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Articles

Why not get vaccinated? A study on psychological reasons

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Abstract

The article deals with the psychological reasons pro or against vaccination. After a review of the literature, a study was conducted aimed at evaluating the differences in some psychological characteristics between people who have definitely consented to vaccination and persons opposed to vaccines. Two groups were selected pro or against vaccination (n = 54 each), balanced by gender, age, education and work activity. The research was conducted using an online form, including opinion, attitude and motivation questionnaires, test on stress and attribution of control in health issues, and the 10-item Big Five Inventory Test.

The results show that a less favorable attitude toward vaccines correlates with a lack of confidence in institutions, linked to external Locus of Control of Health, and to the perception that the actual risk is artificially increased for hidden reasons in vaccination campaigns; while the personality variables seem to have less influence.

These results could be helpful for addressing the vaccination campaign to specific targets, and overcoming psychological biases and prejudices.

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1. Introduction

The reasons for compliance with vaccination against SARS-Cov-2 are a core issue of debate in several countries, with a great deal of media attention to 'pro' and 'against' vaccines. The willingness to be vaccinated in the prescribed doses is in fact essential behavior in contrasting the infection, together with physical distancing and the use of physical means of protection.

Also, before the Covid pandemics, vaccine hesitation had been identified by the World Health Organization (2019) as one of the top ten global health threats and represents a considerable

obstacle to achieving vaccination coverage recommended by WHO to cope with the current pandemic (Soares et al., 2021).

Vaccination hesitation means refusal, delay, or reluctance to accept the vaccine despite the person being not subject to particular medical conditions, and vaccines are already available (MacDonald, 2015; Palm et al., 2021).

The need for governments and their health institutions is to identify the elements that favor vaccine hesitation in order to develop effective strategies to address this resistance.

In Italy, the data showed that initially the willingness to receive vaccination has been steadily increased since the distribution of vaccines against the pandemics was announced in 2020 (Bucchi & Saracino, 2021).

But, according to data from a study undertaken in December 2020 (Graffigna, 2021) still 43% of Italians were hesitant about the future vaccine and the figure appeared to be growing. Besides the decided "deniers" towards the new vaccine (the so-called "no-vax", which amounts to 16%), the percentage of those who did not know whether to get vaccinated was high (27%).

An extensive systematic review of studies from 33 countries (Sallam, 2021) found that Italy had one of the highest rates of non-compliance with immunization programs, with only 53.7% of the population willing to get vaccinated. At the beginning of April 2022, the percentages of the population vaccinated against Covid with at least one dose (85.6%) and with a complete cycle (83.9%) were stable: almost 7 million remained unvaccinated, resisting to the continuous and insistent media campaigns. Not even the type of vaccine that was supposed to "convince" the opposites and the uncertain (Nuvaxovid) seems to have achieved its purpose: of the million doses introduced in Italy only a small part was actually used.

So it is not the type of vaccine that no-vax persons do not like, but having to vaccinate itself, accepting the prescriptions of scientific and government authorities.

It is, therefore, necessary to thoroughly investigate the psychological reasons behind this opposition.

Recent studies show how hesitation regarding vaccination is related to both socio-demographic factors and cultural and personality factors.

Individuals who express positive intentions with respect to vaccination have a medium-high education level, have accepted previous vaccinations, perceive a high risk of infection, trust information provided by institutional sources, and believe in the efficacy of vaccines and medical

advice (Dror Eisenbach et al., 2020; Lazarus et al., 2020; Malik et al. 2020; Wang et al., 2020). Conversely, young adults, the unemployed, and people with lower socioeconomic status would be less likely to get vaccinated (Malik et al., 2020; Murphy et al., 2021; Rhodes et al., 2020).

The reasons for the negative and hesitant attitudes towards vaccination are mainly attributed to concerns about the safety of vaccines, their effectiveness, and their need; the lack of clear and sufficient information on the cost-benefit ratio of vaccines would also seem to explain the hesitant behavior (Giuliani et al., 2021).

