# Sociodemographic and psychological correlates of COVID-19 vaccine hesitancy and resistance in the young adult population in Italy ☆

Ughetta Moscardino [a,*], Pasquale Musso [b], Cristiano Inguglia [c], Chiara Ceccon [a], Diana Miconi [d], Cécile Rousseau [e]

[a] Department of Developmental Psychology and Socialization, University of Padova, Italy
[b] Department of Educational Sciences, Psychology, Communication, University of Bari 'Aldo Moro', Italy
[c] Department of Psychology, Educational Science and Human Movement, University of Palermo, Italy
[d] Department of Psychopedagogy and Andragogy, University of Montreal, Canada
[e] Division of Social and Cultural Psychiatry, McGill University, Canada

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## ABSTRACT

*Background:* Previous research has shown that young adults are more hesitant/resistant to COVID-19 vaccine uptake than older age groups, although the factors underlying this tendency are still under debate. The current study aimed to identify the sociodemographic and psychological correlates of vaccine hesitancy and resistance among young adults (18–40 years) during the nationwide COVID-19 vaccination campaign in Italy, the first country after China being hit by the pandemic and which suffered a large number of fatalities.

*Methods:* This is a cross-sectional, web-based study conducted in Italy using an ISO-certified international survey company (respondi.com). Data were collected on 1200 participants in June 2021.

*Results:* Vaccine hesitancy/resistance was found for 25% of the sample. In multinomial logistic regression ($N = 1159$), being aged 30–40 years, residing in northern Italy, having lower educational and income level, being unemployed, and not knowing any friends/relatives diagnosed with COVID-19 were associated with higher odds of hesitancy or resistance. In multivariate analysis of variance ($N = 1177$), both vaccine hesitant and resistant young adults perceived significantly less social support from friends and family than vaccine accepting ones. Resistant individuals reported significantly higher levels of conspiracy theories and negative attitudes toward vaccines than their accepting and hesitant counterparts. Moreover, resistant individuals reported significantly lower levels of attachment to country and perceptions of a just government compared to accepting ones, with hesitant young adults scoring in between.

*Conclusions:* Our findings support the idea that young adults with a hesitant (vs. resistant) attitude show a more nuanced and less extreme psychological profile. Public health messaging should capitalize on social media to provide accessible, transparent, and age-appropriate information concerning COVID-19 vaccine safety. Moreover, policy efforts improving the availability of social support systems are warranted to strengthen connectedness and foster trust in institutions amongst this particular segment of the population.

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## 1. Introduction

Since its outbreak in late 2019, the COVID-19 pandemic has caused over 5 million deaths across the globe and still represents a major public health concern [1,2]. Although conclusive empirical evidence is available on the safety and effectiveness of COVID-19 vaccines and mass vaccination campaigns have progressed substantially [3,4], many people are still reluctant or reject COVID-19 vaccine uptake, therefore compromising the achievement of "herd immunity" [5]. Previous research suggests that this phenomenon is more frequent among young adults (18–40 years) [6,7], posing a threat to older people who are more vulnerable to the virus and facilitating the spread of new COVID-19 variants. Thus, identifying the factors that more strongly influence acceptance of COVID-19 vaccines in young adults is paramount to tailor communication strategies, fight misinformation, and improve vaccination coverage in this segment of the population [6], especially in light of the recent resurgence of infections and the consequent decision of many countries to accelerate administration of third doses of COVID-19 vaccines [8].

