



Mistrust in biomedical research and vaccine hesitancy: the forefront challenge in the battle against COVID-19 in Italy

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Abstract

Researchers have been working quickly and collaboratively for the development of vaccines against the COVID-19 virus. The effort of the scientific community in searching a vaccine for COVID-19 may be hampered by a diffused vaccine hesitancy. Two waves of data collection on representative samples of the Italian population (during the “first” and “second” phase of the Italian Covid-19 mitigation strategy) were conducted to understand citizens’ perceptions and behaviors about preventive behaviors willingness to vaccine for COVID-19. Our study shows that willingness to COVID-19 vaccine is correlated to trust in research and in vaccines, which decreased between phase 1 and phase 2 of the Italian pandemic. According to the results of our study, the proportion of citizens that seem to be intentioned to get the Covid-19 vaccine is probably too small to effectively stop the spreading of the disease. This requires to foster a climate of respectful mutual trust between science and society, where scientific knowledge is not only preached but also cultivated and sustained thanks to the emphatic understanding of citizens worries, needs of reassurance and health expectations.

Keywords Covid-19 · Vaccine hesitancy · Trust in science · Vaccine effectiveness · Trust in vaccine

Introduction

The spread of COVID-19 has resulted in an unprecedented humanitarian and economic crisis [1]. Researchers have been working quickly and collaboratively for the development of vaccines against the COVID-19 virus. This global effort, however, might be hampered by vaccine hesitancy, which is a common phenomenon in western countries, with Italy being one of the countries with the highest rate of non-compliance to vaccination programs in Europe [2, 3]. The causes behind vaccine hesitancy are various and somehow unclear, as they include socio-demographic and psychological

factors, such as public trust (or mistrust) towards health-care professionals and health authorities [4]. Citizens’ trust in biomedical science is acknowledged as another relevant factor that might affect people’s attitudes towards vaccination; in a situation of great uncertainty (in daily life and in scientific advances) such as the one we are currently living, this could be magnified as people look for answers from the scientific community: in this context, health literacy should be regarded as a key issue [5], and a dialogue based on trust between health scientists and lay people plays a pivotal role.

Methods

A first random sample of 968 Italian citizens, representative of the Italian population for age, gender, geographic distribution, and occupational status was asked to fill an online survey during the early days after the initial spread of the SARS-COV-2 virus in Italy (i.e., phase 1). Information about age, gender, smoking status, and other socio-economic variables were collected. Two questions surveying participants’ attitude towards general vaccines’ effectiveness and trust towards science were asked as well (participants answered on a 5-points Likert scale). A second random

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sample ($n = 1004$), still representative of the Italian population, was then recruited for a second wave of data collection during the early days of the Italian reopening after lockdown (i.e., phase 2) and asked to fill the same survey. In the second wave, participants were also asked to report their willingness to vaccinate for COVID-19 “if a vaccine was found” on a scale ranging from 1 (not likely at all) to 5 (absolutely likely).

Participants for both waves were recruited by a professional panel provider (Norstat Italia, srl) with stratified random sampling. To match the sample quotas with those of the general population, survey weights were calculated and used during data analysis.

An independent samples t test was carried out to test whether there was a difference between answers in phase 1 and phase 2 in trust towards scientific research and in general attitude towards vaccines’ efficacy.

A Welch’s ANOVA with Games-Howell post hoc comparisons was then carried out to compare the willingness to vaccinate amongst three age groups (18–34, 35–59, and over 60 years old).

An independent samples t -test was then carried out to test differences in willingness to vaccinate between smokers and non-smokers.

Finally, a Spearman’s rank correlation between trust in science, general attitude towards vaccines’ efficacy and willingness to vaccinate for Covid-19 was carried out to investigate the relationship between these variables.

Informed consent was obtained from subjects before participation; all procedures followed were in accordance with the standards provided by the Helsinki Declaration. The protocol was reviewed and approved by the Ethical Commission of the Department of Psychology of the Catholic University of Milan.

Results

The study showed that 59% of the respondents in phase 2 reported to be likely to vaccinate for COVID-19 (namely, the percentage of respondents that answered 4, “likely”, or 5, “very likely”, on the Likert scale).

Italian citizens’ trust towards scientific research, however, decreased from a mean value of 4.09 ($SD = 0.87$) to 3.89 ($SD = 0.91$), $t_{(1969)} = 4.947$; $p < .001$. Similarly, the attitude towards vaccines’ efficacy decreased as well from a mean value of 4.01 ($SD = 0.91$) to 3.72 ($SD = 1.03$), $t_{(1969)} = 6.606$; $p < .001$.

The Welch’s ANOVA showed a significant main effect of age on willingness to vaccinate ($F_{(2, 473.716)} = 16.708$; $p < .001$). In particular, post hoc tests showed that the middle-age group had a reduced willingness to vaccinate for Covid-19 when compared to the 18–34 y.o. group ($M = 3.42$, $SD = 1.23$; $M = 3.87$, $SD = 1.04$, respectively, for middle-age

and younger; $p < .001$) and the over-60 y.o. group ($M = 3.42$, $SD = 1.23$; $M = 3.79$, $SD = 1.09$, respectively, for middle-age and over-60; $p < .001$). No significant difference was found between younger people and over-60 ($p = .751$). Results showed that there was no significant difference between smokers’ and non-smokers’ willingness to vaccinate against COVID19 ($p = .443$). Lastly, we found that willingness to vaccinate was positively correlated with both trust in scientific research ($r = .373$; $p < .001$) and general attitude towards vaccines’ efficacy ($r = .618$; $p < .001$).