Most studies agree that trust and safety play a key role in reducing vaccination hesitation, instead strengthened by declining reliance in science and medicine (Moccia et al., 2022; Razai et al., 2021). Concerns about potential short- or long-term side effects and vaccine safety are among the main reasons for vaccination hesitation (Sweileh, 2020).

In addition to the previous factors, a further motivation for vaccination hesitation was – at least in the early stages - the concern about the speed of vaccine development and testing. The novelty of the virus has raised uncertainties about the adequacy of experimental tests, with a negative impact on the evaluation of the vaccine (Al-Amer et al., 2022; Chou & Budenz, 2020; Goldman et al., 2020; Moccia et al., 2022; Yoda et al., 2021).

Conversely, positive attitudes toward vaccination have been associated with an increased perception of efficacy and safety (Karlsson et al., 2021; Rhodes et al., 2020; Sherman et al. 2020); the desire for self-protection and to "get one's life back", together with a confident attitude in science (Giuliani et al., 2021; Wismans et al., 2021).

Furthermore, a relationship emerges between hesitant or negative vaccination intentions and variables such as high self-centered interest prevalent over altruism, impulsivity, less agreeableness, more emotional instability, and less conscientiousness (Murphy et al., 2021; Rieger, 2020). Malas and Tolsá (2021) found no relationship between the fear of Covid-19 and the intention to get vaccinated, more determined by the specific fear of vaccination.

In general, an increase in non-protective health behaviors occurs in people who have shown a non-functional fear of infection despite their good mental health (Veronese et al., 2021).

Regarding the Locus of Control of health, correlations were highlighted between attribution of causes of health events to external factors and hesitation or refusal to vaccinate oneself and one's children (Giuliani et al., 2021; Murphy et al., 2021; Olagoke et al., 2021). A fatalistic view of health could explain the reluctance to rely on the vaccine as a means of safeguarding oneself

and the community, in the belief that being healthy is more a matter of luck than of specific behaviors and actions aimed at preserving it.

Furthermore, both negative and hesitant vaccination intentions and high levels of external attribution of control have been associated with "conspiratorial" thinking - such as, for example, in the case of Covid-19, the belief that the virus was created and spread specifically (Abalakina-Paap et al., 1999; Giuliani et. al., 2021; Hornsey et al., 2018; Salali & Uysal, 2020; Van Prooijen & Acker, 2015).

According to the Italian study by Graffigna (2021), the psychological reasons underlying the refusal of the vaccine are multiple and diversified and should be investigated in detail to guide a timely and personalized communication campaign. The vagueness and often contradictory nature of media communication on Covid by "experts" have been contested by a large majority of Italians, not only by the "no vax" minority.

1.1 Aim of the study

Considering that vaccination hesitation is a heterogeneous and multidimensional phenomenon, defined within a continuum from complete acceptance to complete rejection, a thorough understanding of the specific psychological determinants that cause the phenomenon is needed (MacDonald, 2015).

The present study aims to evaluate the differences in some psychological characteristics between people who agreed to be vaccinated (some out of conviction, others because they were obliged) and subjects opposed to vaccination.

2. Methods

2.1 Sample

Two groups were selected that declared themselves strongly pro or against vaccination (n = 54 each). The two groups are balanced by gender (52 Male and 56 Female participants) and by age (less than 30 years: 20 no-Vax and 20 pro-Vax; 30-50 years: 23 no-Vax and 24 pro-Vax; over 50 years: 11 no-Vax and 11 pro-Vax; $\chi 2 = 0.05$, $p = 0.98$). Furthermore, the two groups do not differ significantly in terms of education (lower and upper secondary school, degree: $\chi 2 = 3.31$, $p = 0.19$) and work activity (students, professionals, employees, housewives, non-employed, balanced in the two groups: $\chi 2 = 6.96$, $p = 0.14$). None of the No-Vax participants had any impediments to vaccination due to physical conditions.

