



Conspiracy Beliefs and Covid-19 Vaccination Hesitancy in Italy: A Cross-Sectional Study

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Abstract

Background: This cross-sectional study examines sociodemographic characteristics and conspiracy beliefs among vaccinated and unvaccinated during the COVID-19 pandemic.

Methods: 317 Italian-speaking participants were surveyed online, categorized by vaccination status. Sociodemographic variables were compared, and an exploratory factor analysis assessed conspiracy beliefs.

Results: Of 217 vaccinated and 100 unvaccinated participants, differences in demographics and vaccine-related attitudes were observed. Vaccinated individuals sought more information online and had lower conspiracy beliefs than unvaccinated individuals. The exploratory factor analysis revealed a single factor, which was found to be significantly higher among unvaccinated participants, suggesting a correlation between vaccine hesitancy and belief in conspiracy theories.

Conclusion: Addressing conspiracy beliefs may help increase vaccination rates in Italy. The study's limitations and implications for future research are discussed.

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INTRODUCTION

Vaccination hesitancy (VH) has gained significant research attention since the 2000s, owing to its impact on vaccine-preventable diseases. VH is defined as the "delay in acceptance or refusal of vaccination despite the availability of vaccination services" (MacDonald, 2015) and has been described as a multifaceted phenomenon influenced by various factors specific to different contexts, timeframes, locations, and vaccines (Larson et al., 2014).

In the realm of public health, it has been observed that VH is influenced by various factors, including beliefs in conspiracy theories (Limbu & Gautam, 2023). Conspiracy beliefs can be defined as "the unnecessary use of a superfluous explanation when simpler and more probable explanations are available" (Brotherton et al., 2013). The proliferation of conspiracy theories has been shown to adversely affect health (Van Prooijen & Douglas, 2018; Žeželj & Lazarević, 2019). For these reasons, in the past 15 years, there has been a notable increase in scientific literature addressing conspiracy beliefs. Studies suggest that the spread of conspiracy theories in Italy has contributed to the low acceptance of influenza vaccines before Covid-19 (Mancosu et al., 2017). Although Covid-19 vaccines have been developed to end the pandemic, their successful deployment has faced challenges, as in the past for the seasonal flu, owing to the resurgence of conspiracy theories (Salazar-Fernández et al., 2023). During the pandemic, Italy faced early challenges as the first European nation to hit in February 2020. Stringent measures have led to a temporary increase in institutional trust, yet political polarization and public distrust have also risen (Lello et al., 2022). In a study of parents generally open to vaccines, only approximately 26% accepted Covid-19 vaccines in Italy, dropping to 22.4% when considering multiple doses and reduced efficacy (Fedele et al., 2021). Another study found a 64.6% acceptance rate in the Italian population (Zarbo et al., 2022), whereas a cross-country review noted that Italy's acceptance rate exceeded 80%, surpassing the WHO goal of 70% by mid-2022 (Wang et al., 2022).

Given these considerations and the

limited existing literature on the Italian population during the first wave of the pandemic, it is important to investigate the differences between individuals who have already been vaccinated and those who have not and do not intend to be vaccinated, to provide valuable insights into the role of conspiracy beliefs in shaping vaccination decisions and not the simple intention to get vaccinated.

This cross-sectional study conducted in Italy aimed to examine the sociodemographic profiles of vaccinated and unvaccinated individuals and investigate potential disparities in agreement with country-specific conspiracy beliefs during the initial phase of the pandemic when vaccination (at least one dose) was universally accessible, defining vaccination hesitancy as the self-reported reception of at least one dose of the Covid-19 vaccine.

METHODS

This cross-sectional study was conducted in Italy from August 2021 to May 2022, approximately one year and four months after the first lockdown. Snowball sampling was used to recruit participants via social media and email, ensuring no missing data, as all questions were mandatory. Informed consent was obtained from each participant and ethical standards were obtained according to the Declaration of Helsinki and approved by the Institutional Review Board (PSYCH20/2021).