Vaccine hesitancy, defined as "delay in acceptance or refusal of vaccination despite availability of vaccination services" [9, p. 4161], is a multidetermined phenomenon involving individual, group, and contextual factors as well as vaccine-specific influences. Recent studies have investigated people's hesitancy in receiving a COVID-19 vaccine, highlighting a large variation in prevalence rates across countries [10,11]. Among the most relevant predictors of COVID-19 vaccine hesitancy, researchers have identified sociodemographic factors (e.g., age, gender, educational level, income), trust in several entities (e.g., scientists, government, medical system), perceived threat and risk of the coronavirus disease, and political ideologies [12]. However, the majority of extant studies addressing COVID-vaccine hesitancy has been conducted at a time when no COVID-19 vaccine was publicly available, therefore limiting the generalizability of results. The actual availability of COVID-19 vaccines has been shown to impact on people's behavioral intentions related to vaccine uptake, although the evidence is mixed. For example, some studies have found that the availability of multiple COVID-19 vaccines was linked to less compliance with safety measures (e.g., social distancing) and to refusal of specific vaccines based on their reported side effects and efficacy [13]. However, other studies also documented an increased vaccination uptake, especially in low- and middle-income countries [14,15]. Furthermore, large-scale surveys mostly comprise broad age ranges (e.g., from 18 to over 65 years), failing to address the specificities which characterize the period of young adulthood (18–40 years). This period involves the exploration of options in education and work as well as changes in personal values and beliefs, social relationships, and health concerns, all of which may affect individuals' compliance with preventive behaviors [16].

Overall, emerging evidence suggests that vaccine hesitancy and resistance in young adulthood can take different forms and may depend on a numer of personal and contextual characteristics. Yet, most studies in the field have included broad age groups and were conducted when COVID-19 vaccines were still unavailable or in the early phases of vaccination campaigns. The current study aimed to address these issues by focusing on a general population sample of young adults living in Italy recruited in the midst of the COVID-19 national vaccination campaign. In doing so, we respond to recent calls for research focusing on the factors that influence COVID-19 vaccine hesitancy in different cultural contexts and populations [17]. Indeed, it has been suggested that both age and country-specific aspects need to be taken into consideration when designing communication campaigns to enhance people's vaccine acceptance [18]. Our study endorses a social-ecological approach to obtain a more comprehensive picture of the factors involved in young adults' attitudes toward COVID-19 vaccines [19]. Specifically, we aimed to (1) identify the key sociodemographic variables more strongly associated with a hesitant/resistant attitude in comparison to an accepting attitude among Italian youth; and (2) determine on what psychological characteristics vaccine hesitant and vaccine resistant young adults differed from their vaccine accepting counterparts. To this end, we included self-report measures tackling personality, mental health, social support, beliefs, and sociopolitical attitudes that are particularly salient within this age group.

The study was conducted in Italy, the first country after China being hit by the pandemic and which suffered a large number of fatalities during the first and second waves [20]. Italy was also among the first European countries to sign contracts for COVID-19 vaccines. The vaccination campaign started on December 27th 2020 and, despite some initial problems with vaccine supplies, it proceeded at a relatively fast pace until reaching 37% vaccination coverage at the time this study was conducted (June 2021). To date (29 November), the country has one of the highest vaccination rates in Europe, with over 80% of the population aged 12 + being fully vaccinated against COVID-19 [21]. Yet, heavy protests of anti-

vaccination movements as well as delays in anti-COVID-19 immunization due to hesitant individuals continue to represent a major concern for public authorities. Thus, understanding the psychological factors involved in young adults' reluctance or refusal of COVID-19 vaccines is essential to improve communication strategies, increase immunization uptake, and ultimately prevent the spread of new coronavirus variants that can have devastating effects at all levels of society.

## 2. Method

### 2.1. Sample and procedure

The study was approved by the Ethics Committee of the University of Padova (protocol n. 4189).

Data collection took place between June 21st and 28th, 2021. Participants were recruited via Respondi, an ISO-certified international survey company (https://www.respondi.com). Individuals were randomly selected from a pool of respondents (i.e., online panel) based on the following inclusion criteria: (1) being aged between 18 and 40 years, (2) residing in Italy, and (3) being able to complete the survey in Italian. Quota-based sampling ensured that the sample was representative of the country's population in terms of age, gender, and geographic region (North vs South). The final sample comprised 1200 participants, who were compensated for participation via Respondi at their usual rate.

