furthermore, this

survey was based on self-report instruments, which may introduce systematic bias and produced different response rates than interview-based measures. For these reasons, the mental health outcome rates should be interpreted with caution. Finally, given the stepwise regression approach, we did not investigate how anxiety, stress and depression may have been affected by other non-included variables. Because this kind of investigation has been conducted in previous studies,^{11,45} with debatable results, further research on the factors examined here is needed to clarify this topic.

In conclusion, these findings reinforce the idea that health information provided during a disease outbreak must be grounded in evidence to avoid generating adverse psychological reactions,^{11,64} disaster-related hyperarousal and incident somatization symptoms.⁶⁵ Taking these factors into account could help to prevent the COVID-19 outbreak from evolving into an infodemic. Such an infodemic would encourage these negative psychological reactions and engulf healthcare systems in erroneous and excessive referrals for COVID-19 related symptoms, especially in clinical areas such as ENT, which frequently deal with airway problems.

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