Participants

A total of 343 Italian-speaking participants completed the survey. A total of 340 participants who provided their consent were included in the analysis. Twenty-three participants (6.7%) responded to the survey twice; the second responses were excluded (N=317). The participants' characteristics are presented in Table 1. Their mean age was 36.83 years (SD = 13.09) years, ranging from 18 to 73 years.

Survey measures

The instrument, specifically crafted for this study, comprised sections addressing sociodemographic factors, inquiries about Covid-19 vaccination and motivations, the perceived influence of vaccination campaign information, and conspiracy beliefs among vaccinated and unvaccinated individuals

Data analysis

Categorical data were presented as N (%) and continuous data as means (SD), and chi-squared tests with p-values were calculated with 95% confidence intervals (CIs). Chi-square and Student's t-tests were used when the normality assumption was violated, and the Mann-Whitney U test for independent samples was performed. An Exploratory Factor Analysis was conducted to examine the structure of the conspiracy questionnaire (maximum likelihood estimation, direct oblimin rotation method, and elimination of coefficients smaller than 0.30). The prerequisite was an inter item correlation of at least moderate (> 0.50). Cronbach's alpha was also examined. To clarify the magnitude of the effect size, Z was rescaled in η^2 and η^2 was rescaled in the f index ($\eta^2 / \eta^2 - 1$). The effect size was defined as small, medium, or large, based on (f) equal to 0.1, 0.25, and 0.40, respectively. SPSS (IBM SPSS Statistics Version 26 for Mac OS) was used for statistical analysis. $P < .05$ was considered statistically significant for all analyses.

RESULT AND DISCUSSION

The characteristics of both the vaccinated and unvaccinated samples, particularly those focusing on sociodemographic factors, are detailed in Table 1.

There was a difference in sex, with more women vaccinated than men (79.7% vs. 20.3%, $\chi^2 = 6.026$, $P = 0.014$). There were fewer men than expected ($\chi^2 = 16.208$, $p < 0.001$) in the non-vaccinated and unvaccinated groups. In our sample, the vaccinated had a mean age of 36.26 years ($SD = 12.76$) and the unvaccinated of 38.04 ($SD = 13.77$). The mean age was equal for vaccinated and non-vaccinated (17-73; $t = 1.092$, $p = 0.276$). There was no difference in domestic status between the groups ($\chi^2 = 9.838$, $p = 0.132$). There was a statistically significant difference between the two groups regarding geographical origin ($\chi^2 = 13.198$, $p = 0.001$): There were more vaccinated subjects from the North regions than expected. Moreover, vaccinated individuals were more educated than unvaccinated individuals ($\chi^2 = 50.076$; $p < 0.0001$).

Questions regarding Covid-19 vaccination and its motivations

Variables related to Covid-19 are presented in Table 2. A total of 217 subjects were vaccinated (68.5%) and 100 were not vaccinated (31.5%). Among the vaccinated subsamples, 152 (47.95%) received 2 doses, 15 (4.73%) received 3 doses, and 50 (15.77%) received three doses. When the questionnaires were posted online, a third dose was not available

Among the vaccinated subsamples ($n = 217$) 47,9% did not report any side effects of the vaccine, 13,8% declared side effects after the first dose, 18,8% after the second dose, 12% after the first two doses administered separately, 3,7% after all three doses, another 3,7% after all doses. On a Likert scale (10-points) the vaccinated declared a mean perceived severity of vaccine side effect of 3.95 ($SD 1.89$). Unsurprisingly, unvaccinated people contracted more Covid-19 (53.6%) than vaccinated people (46.4%) ($\chi^2 = 25.674$, $p < 0.001$).

Among the non-vaccinated individuals, 54% intended to be vaccinated. Regarding those who declared to have an intention to receive the vaccine in the future but were not already vaccinated, the intention to get the vaccine was measured on a 10-point Likert scale (1 = strongly disagree, 10 = strongly agree). Mean agreement of the intention was 1.52 ($SD 0.836$).

