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Conspiracy mentality and health-related behaviour during the COVID-19 pandemic: a multiwave survey in Italy

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ABSTRACT

Objectives: This study aimed to (1) explore the changes in conspiracy mentality across the four waves of the COVID-19 pandemic; (2) assess the relationship between conspirative mentality and psychological/behavioural variables; (3) identify the predictors of conspirative mentality; and (4) explore the effect of conspirative mentality on COVID-19 protective behaviour.

Study design: This was a multiwave survey.

Methods: A total of 10,013 Italian individuals, aged 18–70 years, were assessed across the four waves (from January to May 2021) through online survey. We collected information about the sociodemographic characteristics of participants, personal experiences of COVID-19 infection, trust, COVID-19 protective behaviours, COVID-19 risk perception, arousal, auto-efficacy, resilience and well-being. Conspiracy mentality was assessed with the Conspiracy Mentality Questionnaire. The statistical analyses included exploratory factorial analyses, Pearson correlations and multiple linear regressions.

Results: The conspiracy mentality score during the COVID-19 pandemic was medium–high (mean 59.0 on a 0–100 scale) and slightly increased from 58.2 to 59.9 across months, in parallel with a slight decrease in trust in health institutions and scientific informational sources. Individuals aged >35 years, poorly educated and particularly scared about their financial situation were at risk of showing higher levels of conspirative mentality. Higher levels of conspirative mentality were risk factors for low levels of COVID-19 protective behaviours.

Conclusions: Clear and effective communication may improve trust in health institutions and informational sources, decrease conspirative theories and increase compliance with protective behaviour.

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Introduction

The COVID-19 pandemic has caused an enormous number of deaths and human suffering worldwide, posing extraordinary

challenges to public health. Italy was the first European country to suffer severe effects of the virus spread,¹ with a spiral of infections that placed it at the top of the international rankings. In this context, a range of conspiracy theories emerged in many countries, for example, the virus was purposely created in the laboratory, the virus was a hoax or a bioweapon, secret activities or organisations exist, COVID-19 vaccines had been developed before the pandemic, and the effects of the treatments (including vaccines) have not been disclosed. For example, a survey conducted with adults in the United States found that about 50% reported that they

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believed the virus was either probably or definitely intentionally created or accidentally released by China.² The onset and maintenance of conspiracy theories in facing uncertain and complex events such as the COVID-19 pandemic may be explained by the fact that theories and beliefs about such events grant individuals an illusion of control, which acts as palliative compensation for the lack of real control.^{3,4}

Conspiracy beliefs are particularly noteworthy in the current pandemic. They appear to be pervasive across time⁵ and tend to undermine any action against the conspiracy theories, in part because they are not easy to rebut.⁶ Conspiracy theories play a potentially damaging role in decreasing trust in authorities and institutions^{7,8} and in shaping health-related behaviour, acting as barriers to compliance with health protective behaviour such as poor adherence to medication regimens, resistance to preventive action and unwillingness to vaccinate.^{9–13} Several studies aimed at clarifying the association between conspiracy theories and health-related behaviour have shown that these theories can have negative impacts. For example, HIV conspiracy theories lead to negative attitudes toward HIV medication,^{14,15} and anti-vaccine conspiracy theories reduce the willingness of parents to vaccinate their children.⁹ Similar effects are expected during the COVID-19 pandemic.

Studies published in 2020 and 2021 on conspiracy beliefs and COVID-19 found that conspiracy mentality seems to be inversely related to a variety of factors such as educational level, threat perception of the pandemic, various preventive actions, perceived safety of vaccination, intention to be vaccinated against COVID-19, intention to take diagnostic or antibody tests, trust in different agencies and governments (e.g. media, health care, public health institutions, science) and adherence to public health experts' warnings or official recommendations.^{4,5,13,16–21}

Owing to the important impact of conspiracy mentality on several behavioural domains, it is crucial to investigate how it evolved with the progression of the COVID-19 pandemic, its association with other behavioural and psychological variables and its predictors. Therefore, the aims of our study were to (1) explore the changes in conspiracy mentality during four different periods of the COVID-19 pandemic in a large, representative sample of the Italian population; (2) assess the relationship between conspirative mentality and psychological and behavioural variables (e.g. trust, resilience, risk perception, auto-efficacy and arousal); (3) identify the sociodemographic and COVID-19-related experience predictors of conspirative mentality; and (4) explore the effect of conspirative mentality on COVID-19 protective behaviour.

Methods

Participants and procedures

This study is part of the larger project promoted by the World Health Organisation (WHO), “Monitoring knowledge, risk perceptions, preventive behaviours and trust to inform pandemic outbreak response” and carried out in over 30 countries of the WHO European Region (Registered ISRCTN on 11/05/2021, ID: ISRCTN26200758).