Respondents were directed via a study link to the Qualtrics platform and provided informed consent prior to completing the survey, which took about 10 min to complete. The response rate for this study was 81% (personal communication; Respondi, 2022). Participants were recruited based on the global quotas reported above (i.e., gender, age, and region of residence), without specific other targeting. Individuals who did not meet inclusion criteria (n = 473) and who provided incomplete data (n = 405) were excluded. At the time of data collection, the vaccination campaign was rolling although some groups were prioritized (e.g., older ages, people working in public sectors) due to concerns related to vaccine supplies, and some northern regions experienced organizational difficulties (e.g., Lumbardy). In line with these national trends, 48% of the study sample (n = 570) reported to have received at least one dose of a COVID-19 vaccine.

### 2.2. Measures

#### 2.2.1. Vaccine hesitancy

COVID-19 vaccine hesitancy was measured via the following questions: "Did you receive a COVID-19 vaccine?" and "If not, do you intend to receive one?" [22,23]. Based on prior research [24,25], participants were classified as "vaccine accepting" if they responded "yes" or "I intend to receive it as soon as possible"[1],

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[1] We merged participants who had received a COVID-19 vaccine and those who intended to receive it as soon as possible into the 'accepting category' for two reasons. First, at the time of data collection COVID-19 vaccination in Italy was not mandatory and there were still no 'green pass' restrictions for unvaccinated people. Hence, it is reasonable to assume that individuals who reported having received at least one dose of vaccine had an accepting attitude toward COVID-19 vaccines. Second, our study took place over a short period of time (21–28 June 2021) during which the national vaccination campaign was proceeding at a speedy rate. Thus, excluding participants who had received their vaccine would have yielded a biased picture of the situation at that time. Supplemental analyses (see Appendix A) comparing the vaccinated group (n = 560) with the group who intended to vaccinate as soon as possible (n = 303) on all study variables revealed no significant differences, with three exceptions: vaccinated individuals were more likely to be aged between 30 and 40 years (vs. 18–29 yrs), to reside in South (vs. North) Italy, and to be employed (vs. unemployed). This pattern mirrors the characteristics of the ongoing vaccination campaign (e.g., priority given to older age groups and people working in public sectors, difficulties with supplies and logistics concerning immunization in some northern regions). Hence, we believe that merging the two samples is justified from both a theoretical and an empirical perspective.

"vaccine hesitant" if they responded "I intend to wait to see how it affects others in the community before I get it" or "I do not intend on getting it soon, but might sometime in the future", and "vaccine resistant" if they responded "I do not intend to ever get the vaccine". Participants who chose the "prefer not to answer" response option were excluded from data analysis (see Results section).

### 2.2.2. Environmental sensitivity

The personality trait of Environmental Sensitivity was assessed via the Highly Sensitive Person Scale-Brief Version [26]. The questionnaire comprises 12 items (e.g., "Do changes in your life shake you up?") rated on a seven-point Likert-scale ranging from 1 (*not at all*) to 7 (*completely*), with higher scores indicating higher levels of sensitivity. Empirical evidence supports the reliability and validity of this measure [26], also in the Italian context [27]. In the current study, Cronbach's alpha was 0.84.

### 2.2.3. Depressive symptoms

Participants' depressive symptoms were measured with the Hopkins Symptom Checklist-25 [28], a widely used self-report questionnaire assessing levels of anxiety and depression in the past week. The depression subscale includes 15 items (e.g., "During the past seven days, I have felt low in energy, slowed down") rated on a four-point Likert scale ranging from 1 (*not at all*) to 4 (*very much*), with higher scores indicating more depressive symptoms. The psychometric properties of the measure have been well-established in different nations and cultural groups [29], and the questionnaire is available in Italian language [30]. In this study, Cronbach's alpha for the Depression subscale was 0.96.