Personal relationship quality (improved, unchanged, and deteriorated) exhibited noteworthy variance among participants ($\chi^2 = 14.06$, $p = 0.001$). Overall, 11.4% of the respondents reported an enhancement in their relationships, while 51.7% did not. Conversely, a decrease was noted in 36.9% of the participants. Only 3% of non-vaccinated responders claimed deterioration in their relationships as opposed to vaccinated individuals, indicating improvement, accounting for 15.2%.

Motivations to refuse the vaccine were fear of possible side effects (47.8%) and belief in the inefficacy of the vaccine in contrast to the virus (43.48%). Another 8.69% are usually opposed to vaccinations per se.

The mean self-rated belief in the probability of contracting the disease after the vaccine was 6.29 ($SD 3.11$), and it was evaluated the same in the two groups ($t = 5.43$, $p = 0.18$).

Table 1. Sample Characteristics (N = 317). Vaccinated = V; Not Vaccinated = N.V.

Variable	N (%)	V. N (%)	N.V. N (%)	χ^2	<i>p</i>
Gender					
Female	240 (75.7)	173 (72.1)	67 (27.9)	6.03	0.014
Male	77 (24.3)	44 (57.1)	33 (42.9)		
Domestic status				9.838	0.132
Single	69 (21.8)	49 (71)	20 (29)		
Married	107 (33.8)	64 (59.8)	43 (40.2)		
Divorced/separated	15 (4.7)	9 (60)	6 (40)		
In a relationship	68 (21.5)	53 (77.9)	15 (22.1)		
Living together	53 (16.7)	39 (73.6)	14 (26.4)		
Other	5 (1.6)	3 (60)	2 (40)		
Region				13.198	0.001
North	103 (32.5)	83 (80.6)	20 (19.4)		
Center	26 (8.2)	6 (23.1)	20 (76.9)		
South and islands	188 (59.3)	114 (60.6)	74 (39.4)		
Education				50.619	0.000
Primary school	2 (0.6)	1 (50)	1 (50)		
Middle school	29 (9.1)	9 (31)	20 (69)		
High school	102 (32.2)	55 (53.9)	47 (46.1)		
Bachelor's degree	64 (20.2)	48 (75)	16 (25)		
Master's degree	56 (17.7)	46 (82.1)	10 (17.9)		
Doctorate	4 (1.3)	3 (75)	1 (25)		
Specialization school	55 (17.4)	51 (92.7)	4 (7.3)		
Other	5 (1.6)	4 (80)	1 (20)		
University type (n=69)				50.619	0.000
Bachelor	35 (50.7)	27 (77.1)	8 (22.9)		
Master	31 (44.9)	24 (77.4)	7 (22.6)		
Single cycle degree	3 (4.3)	2 (66.7)	1 (33.3)		
Work type				75.948	0.000
Legislators, entrepreneurs and managers	5 (1.6)	3 (60)	2 (40)		
Intellectual, Scientific and Highly Specialized	77 (24.3)	72 (93.5)	5 (6.5)		
Technical professions	20 (6.3)	13 (65)	7 (35)		
Executive professions in the office work	27 (8.5)	18 (66.7)	9 (33.3)		
Skilled professions in business and services	25 (7.9)	17 (68)	8 (32)		
Artisans, Skilled Laborers and Farmers	24 (7.6)	8 (33.3)	16 (66.7)		
Plant Drivers, Fixed and Mobile Machinery Workers and Vehicle Drivers	7 (2.2)	2 (28.6)	5 (71.4)		
Unskilled professions	14 (4.4)	1 (7.1)	13 (92.9)		
Armed Forces	5 (1.6)	3 (60)	2 (40)		
Students	72 (22.7)	1 (50)	1 (50)		
University student	69 (21.8)	54 (77.1)	16 (22.9)		
Unemployed	27 (8.5)	13 (48.1)	14 (51.9)		
Other	14 (4.4)	12 (85.7)	2 (14.3)		

Table 2. Questions regarding Covid-19 (N = 317)