In Italy, the survey was conducted by administering an online questionnaire developed *ad hoc* by the WHO (January–May 2021) to 10,013 individuals aged 18–70 years across the four waves of the pandemic, with approximately 2500 participants for each wave.^{22–24} The four sample groups were selected using the same stratification method; they were equally representative of the Italian population and were therefore homogeneous and comparable. Therefore, in this manuscript, we henceforth use the term “sample” to refer to the four sample groups interviewed in the four waves.

A detailed sampling plan was developed to obtain a representative sample of the Italian adult population (for details, see <https://doi.org/10.1186/ISRCTN26200758>). The interviews were conducted using Doxa S.p.a. and carried out with the computer-assisted web interviewing technique on an online panel and on the Confront software platform used by Doxa S.p.a. The average administration time was approximately 18–20 min.

Measures

The WHO questionnaire included 21 thematic areas noteworthy for the investigation of the COVID-19 experience. The questionnaire was translated into the desired country language by the designated recruiting sites following the WHO guidelines for translations of study tools. The process included the following steps: forward translation, panel experts, back-translation, pretest and cognitive interviews and development of the final version.

In this article, we considered the following areas explored in the WHO survey:

- Sociodemographic characteristics (e.g. age, sex, education, rural/urban residence, financial situation, work status); personal experience of COVID-19 infection; trust in information sources (e.g. television, newspapers, health workers, social media, radio, Ministry of Health, Institute of Public Health, hotlines, official websites, celebrities, etc.); attitudes toward COVID-19 protective behaviours (hygiene, social behaviour, mask use, respecting social distancing protocol); COVID-19 risk perception; arousal; and auto-efficacy.
- The three items of the *Brief Resilience Scale*,²⁵ ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). Higher scores indicated higher resilience.
- The *Conspiracy Mentality Questionnaire*,²⁶ an instrument composed of five items to assess generic beliefs in conspiracy theories, ranged from 1 (*certainly not true*) to 7 (*certainly true*). Higher scores indicated a higher conspiracy mentality.
- The *WHO 5-item well-being scale (WHO-5)*: a measure of well-being composed of five items, ranged from 1 (*at no time*) to 6 (*all of the time*).²⁷ The overall score ranged from 0 to 100. A score ≤ 50 indicated poor psychological well-being, suggesting further investigation into possible symptoms of depression. A score ≤ 28 or below was indicative of clinical depression.

Statistical analyses

We performed nine different explorative factorial analyses on the respondents' scores of items that revealed the psychological (cognitive and emotional) and behavioural patterns of the interviewees: conspiracy mentality, risk perception, arousal, auto-efficacy, protective behaviours, trust in media information sources, trust in health information sources, frequency of use of media information sources, frequency of use of health information sources, trust in health institutions and resilience, for each of the four waves, separately. These items are listed in [Table 1S](#). Metric invariance among the waves was computed for each pattern. Because no significant difference was observed among the waves, explorative factorial analyses were performed on the four waves combined, and a single factor was estimated for each pattern. The factorial scores of each pattern were then transformed to assume values from 0 to 100 for better interpretation and were used in all subsequent analyses.

Categorical data were summarised as absolute and percentage frequencies, whereas quantitative data (normalised factorial scores) were presented as means and standard deviations.

Differences among waves in the distribution of categorical variables were assessed using the Chi-squared test, whereas differences in the mean values of quantitative variables were assessed using analysis of variance, followed by multiple comparisons corrected by the Bonferroni's method.

Pairwise correlations between behavioural and psychological scores were computed using the Pearson correlation coefficient.

A multiple linear regression was performed using the conspiracy index (normalised to 0–100) as the dependent variable and the following variables as independent variables: sex, age, education, occupation, presence of chronic diseases, area of residence, rural/urban zone, concerns about their own economic situation (due to the pandemic), having had COVID-19 (self) and knowing someone who was infected with COVID-19. Regression unstandardised coefficients (b) with 95% confidence intervals were calculated for each independent variable. All regression models were computed for each wave separately and for all waves combined (adjusting for waves). The heterogeneity statistic I^2 was computed to assess the heterogeneity of the estimated coefficients among waves. An I^2 value greater than 60% was considered indicative of substantial heterogeneity. The same multiple linear regressions were also performed, considering the protective behaviours index (transformed to a 0–100 scale) as the dependent variable and adding the conspiracy index (transformed to a 0–100 scale) to the independent variables listed above. Regression models' goodness-of-fit was calculated using the R^2 statistics. Regression models were built based on clinical considerations, on an accurate literature screening and findings of previous studies and on the availability of data included in the WHO questionnaire. All analyses were performed using STATA 16 based on the statistical weights provided by the DOXA.