Discussion

Our study highlighted that Italian citizens’ trust in science and in vaccination decreased between the first phase of the Italian pandemic and the second one, characterized by the “reopening” after the lockdown. According to the results of our study, the proportion of citizens that seem to be intentioned to get the Covid-19 vaccine is probably too small to effectively stop the spreading of the disease: a recent research found that between 55 and 82% of the population needs to be immune (through either exposure or vaccination) to gain herd immunity [6]. This is consistent with data reports regarding flu vaccination rates from the Ministry of Health, which show that (in spite of a minimum target of 75% and an optimal target of 95% of the population vaccinated), only about 17% of the general population and 55% of the over 65 actually vaccinated in 2019 autumn [7]. Parental vaccine hesitancy in Italy is also a diffused phenomenon, even though not so much spread: a nation-wide survey in 2016 actually found that about 16% of the sample was either hesitant or outright anti-vaccine [8].

According to other studies [9], our evidences confirmed that trust in science should be considered as a necessity as soon as a vaccine becomes available. Indeed, the presumption to explain vaccine hesitancy as a matter of ignorance and misunderstanding of science by the public is misleading and leads to ineffective educational strategies, while “shielding science and government institutions from examining their own practices with respect to earning and maintaining public trust” [10].

Moreover, our findings might suggest that elder people, who are indeed more susceptible to clinical complications, and that should be immunized as a priority [11], are not more willing to vaccinate than younger and healthier people. However, our results actually show that the age group that is, on average, less willing to vaccinate is the middle-age group. This evidence is coherent with previous studies which underlined how the generation of parents above 35 years old is hesitant towards vaccines less compliant with the vaccination recommendation [8].

Our data also showed that a group that is more at risk of infection and with a higher probability of lung complications, namely smokers [12], should indeed be sensitized to increase their attitude towards prevention. At risk populations, according to our study, require enhanced attention not only because of their healthcare fragility but also because they resulted psychologically less engaged in self-care and preventive behaviors and poorly aware of the importance of vaccination for their and their own community's safety.

This evidence is worrying and deserves urgent consideration to plan dedicated initiatives to reassure the general population and to foster trust in biomedical research and in a potential future vaccination program against COVID19. It is increasingly becoming evident that the time needed for scientific advances differs from the time expected by citizens to obtain satisfactory responses. In a way, scientific evidence is uncertain and often discordant and this may change the public perception of scientific knowledge for a long time [13]. Therefore, due to characteristics of the scientific process, such as making conclusions based on complex epidemiological modeling citizens' perception of the scientific community—and consequently their trust in scientific institutions—may have been altered in some way in the last months [14]. Shift in trust is therefore important to be understood [15]. In this direction, according to previous research [16–18] it seems that further investigation about the impact of political orientation and the perceived economic impact of the crisis on trust in science/scientists, and vice versa, might be also useful to better understand this phenomenon.

While researchers all over the world are striving to find a vaccine that could slow down or completely bring to a halt the spreading of this virus, the whole scientific community and public health institutions should make a serious effort in keeping and enhancing the feeling of mutual trust and cooperation between science and citizens [19]. This implies creating a dialogue that is not aimed at top-down “teaching” recommendations, but instead that is aimed to sensitize, educate, and engage the public towards scientific instances. Educational campaign should not only explain the reasons behind some measures (hence increasing transparency), but also open a debate that allows concerns from the public—such as safety and urgency—to be expressed and, thus, properly addressed by the scientific community. The decrease of trust in scientific research in Italy resulted from our study is also an alarm signal of how the media amplification of the scientific debate, if not accompanied by an accurate health education and engagement of the population, may lead to misunderstanding and mistrust towards science and health institutions [20]. Creating the space for a collaborative dialogue between science and the community is urgent, but seems to have been lacking—so far—in the public health communication about Covid-19. In this direction, adopting a scientific citizenship approach where considering the active

engagement of citizens as a pivotal—rather than ancillary or secondary—element in the research process could be a virtuous strategy to improve the partnership between the public and the scientific enterprises [13]. A scientific citizenship strategy may have transformative potential, especially for the development of a climate of respectful mutual trust between science and society, where scientific knowledge is not only preached but also cultivated and sustained thanks to the emphatic understanding of citizens worries, needs of reassurance and health expectations [21]. Finally, public trust in scientific research should be considered as a multi-level phenomenon that is undoubtedly affected by citizens' attitudes towards public health authorities and implementation forces. Therefore, citizens' engagement at those different levels should be pursued to actually realize a collaborative agenda between lay people and the scientific community.

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Compliance with ethical standards

Conflict of interest The Authors declare that there is no conflict of interest.

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