2.2 Instruments

The research was conducted using an online questionnaire, implemented through a specific Google form, which included the following sections:

- *Questionnaire of attitude towards Covid,* composed of 8 items on a Likert scale, derived, with adaptations, from Giuliani et al. (2021). Examples: "*My health could be seriously compromised if I contracted Covid*"; "*I think Covid-19 is more serious than the common flu*"; "*I trust the Government and its indications for dealing with the pandemic*"). At the preliminary analysis of the items in this section of the questionnaire in our sample, the overall Cronbach's alpha was unsatisfactory (0.74) so the structure of the scale was verified by factor analysis with the method of principal components and Varimax rotation. The analysis identified two main factors that jointly explain 51.62% of the variance, and allow for two factor scores: *Fear of the virus* (alpha = 0.87) and *Trust in national and international institutions* (0.89), evaluated negatively as *Distrust* by reversing the assignment of the scores on the Likert scale of the related items.

- *Vaccine attitude questionnaire* (12 Likert-like items, also adapted by Giuliani et al. (2021)). Examples: "*Vaccines can be risky for health*"; "*The pandemic is the result of a conspiracy to the international level*";" *The vaccination obligation affects individual freedom*". The total score has, in our sample, alpha = 0.90 excluding the item "*If many are vaccinated, immunity is still achieved* " which appears to be independent of the main factor (negative attitude towards vaccines).

- Questionnaire on stress perceived in recent weeks (*Generalized Anxiety Disorder Questionnaire - GAD-7*: Spitzer et al., 2006; Swinson, 2006). Examples of items: "*I feel* d*ifficult to relax*"; "*Feeling scared as if something terrible could happen*". Alpha in our sample = 0.95.

- Questionnaire on external attribution of control in health issues (*Multidimensional Health Locus of Control Scale - MHLCS* (Wallston et al., 1978; Wallston, 2005); examples of items: "*No matter what I do, if I have to get sick, I'll get*"; "*Most of the things that affect my health happen to me by accident*"), alpha in our sample = 0.80.

Other sections of the questionnaire, in addition to the demographic variables (age, gender, educational qualification, employment status), asked:

- if previous vaccinations, for example against the flu, have been undertaken;

- the motivation to get vaccinated: out of conviction or obligation, in those who had to do it anyway, even if they didn't want to.

The final part of the questionnaire reported the 10-item *Big Five Inventory Test* (Italian version: Guido et al. 2015), a shortened version of the Big Five Questionnaire, which measures the five personality factors deduced from the theory of Five Personality Factors (McCrae & Costa, 1987). The traits investigated are agreeableness, conscientiousness, extraversion, emotional stability, and mental openness.

The form contained a statement where participants confirmed their will to adhere to the study and their informed consent.

3. Results

Comparing the two groups in favor of and against vaccines, the difference with respect to the perception of the probability of being infected by the Covid virus is not significant. Instead, the greater fear of the virus in the Pro-Vax group, and the greater distrust of the institutions in the No-Vax group are significant.

None of the other variables considered in the questionnaire significantly differentiates the two groups.

Table 1. Differences between anti- and pro-vaccine (Student's t, d.f. 106, and effect sizes of the comparisons, as Cohen's d)

	No Vax (n=54)		Pro vax (n=54)				
	M	s.d.	M	s.d.	*t*	*p*	*e.s. (d)*
Probability of being infected	6.54	2.78	7.15	2.34	-1.24	0.22	0.24
Fear of the virus	14.98	5.56	17.07	4.16	-2.21	0.03	-0.43
Distrust of institutions	8.22	2.12	5.33	2.16	7.02	<0.001	1.35
Stress in recent weeks	15.20	6.57	13.96	6.27	1.00	0.32	0.19
External locus of control	15.80	4.94	14.74	4.40	1.17	0.24	0.23
Agreeableness	6.22	1.72	6.50	1.50	-0.89	0.37	-0.17
Consciousness	7.52	1,61	7.74	1,60	-0.72	0.47	-0.14
Emotional stability	5.91	2.42	6.00	2.15	-0.21	0.83	-0.04
Extraversion	6.37	1.87	6.54	1,56	-0,50	0.62	-0.10
Openness	6.74	3.89	6.70	1.73	0.06	0.95	0.01

The attitude towards vaccines was then considered, first of all evaluating the possible gender difference, which is not significant (male n = 52, mean 32.79, s.d. 10.62; female n = 56, mean 30.16, sd 11.28; t = 1.24, df = 106, p = 0.22).