Results

Sociodemographic, behavioural and psychological characteristics of the sample across the four waves

Table 1 shows the weighted absolute numbers and percentages of the sociodemographic and health variables of the study sample across the four waves. Sex, age, occupation, area of residence and rural/urban area were used as stratifying factors in the sampling strategy; hence, their distributions did not differ across the four waves. The percentage of participants infected with COVID-19 significantly increased from 5.7% in the first wave (mild: 5.4%; severe: 0.3%) to 9.3% in the fourth wave (mild: 8.2%; severe: 1.1%). Regarding concerns about their own economic situation due to the pandemic, the percentage of individuals who were not worried significantly increased from 11.5% in the first wave to 17.4% in the fourth.

Table 2 presents behavioural and psychological factorial scores across the four waves. The conspiracy score slightly increased over time, with a significant difference between waves 1 (58.20 ± 23.41) and 4 (59.90 ± 24.24). The highest level of trust in scientific information sources and health institutions and the highest use of scientific information sources were reached in wave 2, which showed significant differences compared with waves 3 and 4. The use of informal information sources decreased over time, with the only significant difference being between waves 1 and 4.

Correlations between conspirative mentality and psychological and behavioural aspects

The pairwise correlations between the conspiracy mentality factor and all other variables considered here (e.g. risk perception, arousal, auto-efficacy, protective behaviour, trust in informal

information sources, trust in scientific information sources, trust in scientific institutions, resilience and WHO-5 score) are presented in Table 2S. We considered only correlations with absolute values above or equal to 0.2. Conspiracy mentality was negatively correlated with trust in scientific information, either when considering all waves together ($r = -0.31$) or separately in the four waves (wave 1, $r = -0.37$; wave 2, $r = -0.30$; wave 3, $r = -0.32$; and wave 4, $r = .025$). Conspiracy mentality was also negatively correlated with trust in health institutions in the overall group ($r = -0.28$) and in the four waves (wave 1, $r = -0.32$; wave 2, $r = -0.27$; wave 3, $r = -0.29$; and wave 4, $r = -0.21$).

Predictors of conspirative mentality

The results of the multiple regression analysis are presented in Table 3. No heterogeneity was found among waves ($I^2 < 60\%$ for all predictors). The conspiracy index was higher in older (>35 years) and less-educated people. Being worried about the economic situation due to COVID-19 is associated with higher ratings on the conspiracy index, as well as not knowing about contracting the disease with respect to not having contracted it. Knowing someone who was infected with COVID-19 was associated with a decrease in conspiracy mentality levels. In terms of differences across the four waves, conspiracy mentality ratings increased significantly in the fourth wave compared with the first. We replicated the models for every wave, and the results were similar, merging all waves, with only a few exceptions: not knowing about having contracted the disease with respect to not having contracted it. This factor was not significant in any of the waves, although it was consistent with respect to direction and size across the four waves. In wave 3, people living in rural settings had a higher conspiracy index than those in urban settings, and subjects who did not suffer from any chronic illness had a lower conspiracy mentality index compared with those who reported suffering from at least one. In most other cases, the results for every wave individually do not reach statistical significance, although they are of the same magnitude and direction.

Predictors of protective behaviour

All predictors, apart from age (35–44 years) and occupation (being a health professional), were homogenous among the waves ($I^2 = 78\%$ and 77% , respectively). Women, older subjects (35 years and above), having a greater number of worries about the economic situation, and people who knew someone who died of COVID-19 reported higher levels of protective behaviour. Conversely, people who declared not to know if they had ever been infected or to have had a mild infection did not work in the health sector and did not have or did not know of having any chronic disease reported lower levels of protective behaviours. Finally, a slightly higher conspiracy normalised score was associated with lower levels of protective behaviours across all waves, with the exception of wave 3 (Table 4).

Discussion

Is there any consistent profile of individuals showing a 'conspirative' mentality?

We found that higher levels of conspirative mentality were associated with lower trust in scientific information sources and healthcare institutions. Furthermore, in our survey, conspirative mentality was associated with older age, lower education levels and greater number of worries about economic difficulties. Interestingly, individuals with the highest levels of conspirative beliefs were also the least likely to have personally known people who were directly infected by the SARS-CoV-2 virus or who died due to the infection.

Table 1
Sociodemographic characteristics and COVID-19 personal experience of the Italian general population (n = 10,013).