Question	N (%)	V. N (%)	N.V. N (%)	X ²	p
Affected by Covid-19					
Yes	84 (26.5)	39 (46.4)	45 (53.6)	25.674	0.000
No	233 (73.5)	178 (76.4)	55 (23.6)		
Affected by Covid-19 at the moment					
Yes	28 (8.8)	7 (25)	21 (75)	7.754	0.005
No	56 (17.7)	32 (57.1)	24 (42.9)		
Isolation at the moment					
Yes	33 (10.4)	9 (27.3)	24 (72.7)	28.928	0.000
No	284 (89.6)	208 (73.2)	76 (26.8)		
Duration of isolation (n=33)					
24h	1 (0.3)	0	1 (100)	37.694	0.000
48h	3 (0.9)	3 (100)	0		
About 1 week	17 (5.4)	3 (27.3)	8 (72.7)		
About 15 days	11 (3.5)	0	1 (100)		
About 1 month	1 (0.3)	3 (17.6)	14 (82.4)		
Relatives affected by Covid-19					
Yes	119 (37.5)	133 (67.2)	65 (32.8)	0.402	0.526
No	198 (62.5)	84 (70.6)	35 (29.4)		
Parents or relatives died of Covid					
Yes	66 (20.8)	52 (78.8)	14 (21.2)	4.122	0.042
No	251 (79.2)	165 (65.7)	86 (34.3)		
Hospitalized (n=84)					
Yes	5 (6)	2 (40)	3 (60)	0.088	0.766
No	79 (94)	37 (46.8)	42 (53.2)		

Table 3. Percentage of weak, moderate, and strong belief endorsements for each conspiracy theory statement

	% No-to-Weak	% Moderate	% Strong
It's useless to get the vaccine because it doesn't protect against the virus and it doesn't stop the epidemic	61.2	31.8	6.9
The new Coronavirus has mutated so the vaccine is useless	51.1	26.8	22
The vaccine is useless because immunity lasts only a few weeks	56.2	23.9	19.8
I don't trust vaccines because they only serve to make money for pharmaceutical companies	56.5	19.2	24.2
I think the Covid-19 vaccine will cause myocarditis	86.1	9.5	4.3
I consider the anti-Covid-19 vaccines dangerous	33.4	44.9	21.8
Vaccines against Covid-19 are dangerous because they cause ADE, the Antibody Dependent Enhancement, reactions whereby some antibodies instead of blocking a virus facilitate its entry into cells	55.5	22.3	13.6
The vaccine is dangerous because it modifies DNA	64	13.5	22.4
There is no need to get vaccinated if you pay attention	62.5	13.3	24.3
I do not get vaccinated because my fertility could be compromised	66.9	11	22
It's all a conspiracy built/mounted by pharmaceutical companies to get an economic return	59.9	15.4	24.6
It is all a conspiracy built by the States	62.1	14.2	23.6
Covid-19 vaccines have not been tested enough	28.7	71.2	19.9
Covid-19 was deliberately created in a laboratory	39.7	36	24.3

Vaccination campaign information perceived influence

There was a significant difference in the perceived influence of information and news from the web/social networks on the propensity to Covid-19 vaccine: not vaccinated (51.8%) were those who declared that they were more influenced by information and news ($\chi^2 = 32.855, p < 0.001$) compared to those who had already been vaccinated (48.2%). Vaccinated individuals liked to receive more vaccine details compared to the unvaccinated group (37.1%) ($\chi^2 = 8.037, p = .005$).

Questions regarding conspiracy beliefs asked to the whole sample

The inquiry focused on assessing disparities in beliefs about conspiracies between vaccinated and unvaccinated individuals in an Italian sample. Questions regarding conspiracy beliefs were administered to the entire sample, revealing positive and statistically significant correlations among all conspiracy items ranging

from 0.50 0.9. To depict the prevalence (%) of conspiracy beliefs in the sample, quartiles were calculated by dividing the distribution of responses across the 14 items and presenting the percentage of subjects in each percentile (1) 1-25%; 2) 26-50%; 3) 51-99%), as detailed in Table 3.