Vaccine supporters differ significantly in having had previous vaccinations, e.g. against flu (65.7% vs 34.29%), while no-vaxes in greater proportion did not get vaccinated as adults (67.80% vs 32.20%; $\chi 2 = 9.98$, $p < 0.001$).

The two groups also differ in the motivation for the decision to vaccinate: mainly by conviction in the pro-vax (88.23% vs 11.77%) by obligation in the no-vax (66.67% vs 33.33%, $\chi 2 = 21.16$, $p < 0.001$).

The responses to the items of the Vaccine Attitude Questionnaire were then compared analytically in the two groups that declare themselves pro or against vaccines:

Table 2. Differences in specific opinions toward vaccines (Student's t, d.f. 106, and effect sizes of the comparisons, as Cohen's d)

	No-vax (n=54)		*Pro-vax (n=54)*				
	Mean	*s.d.*	*Mean*	*s.d.*	*t*	*p*	*e.s. (d)*
(I don't think) vaccines are produced to safeguard everyone's health *	3.50	1.21	1.67	0.91	8.90	<0.001	1.71
Someone can be held responsible for the pandemic	3.59	1.50	2.98	1.27	2.29	<0.02	0.44
Vaccines can be risky to health	3.85	0.96	2.33	0.99	8.09	<0.001	1.56
The vaccine is annoying because it requires a shot	2.02	1.24	1.46	0.77	2.80	<0.01	0.54
The pandemic is the result of an international conspiracy	2.93	1.36	1.91	1.15	4.20	<0.001	0.81
Propaganda on vaccinations responds to the interests of pharmaceutical companies	3.80	1.34	2.56	1.18	5.12	<0.001	0.99
The vaccination obligation affects individual freedom	4.13	1.26	2.22	1.19	8.08	<0.001	1.55
The vaccine does not have to be mandatory for workers	4.06	1.27	2.33	1.39	6.74	<0.001	1.30
The media pressure for vaccination is excessive and inappropriate	4.11	1.28	2.39	1.29	6.94	<0.001	1.34
I can understand the reasons for the "no vax"	3.61	1.23	1.93	1.21	7.16	<0.001	1.38
I (don't) trust the safety of vaccines *	3.44	1.33	2.04	1.01	6.20	<0.001	1.19
If many are vaccinated, immunity is still achieved	2.96	1.40	3.35	1.29	-1.50	0.14	0.29

* Inverted scoring.

Only the last item (which, as mentioned, on the basis of the item-analysis was excluded for the purposes of the total score) does not differentiate the two groups. All the other items see a significantly higher average in No-Vax; the higher effect sizes indicate that the greatest differences concern the trust in vaccines for the protection of collective health, the collateral risks, and the deprivation of personal freedom if the vaccine is proposed as mandatory.

The discriminant analysis confirms the effectiveness of the questionnaire to significantly differentiate between the two groups: Lambda = 0.42 (df 12,1,106), F-ratio 10.98, p <0.001; percentage of correct classification 91% for both groups (only 5 cases are misclassified; canonical correlation 0.769.

Table 3 shows the differences between unvaccinated, vaccinated by conviction or by obligation with respect to the various variables considered in the questionnaire.