Characteristics	Wave 1		Wave 2		Wave 3		Wave 4		Total		χ^2 P
	n	%	n	%	n	%	n	%	n	%	
Sex											ns
Male	1244	49.7%	1243	49.7%	1245	49.7%	1242	49.7%	4974	49.7%	
Female	1260	50.3%	1259	50.3%	1262	50.3%	1258	50.3%	5039	50.3%	
Age (years)											ns
18–34	652	26.0%	652	26.0%	653	26.0%	651	26.0%	2607	26.0%	
35–44	481	19.2%	480	19.2%	481	19.2%	480	19.2%	1923	19.2%	
45–54	594	23.7%	594	23.7%	595	23.7%	594	23.7%	2377	23.7%	
55–70	777	31.0%	776	31.0%	778	31.0%	775	31.0%	3106	31.0%	
Educational level (years)											<0.0001
0–8 years	1027	41.0%	1026	41.0%	1028	41.0%	1025	41.0%	4105	41.0%	
9–13 years	772	30.8%	832	33.2%	891	35.5%	1013	40.5%	3507	35.0%	
>13 years	705	28.2%	645	25.8%	588	23.5%	462	18.5%	2400	24.0%	
Occupational status											0.16
Employed (not health sector)	1216	48.6%	1198	47.9%	1213	48.4%	1237	49.5%	4864	48.6%	
Employed (health sector)	93	3.7%	111	4.4%	98	3.9%	71	2.8%	373	3.7%	
Unemployed	1194	47.7%	1193	47.7%	1196	47.7%	1193	47.7%	4776	47.7%	
Chronic illness											0.0007
None	1869	74.7%	1890	75.5%	1841	73.4%	1810	72.4%	7411	74.0%	
Yes	548	21.9%	530	21.2%	544	21.7%	549	22.0%	2171	21.7%	
Do not know	86	3.5%	83	3.3%	122	4.9%	141	5.6%	431	4.3%	
Rural/urban area											ns
Rural	1920	76.7%	1918	76.7%	1922	76.7%	1917	76.7%	7677	76.7%	
Urban	584	23.3%	584	23.3%	585	23.3%	583	23.3%	2336	23.3%	
Italian region											
North-West	662	26.5%	662	26.5%	663	26.5%	661	26.5%	2649	26.5%	
North-East	480	19.2%	480	19.2%	481	19.2%	480	19.2%	1921	19.2%	
Centre	497	19.8%	496	19.8%	497	19.8%	496	19.8%	1985	19.8%	
South/Islands	865	34.5%	864	34.5%	866	34.5%	863	34.5%	3458	34.5%	
Concerns about their own economic situation											<0.0001
Absolutely not	49	2.0%	60	2.4%	52	2.1%	68	2.7%	230	2.3%	
Not	93	3.7%	78	3.1%	93	3.7%	107	4.3%	371	3.7%	
Partially not	145	5.8%	125	5.0%	169	6.7%	261	10.4%	700	7.0%	
Neither not nor yes	655	26.1%	647	25.9%	612	24.4%	577	23.1%	2491	24.9%	
Partially yes	685	27.4%	711	28.4%	722	28.8%	749	30.0%	2868	28.6%	
Yes	346	13.8%	367	14.7%	332	13.2%	353	14.1%	1397	14.0%	
Absolutely yes	531	21.2%	512	20.5%	527	21.0%	386	15.4%	1956	19.5%	
COVID-19 (self)											<0.0001
Do not know	233	9.3%	230	9.2%	191	7.6%	193	7.7%	847	8.5%	
No	2129	85.0%	2078	83.1%	2134	85.1%	2076	83.0%	8417	84.1%	
Yes, mild	136	5.4%	175	7.0%	158	6.3%	204	8.2%	673	6.7%	
Yes, severe	6	0.3%	19	0.8%	24	0.9%	27	1.1%	76	0.8%	
COVID-19 (others)											0.015
No	715	28.5%	687	27.5%	671	26.7%	666	26.6%	2738	27.3%	
Yes, alive	821	32.8%	767	30.7%	774	30.9%	862	34.5%	3224	32.2%	
Yes, deceased	969	38.7%	1048	41.9%	1062	42.4%	972	38.9%	4051	40.5%	

Table 2
Behavioural and psychological scores across the four waves in Italian general population (n = 10,013).

Factorial scores	Wave 1		Wave 2		Wave 3		Wave 4		TOT	P	W1 vs W2	W1 vs W3	W1 vs W4	W2 vs W3	W2 vs W4	W3 vs W4
	Mean	SD	Mean	SD	Mean	SD	Mean	SD								
Conspiracy	58.20	23.41	58.66	26.04	59.35	22.16	59.90	24.24	59.03	24.01	—	—	*	—	—	—
Risk perception	56.71	18.17	56.63	19.96	56.18	17.20	55.68	20.01	56.30	18.87	—	—	—	—	—	—
Arousal	63.38	28.50	64.14	31.09	63.92	27.54	59.97	31.91	62.86	29.86	—	—	**	**	**	**
Auto-efficacy	59.16	17.89	59.33	20.62	59.64	18.08	60.46	20.89	59.65	19.42	—	—	**	*	*	—
Protective behaviours	81.41	23.18	81.79	25.67	81.32	21.70	80.52	26.85	81.26	24.43	—	—	—	—	—	—
Trust in informal information sources	43.21	21.64	43.59	22.99	42.73	21.07	42.51	22.87	43.01	22.15	—	—	—	—	—	—
Trust in scientific information sources	64.02	25.00	65.21	26.30	62.86	24.38	63.08	27.31	63.79	25.78	—	—	—	**	**	—
Use of sources of informal information sources	36.07	21.14	35.97	22.54	35.42	21.28	34.56	23.06	35.51	22.02	—	—	*	—	—	—
Use of sources of scientific information sources	47.70	25.49	49.66	26.24	46.35	25.45	46.53	27.33	47.56	26.17	—	—	—	**	**	—
Trust in health institutions	61.71	24.08	62.34	25.94	60.41	23.97	60.49	25.95	61.24	25.01	—	—	—	**	**	**
Resilience	50.29	23.09	49.78	25.69	49.32	22.82	49.17	24.60	49.64	24.08	—	—	—	—	—	—