### 2.2.4. Perceived social support

We used the Multidimensional Scale of Perceived Social Support [31] to assess participants' perceived social support from family (4 items; e.g., "My family really tries to help me") and friends (4 items; e.g., "I can count on my friends when things go wrong"). Response options range from 1 (*strongly disagree*) to 7 (*strongly agree*), with higher scores indicating greater perceived support. The questionnaire has shown excellent psychometric properties across countries [32], including Italy [33]. Cronbach's alpha for the global score was 0.92 in the current study.

### 2.2.5. Negative attitudes toward vaccines

We assessed people's general attitudes toward vaccines via the Vaccination Attitudes Examination [34], a 12-item measure (e.g., "Vaccines make a lot of money for pharmaceutical companies, but do not do much for regular people") in which respondents were asked to express their level of agreement on a seven-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Higher scores reflect stronger anti-vaccination attitudes. In previous research, the questionnaire has demonstrated good internal reliability, convergent validity, and construct validity [35]. Cronbach's alpha for this scale was 0.91 in the present study.

### 2.2.6. Conspiracy beliefs

Participants' endorsement of conspiracy beliefs concerning the COVID-19 pandemic was measured with 4 items selected from [36] (e.g., "The government is misleading the public about the cause of the Coronavirus"). Respondents were asked to indicate their level of agreement with each statement on a five-point Likert scale ranging from 1 (*disagree*) to 5 (*totally agree*), with higher scores indicating more endorsement of such theories. In the present study, Cronbach's alpha for this score was 0.87.

### 2.2.7. Perceptions of a just government

Perceived government justice was evaluated by a 4-item scale [37]. For the purpose of this study, items referenced "Italy" and "the Italian government" instead of "America" and "the U.S. government" (e.g., "In Italy you have an equal chance no matter where you are coming from"), with participants being asked to express their agreement on a seven-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Higher scores indicate perceptions of the government being more just. Previous research found good internal reliability [37]. In the current sample, Cronbach's alpha was 0.75.

### 2.2.8. Identification and commitment to country of residence

Attachment to country of residence was measured via the 8-item Attachment subscale of the Measure of Identification with the National Group [37,38]. This measure assesses people's perceived identification and commitment to a particular country (Italy in our study). Items (e.g., "It is important to me to contribute to Italy") are rated on a seven-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), with higher scores indicating stronger perceived attachment and connection to country of residence. The measure has shown strong internal reliability in prior work [37]. Cronbach's alpha of the Attachment subscale was 0.94 in the present study.

### 2.2.9. Demographic characteristics and exposure to COVID-19

Questions about sociodemographic characteristics were asked at the end of the survey. Specifically, participants reported on their gender, age, region of residence, educational level, annual income, employment status, religion, as well as exposure to COVID-19, i.e., "To your knowledge, have you or anyone around you (in your family, community, neighborhood, group of friends, etc.) been diagnosed with COVID-19?". Response options for all these questions are presented in Table 1 (left column).

### 2.3. Data analysis

First, we calculated the proportion of individuals classified as "vaccine accepting", "vaccine hesitant", and "vaccine resistant". Given the categorical nature of this variable, we used multinomial logistic regression analysis (MLRA) to identify the sociodemographic characteristics associated with vaccine hesitancy and resistance, considering the vaccine acceptance group as the reference category. The model was then re-estimated using the vaccine hesitant group as the reference category to analyze the sociodemographic characteristics differentiating the resistant from the hesitant group. In these analyses, all associations between the predictor and criterion variables are represented as adjusted odds ratios with 95% confidence intervals. Second, a multivariate analysis of variance (MANOVA) was conducted to compare the three groups (i.e., accepting, hesitant, and resistant) on the psychological variables. In this analysis, eta squared ($\eta^2$) was used as a measure of effect size where values of $\leq 0.05$ reflect a small effect size, values from 0.06 to 0.13 reflect a medium effect size, and values $\geq 0.14$ represent a large effect size [39].