As suggested by Constantinou et al. (2021), they represent the strength of conspiracy beliefs as 1) zero to weak, 2) moderate, or 3) strong. Exploratory Factor Analysis of the 14 conspiracy items produced only one factor, with 77.49% of the variance explained. An examination of the Kaiser-Meyer Olkin measure of sampling adequacy suggested that the sample was factorable (KMO = .956). The fourteen statements relied heavily on a single factor. Table 4 lists the mean (SD) and loading factors. The factor was labeled “CAC” “Conspiracy against Covid-19.” The internal reliability of the 14 conspiracy theories was high (Cronbach’s alpha = .974).

Table 4. Average responses M (SD), loading factor (LF) “CAC”

Degree of agreement with the following statements	M (SD)	LF
It's useless to get the vaccine because it doesn't protect against the virus and it doesn't stop the epidemic	2.93 (3.044)	0.937
The new Coronavirus has mutated so the vaccine is useless	3.15 (3.074)	0.914
The vaccine is useless because immunity lasts only a few weeks	2.91 (2.802)	0.904
I don't trust vaccines because they only serve for pharmaceutical companies making money	2.97 (2.908)	0.897
I think that the Covid-19 vaccine will cause myocarditis	3.48 (3.014)	0.895
I consider the anti-Covid-19 vaccines dangerous	4 (3.296)	0.890
Vaccines against Covid-19 are dangerous because they cause ADE, the Antibody Dependent	3.07 (3.033)	0.886
The vaccine is dangerous because it modifies DNA	2.68 (2.819)	0.885
There is no need to get vaccinated if you pay attention	2.74 (2.823)	0.881
I do not get vaccinated because my fertility could be compromised	2.67 (2.954)	0.858
It's all a conspiracy built by pharmaceutical companies to get an economic return	2.82 (2.910)	0.844
It is all a conspiracy built by the States	2.50 (2.533)	0.814
Covid-19 vaccines were not tested enough	5.33 (3.346)	0.722
Covid-19 was deliberately created in a laboratory	4.01 (3.338)	0.672

Bivariate Pearson’s correlations were also calculated. These factors were significantly correlated with sex ($r = 0.122; p < 0.05$), vaccination ($r = -0,672; p < 0.01$), and being affected by Covid-19 ($r = 0.244; p < 0.01$). This factor was not correlated with age or hospitalization.

A Q-Q plot showed a platykurtic distribution of CAC; therefore, we decided to apply a non parametric analysis to test for the difference between vaccinated and non vaccinated individuals. Median beliefs of CAC between Vaccinated and Not-Vaccinated groups were -0,65 and 1.04 and they differed

significantly ($U = 2684.5$, $p < 0.0001$ two-tailed; $Z = -10.77$; $\eta^2 = -0.03$; $f = 0.17$). This result was consistent with the t-test (vaccinated $M = 0.978$ $SD = 1.029$; unvaccinated $M = -0.451$ $SD = 0.548$; $t = 13.048$ $p < 0.0001$) and had a large effect size ($d = 1.732$ $CI [1.25, 1.60]$).

Our study found a strong association between beliefs and Covid-19 vaccine refusal in Italy, between August 2021 and May 2022. We also identify sociodemographic variables, media influence, motivations for vaccine refusal, and prevalent conspiracy theories among unvaccinated individuals. Our vaccination rate of 68.5% is consistent with the global average reported by Kazemini et al., who estimated a vaccination rate of 63.9% by May 2021.

We observed that among those not yet vaccinated but intending to do so in the future, approximately 54% expressed this intent, while approximately 31.5% did not intend to be vaccinated. Interestingly, when we examined their intention intensity, it was notably low, and they appeared similar to other non-vaccinated individuals in terms of their choice of vaccination. These findings suggest that a notable proportion of people who express intent to be vaccinated do not follow through, emphasizing the importance of monitoring actual vaccination rates alongside intentions or willingness in psychological studies of VH.