P-values in bold are significant at 0.05 level, *p-value for pairwise comparisons <0.05, ** p-value for pairwise comparisons <0.01.

Our results are in line with previous studies that identified how a higher conspirative mentality was associated with low educational levels^{28,29} and low trust in governments and aided institutions (e.g. media, health care, public health institutions) or in science and scientists.^{30–32}

According to the literature, conspiracy theories might be used by more psychologically vulnerable individuals to cope with uncertain and complex events, such as the COVID-19 pandemic, to attain an illusion of control, which may act as palliative compensation for the lack of real control.^{3,4} Moreover, the fact that more individuals with conspirative mentalities were more likely to not know people who were infected by or died because of the SARS-CoV-2 virus may be explained by the fact that the personal experience of this disease may reduce the conspirative belief that the pandemic was either not real or magnified by media or institutions.

Conspiracy mentality increased while trust in Health Institutions and scientific information sources decreased during the progression of the COVID-19 pandemic

Our findings show that the conspiracy mentality in an Italian representative sample was at a medium–high level and increased slightly from January to May 2021. Simultaneously, trust in health institutions and scientific information sources decreased. This maladaptive trend of the conspirative mentality is particularly important if we consider its potentially damaging role in influencing health-related behaviours, acting as barriers to satisfactory compliance with health protective behaviours^{9–13} or containment-related behaviours.³³ This result is somewhat different from the finding of another study⁵ in which the authors found a stability of conspiracy beliefs during the early phases of the COVID-19 pandemic. In any event, it should be emphasised that the differences found, albeit statistically significant, were small in magnitude, and the implications remain to be ascertained.

The result that higher conspirative mentality across time was accompanied by a decline in trust in healthcare institutions is in line with previous studies.^{7,8} However, due to the cross-sectional nature of our survey, we were unable to investigate any causal associations between conspirative mentality and trust. We may hypothesise that some public health decisions (e.g. lockdown and restriction measures, vaccination campaigns, promotion of social distancing) taken during the COVID-19 pandemic may have progressively impaired trust in official institutions and related information sources and may have amplified the conspirative mentality. In particular, the decisions that may have triggered this change may have included containment measures to reduce the spread of the contagion, the perceived lack of economic and social support to families and the perceived absence of strong and transparent communicative messages about vaccines (in particular with reference to the AstraZeneca vaccine). In fact, in Italy, from January to May 2021, there was a massive spread of information (including fake information) about vaccines, and this included numerous controversial issues regarding the AstraZeneca vaccine. This situation may have fuelled the conspirative mentality that affected trust in institutions.

Conspirative mentality affects COVID-19 protective behaviour

We found that lower levels of conspirative mentality, together with sociodemographic and clinical variables such as being women, being older than 35 years, being unoccupied, having a chronic illness, being worried about the economic situation, not having had the COVID-19 infection and knowing someone

Table 3
Multiple regression analyses on conspiracy normalised score.