## 3. Results

### 3.1. Study participants and characteristics

Complete data were obtained from 1200 participants. Of these, 73% were classified as "vaccine accepting", 17.6% as "vaccine hesitant", 7.5% as "vaccine resistant", whereas 1.9% chose the "prefer not to answer" option. To ascertain whether the latter respondents (*n* = 23) differed from those who responded (*n* = 1177), we conducted attrition analysis using binary logistic regression, with all sociodemographic and psychological characteristics included as independent variables, and group (i.e., preferring not to answer

**Table 1**
Sample Characteristics.

| Variable with initial response options (N = 1177) | | Final variables and categories used in MLRA (N = 1159) | |
|---|---|---|---|
| *Gender: % (n)* | | *Gender: % (n)* | |
| Male | 50.6 (595) | Male | 50.7 (588) |
| Female | 49.2 (579) | Female | 49.3 (571) |
| Other | 0.2 (3) | | |
| *Age: M (SD)* | | *Age: M (SD), % (n)* | |
| To be directly filled in (range 18–40 years) | 29.8 (6.5) | 18–29 years | 23.8 (3.26), 46.3 (537) |
| | | 30–40 years | 35.1 (3.17), 53.7 (622) |
| *Regional area: % (n)* | | *Regional area: % (n)* | |
| North Italy | 54.9 (646) | North Italy | 55.0 (637) |
| South Italy | 45.1 (531) | South Italy | 45.0 (522) |
| *Highest education: % (n)* | | *Highest education: % (n)* | |
| No qualification | 0.2 (3) | No qualification to middle school | 6.3 (73) |
| Finished primary school | 0.1 (1) | Finished vocational or high school | 51.6 (598) |
| Finished middle school | 5.9 (69) | Graduate degree | 42.1 (488) |
| Finished vocational school | 6.1 (72) | | |
| Finished high school | 45.7 (538) | | |
| Graduate degree | 42.0 (494) | | |
| *2020 income: % (n)* | | *2020 income: % (n)* | |
| € 0,000 - € 4,999 | 12.3 (145) | € 0,000 - € 19,999 | 46.4 (538) |
| € 5,000 - € 19,999 | 34.2 (402) | € 20,000 - € 34,999 | 31.0 (359) |
| € 20,000 - € 34,999 | 31.1 (366) | € 35,000 + | 22.6 (262) |
| € 35,000 - € 49,999 | 15.0 (177) | | |
| € 50,000 + | 7.4 (87) | | |
| *Employment status: % (n)* | | *Employment status: % (n)* | |
| Unemployed | 21.1 (249) | Unemployed | 21.0 (243) |
| Employed | 52.1 (613) | Employed or student | 79.0 (916) |
| Student | 26.8 (315) | | |
| *Religion: % (n)* | | *Religion: % (n)* | |
| Buddhist | 1.1 (13) | Christian and other | 66.7 (773) |
| Christian (Catholic, Protestant, etc.) | 62.0 (730) | No religion | 33.3 (386) |
| Hindu | 0.3 (4) | | |
| Muslim | 1.7 (20) | | |
| Jewish | 0.2 (2) | | |
| Sikh | 0.2 (2) | | |
| No religion | 33.2 (391) | | |
| Other | 1.3 (15) | | |
| *Exposure to COVID-19: % (n)* | | *Exposure to COVID-19: % (n)* | |
| No | 34.7 (409) | No | 35.1 (407) |
| Yes | 64.0 (753) | Yes | 64.9 (752) |
| Prefer not to answer | 1.3 (15) | | |

*Note.* MLRA = Multinomial logistic regression analysis.

vs. answering the COVID-19 vaccine-related question) as the outcome variable. No significant associations were detected (all $ps > 0.05$), with one exception: those who preferred not to answer the COVID-19 vaccine hesitancy measure were also more likely to choose the "prefer not to answer" response option in the exposure to COVID-19 related question ($p < .05$). Hence, we excluded the "prefer not to answer" group from subsequent analyses, resulting in a sample of $N = 1177$. Table 1 (left column) reports the sociodemographic characteristics of the sample.