In our vaccinated sample, there was a significant proportion of women; however, there were no differences in mean age. Previously published data on Italian populations are ambiguous regarding sex and age differences (Kazemini et al., 2022; AlShurman et al., 2021). Consistent with other studies, individuals with higher educational attainment exhibit diminished susceptibility to conspiratorial thinking (Mancosu et al., 2017). Considering a theoretical principle positing that "conspiracy theories are emotional," it has been suggested that individuals possessing lower levels of education may be more vulnerable to such theories, possibly stemming from a tendency to erroneously assign intentionality (Van Prooijen and Douglas, 2018).

The results for Non-vaccinated individuals with more Covid-19 are coherent with the current body of academic research (Zaack et al., 2023). Moreover, those who were

not vaccinated were more affected by Covid-19 at the time they completed the questionnaire, and were more isolated and for a longer duration.

Our study provides new insights by demonstrating that the influence of web and social network information is perceived to be higher among non-vaccinated individuals, which is consistent with existing research that shows how conspiracy information can impact vaccine opinions (Puri et al., 2020). However, previous studies have not reported a correlation between this informational influence and the actual refusal of vaccination. Addressing the dissemination of misinformation and conspiracy theories on social media is crucial for addressing vaccine hesitancy.

The most common reason for refusing the vaccine was concerns about potential side effects (47.8%). This aligns with Gori et al.'s findings in Italy (2023), where 55.6% of participants cited fear of side effects as a reason for refusal. Our skepticism about the effectiveness of the vaccine against the virus (43.4%) surpasses what Folcarelli, Miraglia del Giudice, Corea & Angelillo reported; they found that around a quarter of their sample was uncertain about the vaccine's effectiveness against Covid-19. Similar results were observed in a U.S. study by Taylor et al., who identified a strong association between vaccination refusal and distrust in the benefits of Covid vaccines ($p < 0.001$). Furthermore, 8.69% of our sample generally opposed vaccination (similar to Gori et al.'s finding at 5.3%).

Moreover, in our study, we found that the number of participants who did not adhere to the proposed conspiracy theories was significantly higher than that of vaccinated participants, which is consistent with Simone et al. (2021). Their study was conducted at the beginning of the pandemic (during the first Italian lockdown) when the intention to be vaccinated was positively correlated with a conspiracy factor. Compared with Simone's study, the presented data replicated the results at different times when vaccines were available, and participants declared their actual behavior as having been vaccinated (not only their intention). The 14 conspiracy ideas that constituted the items of the ad hoc created

questionnaire were built using internet and newspaper research among the Italian most spread Covid-19 news and information. These items were highly and positively correlated with each other, indicating that believing in one conspiracy idea increased the probability of believing in another. We do not know if not being vaccinated is caused by beliefs in conspiracy theories, or if those beliefs are caused by not being vaccinated. However, an experimental study that examined beliefs in conspiracies found a decrease in vaccination intention (Puri et al., 2020), suggesting this relationship. If we consider the percentage of those who declared a belief between moderate and strong, the most widespread belief in our sample was the last one, with 91% of the sample declaring (moderate-to-strong beliefs), they believed that the vaccines were not sufficiently tested. This is not surprising because the rapid and effective deployment of scientific discoveries during the Covid-19 epidemic has been unparalleled in human history. However, people with this idea ignore the fact that these breakthroughs were made possible by decades of progress in virology, immunology, epidemiology, and clinical medicine (Saag, 2022). The second most widespread idea concerns dangers. This idea is consistent with studies conducted in other countries (Lee et al., 2022; Abbas et al., 2022). The third factor is related to the creation of a virus. The spread of this last theory in our sample (60.2% of moderate-to-strong believers) was similar to that of another Greek study (73.4% in Constantinou et al., 2021). Except for these three items, at least half of the sample had no or weak beliefs.

The limitations of this study include the creation of a new conspiracy questionnaire, which hinders a direct comparison with other research findings (Brotherton et al., 2013). Additionally, the non-representative sample limited the generalizability of the findings to the entire country. To mitigate bias, a broad array of sociodemographic characteristics and other variables have been reported as precautionary measures. For future analysis, it is recommended to examine mental health data among both vaccinated and unvaccinated individuals and explore the correlations with adherence to conspiracy theories.

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