Independent variables	Waves 1 + 2 + 3 + 4			Wave 1			Wave 2			Wave 3			Wave 4		
	N	10,013		N	2504		N	2502		N	2507		N	2500	
	F(28,9984)	25.040		F(25,2478)	7.670		F(25,2476)	6.040		F(25,2481)	10.430		F(25,2474)	7.790	
	P (F)	<0.001		P (F)	<0.001		P (F)	<0.001		P (F)	<0.001		P (F)	<0.001	
	R-squared	0.073		R-squared	0.074		R-squared	0.066		R-squared	0.094		R-squared	0.085	
	Coeff ^a	95% CI l	95% CI u	Coeff ^a	95% CI l	95% CI u	Coeff ^a	95% CI l	95% CI u	Coeff ^a	95% CI l	95% CI u	Coeff ^a	95% CI l	95% CI u
Sex															
Females vs males	−0.017	−0.797	0.764	0.230	−1.413	1.873	−0.736	−2.350	0.878	−0.624	−2.234	0.985	0.973	−0.501	2.446
Age (years)															
35–44 vs 18–34 years	2.954	1.772	4.135	3.042	0.578	5.506	2.770	0.196	5.344	4.678	2.463	6.893	1.005	−1.324	3.334
45–54 vs 18–34 years	2.475	1.321	3.629	2.181	−0.157	4.519	1.258	−1.291	3.807	3.524	1.254	5.794	2.468	0.220	4.715
55–70 vs 18–34 years	3.048	1.973	4.123	2.920	0.707	5.133	2.392	0.180	4.604	4.100	1.941	6.259	2.705	0.630	4.780
Educational level (years)															
9–13 vs 0–8 years	−0.578	−1.474	0.318	−1.386	−3.301	0.529	−0.636	−2.618	1.347	−1.010	−2.825	0.805	0.189	−1.491	1.869
>13 vs 0–8 years	−4.343	−5.395	−3.292	−4.147	−6.270	−2.025	−6.040	−8.327	−3.754	−4.374	−6.497	−2.251	−3.531	−5.617	−1.444
Occupational status															
Yes (not health sector) vs No	0.144	−0.679	0.967	0.679	−1.086	2.443	0.386	−1.304	2.076	−0.628	−2.264	1.008	0.215	−1.409	1.839
Yes (health sector) vs No	−1.515	−3.751	0.722	−1.988	−5.842	1.865	−0.467	−5.052	4.118	1.050	−3.200	5.300	−6.039	−10.992	−1.086
Chronic illness															
No vs Yes	−0.866	−1.839	0.107	0.116	−1.869	2.100	−1.016	−3.082	1.051	−2.322	−4.209	−0.434	−0.097	−1.930	1.736
Do not know vs Yes	0.131	−1.815	2.077	2.501	−2.145	7.148	−2.646	−6.993	1.701	−0.676	−4.328	2.977	1.360	−1.968	4.688
Geographical area															
North-West vs Centre	−1.012	−2.206	0.182	−0.217	−2.701	2.266	−0.705	−3.150	1.741	−1.482	−3.781	0.816	−1.262	−3.623	1.100
North-East vs Centre	0.982	−0.162	2.126	2.727	0.464	4.990	1.962	−0.426	4.350	0.065	−2.228	2.358	−1.004	−3.208	1.201
South/Islands vs Centre	0.298	−0.712	1.307	0.794	−1.263	2.851	0.669	−1.426	2.764	−1.032	−3.056	0.991	0.944	−0.978	2.865
Rural/urban area															
Rural vs urban	0.652	−0.264	1.569	0.159	−1.740	2.057	1.359	−0.556	3.274	2.107	0.321	3.893	−0.589	−2.462	1.284
Concerns about their own economic situation															
Absolutely not vs neither not nor yes	−2.586	−6.224	1.052	−0.559	−8.939	7.821	−2.424	−9.079	4.230	−2.226	−8.822	4.370	−3.692	−10.988	3.604
Not vs neither not nor yes	−1.192	−3.657	1.272	−1.586	−6.468	3.295	−1.859	−7.761	4.043	3.532	−1.380	8.443	−4.013	−8.122	0.097
Partially not vs neither not nor yes	−1.441	−3.027	0.144	1.211	−2.218	4.640	−0.899	−4.799	3.001	−1.542	−4.552	1.468	−3.228	−5.925	−0.532
Partially yes vs neither not nor yes	2.915	1.944	3.886	3.478	1.473	5.484	2.893	0.884	4.902	2.248	0.237	4.258	3.089	1.297	4.882
Yes vs not vs neither not nor yes	5.995	4.729	7.260	8.110	5.562	10.659	4.283	1.634	6.932	6.097	3.531	8.663	5.642	3.257	8.027
Absolutely yes vs neither not nor yes	11.295	10.090	12.499	11.804	9.399	14.209	9.575	7.207	11.943	12.256	9.874	14.638	11.726	9.178	14.274
Having had COVID-19															
Do not know vs No	1.622	0.289	2.956	1.269	−1.411	3.949	1.048	−1.784	3.880	1.988	−0.684	4.660	2.291	−0.159	4.740
Yes, mild vs No	0.288	−1.302	1.877	1.504	−1.816	4.823	1.794	−1.635	5.223	−0.150	−3.269	2.970	−1.206	−3.987	1.574
Yes, severe vs No	3.383	−1.460	8.227	5.617	−6.287	17.521	1.367	−12.497	15.230	4.222	−3.024	11.469	3.541	−2.748	9.831
Knowing people who had COVID-19															
Yes, alive vs No	−2.856	−3.849	−1.863	−3.168	−5.217	−1.118	−2.982	−5.005	−0.958	−3.408	−5.390	−1.427	−2.060	−3.976	−0.143
Yes, deceased vs No	−2.374	−3.333	−1.416	−1.985	−3.962	−0.009	−2.415	−4.326	−0.505	−3.348	−5.270	−1.426	−1.939	−3.796	−0.082
Wave															
Wave 2 vs Wave 1	0.371	−0.738	1.480												
Wave 3 vs Wave 1	1.023	−0.066	2.111												
Wave 4 vs Wave 1	1.994	0.920	3.068												
Constant	55.388	53.390	57.385	53.388	49.650	57.125	56.847	52.923	60.771	57.341	53.605	61.078	57.424	53.741	61.108

P-values in bold are significant at 0.05 level.