	Not vaccinated (n=33)	*Vaccinated by conviction (n=51)*	*Vaccinated by obligation (n=24)*	*Total (n=108)*	χ^2	*d.f.*	*p*
Age					1.91	4	0.75
<30 yrs	12	19	8	39			
30-50 yrs	14	20	13	47			
>50 yrs	7	12	3	22			
Gender					1.77	2	0.41
Male	19	23	10	52			
Female	14	28	14	56			
Education					10.64	4	0.03
Lower secondary school	7	2	1	10			
Higher secondary school	19	30	18	67			
Graduate	7	19	5	31			
Occupation					17.82	8	0.02
Student	4	13	4	21			
Professional	5	10	3	18			
Dependent worker	10	25	11	46			
Housewife	7	1	2	10			
Unemployed	7	2	4	13			
Previous vaccinations					10.95	2	<0.001
Not (as adult)	24	17	18	59			
Against flu	9	22	4	35			

Acquaintances' different opinions on vaccines					8.78	4	0.07
No	3	13	1	17			
Yes	26	34	18	78			
Dont' know	4	4	5	13			
Cycle completion forecast					62.67	4	<0.001
No	18	0	4	22			
Yes	2	46	13	61			
Dont' know	13	5	7	25			

Age and gender do not seem to affect the results. Instead, the results are significant for the degree of education (more vaccinated by conviction the higher levels), the type of occupation (less vaccinated housewives and unemployed), previous vaccinations, the opinions of acquaintances, and the forecast of completing the vaccination cycle.

The predictors of negative attitudes toward vaccines have been investigated by means of multiple regression analyses, the results of which are reported in tab. 4.

Table 4. Multiple regression on the dependent variable: Negative attitude vs vaccines (n=108, multiple R = 0.65, Squared Multiple R = 0.42

Effect	*Std. Coeff.*	*t*	*p*
Distrust of institutions	0.59	6.35	<0.001
External Locus of Control	0.24	2.76	0.01
Stress in recent weeks	0.23	2.01	0.05
Consciousness	0.14	1.61	0.11
Emotional stability	0.16	1.52	0.13
Agreeableness	0.10	1.16	0.25
Fear of Covid	0.06	0.61	0.54
Probability of Covid	-0.04	-0.49	0.62
Extraversion	0.04	0.42	0.68
Mental openness	-0.03	-0.37	0.71

Distrust of institutions is the first predictor of negative attitudes towards the vaccine. In turn, it correlates significantly with the lower fear of Covid (-0.47, p <0.001), therefore with an underestimation of why the vaccine can be useful. None of the other correlations of distrust of institutions are relevant: neither age (-0.11), nor the external attribution of causes (0.10), nor any of the personality variables (Agreeableness: -0.18; Consciousness: -0.03; Emotional stability: -0.05; Extraversion: -0.01; Openness: 0.03).

4. Discussion

According to the scientific literature, the factors mainly associated with low vaccination coverage can be found at the individual level (for example, confidence in vaccines or the relationship between risks and benefits), or at the context level (for example the rejection of immunization as a norm). Contextual factors are related to economic, political, health, institutional, environmental or socio-cultural influences (MacDonald, 2015). Vaccination hesitation can be strongly influenced by social media, especially in communities that are highly exposed to them (Palm et al., 2021; Steffens et al., 2019). Misinformation about vaccination is associated with serious public health consequences, such as increased fear and loss of confidence in vaccines (Larson, 2018). Instead, the perception of social support is essential to access protective measures against the pandemic (Gori et al., 2021), and this has been confirmed by our data.

As a recent systematic review (Al-Amer et al., 2022) has evidenced, high exposure to negative information on Covid-19 vaccines is associated with lower acceptability of vaccination. In fact, the media are used to advertise mainly negative experiences, because these are more easily understood, and attract the attention of viewers by increasing the audience (Attwell et al., 2017). It was shown that undecided groups tended to be more influenced by the alarmist claims of "No Vax" activists (Al-Amer et al., 2022), and this could explain the distrust in vaccines for the protection of collective health shown in a relevant part of our sample.

Regarding individual factors, our results confirm that higher educational qualifications and levels of professional employment, having previously undergone other vaccinations, and having completed the vaccination cycle, are more common in subjects who have been vaccinated out of conviction. The results also show that "Pro-Vax" are more afraid of contracting the virus and of the risk that loved ones can also be infected.