^a Unstandardised coefficients.

Table 4
Multiple regression analyses on protective behaviours normalised score.

Independent variables	Waves 1 + 2+3 + 4			Wave 1			Wave 2			Wave 3			Wave 4		
	N	10,013		N	2504		N	2502		N	2507		N	2500	
	<i>F</i> (29,9983)	25.280		<i>F</i> (26,2477)	8.910		<i>F</i> (26,2475)	8.210		<i>F</i> (26,2480)	8.150		<i>F</i> (26,2473)	6.400	
	<i>P</i> (F)	<0.001		<i>P</i> (F)	<0.001		<i>P</i> (F)	<0.001		<i>P</i> (F)	<0.001		<i>P</i> (F)	<0.001	
	R-squared	0.072		R-squared	0.087		R-squared	0.083		R-squared	0.080		R-squared	0.076	
	Coeff ^a	95%CI l	95%CI u	Coeff ^a	95%CI l	95%CI u	Coeff ^a	95%CI l	95%CI u	Coeff ^a	95%CI l	95%CI u	Coeff ^a	95%CI l	95%CI u
Conspiracy normalised score	-0.033	-0.051	-0.014	-0.050	-0.088	-0.013	-0.035	-0.068	-0.001	-0.009	-0.046	0.028	-0.044	-0.087	0.000
Sex															
Females vs males	5.597	4.952	6.241	5.697	4.403	6.991	5.402	4.170	6.633	6.510	5.207	7.814	4.642	3.290	5.993
Age (years)															
35–44 vs 18–34 years	1.324	0.279	2.369	0.998	-1.086	3.082	2.770	0.720	4.819	2.772	0.793	4.750	-2.214	-4.516	0.089
45–54 vs 18–34 years	2.412	1.454	3.371	1.173	-0.702	3.048	3.046	1.051	5.040	2.383	0.518	4.249	1.822	-0.197	3.840
55–70 vs 18–34 years	3.087	2.199	3.975	2.047	0.266	3.827	3.838	2.058	5.618	2.930	1.205	4.656	3.134	1.267	5.001
Educational level (years)															
9–13 vs 0–8 years	0.335	-0.411	1.082	-0.966	-2.502	0.569	-0.068	-1.566	1.430	1.191	-0.318	2.700	1.208	-0.329	2.746
>13 vs 0–8 years	0.043	-0.833	0.919	-1.077	-2.737	0.582	0.332	-1.398	2.063	-0.238	-2.029	1.554	1.290	-0.646	3.226
Occupational status															
Yes (not health sector) vs No	-0.838	-1.519	-0.158	-1.145	-2.495	0.204	-0.924	-2.216	0.368	-0.355	-1.724	1.014	0.090	-1.405	1.585
Yes (health sector) vs No	-0.185	-1.975	1.605	2.226	-0.923	5.376	-0.169	-3.335	2.997	2.655	-0.287	5.597	-6.699	-11.913	-1.485
Chronic illness															
No vs Yes	-0.890	-1.648	-0.131	-1.957	-3.399	-0.515	0.318	-1.164	1.800	-1.108	-2.645	0.429	-0.917	-2.525	0.692
Do not know vs Yes	-4.378	-6.166	-2.590	-5.207	-9.175	-1.240	-3.123	-6.343	0.097	-5.276	-8.708	-1.843	-3.136	-6.536	0.264
Geographical area															
North-West vs Centre	1.139	0.165	2.113	1.157	-0.778	3.092	0.137	-1.760	2.034	1.344	-0.566	3.254	1.882	-0.185	3.950
North-East vs Centre	-0.024	-1.011	0.963	0.247	-1.666	2.159	0.804	-1.071	2.680	0.298	-1.639	2.234	-1.563	-3.724	0.598
South/Islands vs centre	2.566	1.717	3.415	3.255	1.594	4.916	3.112	1.515	4.708	1.784	0.062	3.507	2.085	0.232	3.937
Rural/urban area															
Rural vs urban	0.037	-0.721	0.794	0.878	-0.664	2.420	-0.015	-1.488	1.458	-1.041	-2.493	0.411	0.988	-0.673	2.650
Concerns about their own economic situation															
Absolutely not vs neither not nor yes	-5.015	-8.227	-1.803	-0.511	-7.031	6.008	-3.853	-9.820	2.115	-5.048	-11.105	1.008	-8.684	-15.152	-2.217
Not vs neither not nor yes	-0.568	-2.334	1.199	-1.733	-5.669	2.203	0.588	-3.214	4.390	0.004	-3.039	3.046	-1.013	-4.330	2.304
Partially not vs neither not nor yes	-2.827	-4.260	-1.394	-2.428	-5.380	0.524	-2.221	-5.060	0.618	-2.680	-5.596	0.235	-3.393	-6.096	-0.691
Partially yes vs neither not nor yes	0.311	-0.539	1.161	1.185	-0.495	2.864	0.407	-1.203	2.017	-0.294	-2.046	1.458	0.185	-1.605	1.975
Yes vs not vs neither not nor yes	2.392	1.354	3.430	3.402	1.266	5.539	2.108	0.090	4.126	2.185	0.128	4.243	2.226	0.103	4.348
Absolutely yes vs neither not nor yes	3.174	2.184	4.165	4.000	2.135	5.865	4.485	2.662	6.307	2.154	0.182	4.126	2.110	-0.256	4.477
Having had COVID-19															
Do not know vs No	-3.971	-5.198	-2.744	-4.658	-6.936	-2.380	-3.799	-6.004	-1.595	-2.653	-5.157	-0.150	-3.882	-6.758	-1.006
Yes, mild vs No	-2.971	-4.339	-1.602	-1.847	-4.773	1.079	-3.500	-5.966	-1.034	-4.101	-7.180	-1.022	-2.185	-4.748	0.378
Yes, severe vs No	-2.300	-6.351	1.751	4.292	-1.133	9.718	2.876	-4.191	9.942	-3.098	-11.701	5.506	-6.481	-13.226	0.264
Knowing people who had COVID-19															
Yes, alive vs No	0.334	-0.551	1.219	-0.022	-1.739	1.695	0.457	-1.229	2.142	0.307	-1.507	2.122	-0.031	-1.869	1.806
Yes, deceased vs No	2.281	1.449	3.113	1.690	0.048	3.331	2.588	1.018	4.159	2.137	0.464	3.811	2.632	0.854	4.409
Wave															
Wave 2 vs Wave 1	0.367	-0.499	1.233												
Wave 3 vs Wave 1	-0.078	-0.964	0.809												
Wave 4 vs Wave 1	-0.416	-1.341	0.509												
Constant	77.429	75.394	79.463	79.467	75.590	83.343	75.854	72.253	79.455	76.309	72.328	80.290	77.991	73.612	82.371

^a Unstandardised coefficients.

deceased from the infection were associated with higher levels of COVID-19 protective behaviour. This result confirms previous reports showing that conspiracy mentality is inversely associated with adherence to medication regimens, preventive action and willingness to vaccinate.^{9–13} This association may be because individuals with generic conspirative mentality (i.e. not strictly related to the pandemic) were probably more likely to adhere to conspirative theories about the real existence and extension of the COVID-19 pandemic (e.g. believing that the pandemic was exacerbated by media or institutions). This may explain why they were more likely to not comply with protective behaviours.

Limitations

This study has several limitations. Because we used an online survey, it is likely that the findings of the study underrepresented the responses of those with certain demographic characteristics (e.g. less educated and less affluent people and older respondents). Not everybody has access to the Internet; the online survey methodology is relatively uncontrolled, and the results are less generalisable. Furthermore, the Conspiracy Mentality Questionnaire assesses generic beliefs in conspiracy theories and is not specifically related to the COVID-19 pandemic. Finally, R2 for all models are quite low, and this implies that factors other than sociodemographics, not included in the models, might help explain the variability of conspiracy and protective behaviours.

Conclusions

This study highlights that individuals aged >35 years, poorly educated and particularly worried about their financial situations are at a particular risk of reporting higher levels of conspiracy mentality. Conspiracy mentality in Italy during the COVID-19 pandemic was medium–high and increased slightly over time, in parallel with a decrease in trust in health institutions and scientific/formal informational sources. Furthermore, conspirative mentality was a risk factor for low levels of COVID-19 protective behaviours.

Our findings highlight that during a pandemic, there is an urgent need for clear, effective and earnest communication tailored to specific population subgroups that for their sociodemographic characteristics might be more vulnerable to conspirative mentality. This may improve trust in health institutions and official information sources and, in turn, increase compliance with protective behaviour recommended by public health authorities.

Author statements

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Ethical approval

The studies involving human participants were reviewed and approved by IRCCS San John of God Fatebenefratelli of Brescia (protocol 286/2020). The patients/participants provided their written informed consent to participate in this study.

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Competing interests

None declared.

Data availability

The data sets presented in this study can be found in online repositories. Data sets and codes are available here: <http://doi.org/10.5281/zenodo.5040719>.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.puhe.2022.11.005>.

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