Again with reference to personal characteristics, several studies argue that female gender, younger age groups, lower education level, residence in a rural area, and low socioeconomic status are variables associated with vaccine resistance (Aw et al., 2021; Cascini et al., 2021; Moccia et al., 2021; Murphy et al., 2021; Razai et al., 2021; Soares et al., 2021; Wang et al., 2021). Older people and individuals with higher education and income levels appear to be more likely to intend to get vaccinated (Fisher et al., 2020; Lazarus et al., 2020; Lin et al., 2020; Sallam et al., 2021).

According to Goldman et al. (2020), men get vaccinated to a greater extent because they are generally more likely than women to engage in risky behaviors. From the results of the review

by Al-Amer et al. (2022), women are conditioned by the level of social support and are less willing to accept the recommendations on preventive measures established by the health authorities.

Results of our study do not show age and gender differences while the degree of education, and type of occupation, are significantly predictive (housewives and unemployed are less willing to be vaccinated).

Personality traits seem to have less influence than other studies had shown in different cultural contexts (e.g., Murphy et al., 2021).

Relevant literature has demonstrated the great importance of trust in the health system on willingness to be vaccinated, including reliance on biomedical science, and on information published by institutional bodies (Cascini et al., 2021, Giuliani et al., 2021; Palamenghi et al., 2020; Razai et al., 2021; Soares et al., 2021).

In line with these results, our study also clearly shows that people in favor of vaccines place greater trust in the government and health institutions in terms of directions for dealing with the pandemic. Instead, the lack of confidence in institutions, in turn, correlates with an attitude against vaccines. Mistrust in institutions is accompanied by an External Locus of Control, i.e. the belief that external and uncontrollable factors determine the risk of contagion, already found relevant in previous studies (e.g., Olagoke et al., 2021).

Our data in the Italian context tend to be consistent with those of previous international studies: placing trust in government decisions positively influences readiness to get vaccinated, while a negative opinion towards health policy actions is associated with vaccination hesitation (Fisher et al., 2020; Lazarus et al., 2021; Wang et al., 2021).

The perception that the actual risk is artificially increased for hidden reasons in vaccination campaigns is also connected, and this enhances the overall unfavorable attitude to vaccination. We can hypothesize that among these hidden reasons the interest of the pharmaceutical companies producing vaccines (as affirmed by the No-Vax propaganda) may be one of the most widespread concerns (Moccia et al., 2021).

Health authorities are perceived by some individuals as contradictory and inconsistent. The lack of confidence placed in them predicts possible opposition to the vaccination campaign, as already stated by Soares et al. (2021), and confirmed by our results.

Some limitations of our study must be underlined. The study was conducted during the pandemic using an online form, which presents some inconvenience and possible bias in the

administration of psychometric tests. Sampling was carried out with the snowball method on groups known in advance for their position for or against vaccines; the groups were matched a posteriori by selecting the respondents, with a random method, to reach an acceptable balancing of numbers by gender and age. At the time the research was carried out, no alternative methods were available.

5. Conclusions

Empirical research confirms how fundamental it is to know how to communicate scientific developments to the public in order to avoid negatively modeling the choice of vaccine adhesion (Mheidly & Fares, 2020). An essential action to guide educational campaigns and achieve high compliance with vaccination is to identify the psychological roots of vaccination hesitation (Moccia et al., 2021).

As found in previous research (Giuliani et al., 2021), persons in favor of the vaccine seem to be motivated by trust in its efficacy and in the system of governments and health institutions that provide it, and this favors responsibility toward the collective: get vaccinated is a social duty towards one's community. The lack of this aspect leads to contrast vaccination, together - and often beyond - rational motivations and fears about possible, although rare, negative effects.

The vaccination campaign should therefore be supported not only by information on the technical aspects and benefits of the vaccine, which risks being perceived in an inadequate way by those who are cognitively and emotionally biased. It must also concern pro-social value aspects and an increase in trust in science and in the actions of health institutions based on scientific evidence.

Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any potential conflict of interest.

Authors contribution

All authors participated in the planning of the research, in the collection and processing of data and in their discussion. S.D. coordinated the work.

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