### 3.2. Sociodemographic characteristics associated with COVID-19 vaccine hesitancy and resistance

Given the complexity of the models, we reduced the number of subcategories of the predictors (see Table 1, right column) to ensure the validity of results and facilitate interpretation. Specifically, we excluded participants who chose the category "Other" in relation to gender ($n = 3$, 0.2%), and those who preferred not to answer the exposure to COVID-19 question ($n = 15$, 1.3%). Attrition analysis revealed no significant associations of these variables with the sociodemographic and psychological characteristics (all $ps > 0.05$), except for perceived social support ($p < .05$), which was lower among those who preferred not to respond to the exposure to COVID-19 related item. Thus, the final sample for the two MLRAs consisted of 1159 participants.

Sociodemographic variables were entered simultaneously in the MLRA, with 'vaccine acceptance' initially used as the reference category. The likelihood ratio test of the final model (with all the predictors) against the null model (with intercept only) was statistically significant, $\chi^2(20) = 136.60$, $p < .001$, meaning that the final model outperformed the null model and at least one predictor had influence on COVID-19 vaccine acceptance/hesitancy/resistance. Pearson's chi-square statistic suggested that model fit was adequate, $\chi^2(594) = 606.05$, $p = .36$. Pseudo $R^2$, which refers to the variance explained by the model, was acceptable, Cox & Snell $R^2 = 0.11$, Nagelkerke $R^2 = 0.15$, and McFadden's $R^2 = 0.08$.

Table 2 shows odd ratios (OR) with 95% confidence intervals (CIs) for each category of the dependent variable for each predictor. All ORs > 1 with CIs > 1 at both lower and upper bounds were statistically significant at $p < .05$. Those who were hesitant, compared to those who were vaccine accepting, were more likely to be aged between 30 and 40 years, to have a lower educational level than a graduate degree, to have a lower income level, and to have not been exposed to COVID-19. Those who were resistant, compared to those who were vaccine accepting, were more likely to reside in North Italy, to have a lower educational level than vocational or high school, to have a lower income level, to be unemployed, and to have not been exposed to COVID-19.

When re-estimating the same model with the vaccine hesitant group as the reference category to identify which factors distin-

**Table 2**

MLRA Performed to Identify the Key Sociodemographic Characteristics Associated with Vaccine Hesitancy and Resistance (N = 1159).

| | Reference group (RG) = vaccine accepting | | | | | | RG = vaccine hesitant | | |
|---|---|---|---|---|---|---|---|---|---|
| | Vaccine hesitant | | | Vaccine resistant | | | Vaccine resistant | | |
| | OR | 95% CIs | | OR | 95% CIs | | OR | 95% CIs | |
| *Gender* | | | | | | | | | |
| Male | 1.00 | 0.73 | 1.38 | 0.94 | 0.59 | 1.49 | 0.94 | 0.56 | 1.57 |
| Female (RG) | | | | | | | | | |
| *Age* | | | | | | | | | |
| 30–40 years | **1.52** | **1.09** | **2.12** | 1.08 | 0.67 | 1.73 | 0.71 | 0.42 | 1.20 |
| 18–29 years (RG) | | | | | | | | | |
| *Regional area* | | | | | | | | | |
| North Italy | 1.18 | 0.85 | 1.65 | **1.76** | **1.09** | **2.86** | 1.49 | 0.87 | 2.54 |
| South Italy (RG) | | | | | | | | | |
| *Highest education* | | | | | | | | | |
| No qualification to middle school | **4.15** | **2.23** | **7.73** | **3.05** | **1.28** | **7.27** | 0.73 | 0.29 | 1.84 |
| Finished vocational or high school | **1.87** | **1.29** | **2.70** | 1.51 | 0.88 | 2.59 | 0.81 | 0.44 | 1.49 |
| Graduate degree (RG) | | | | | | | | | |
| *2020 income* | | | | | | | | | |
| € 0,000 - € 19,999 | **2.34** | **1.46** | **3.74** | **2.86** | **1.31** | **6.26** | 1.23 | 0.52 | 2.91 |
| € 20,000 - € 34,999 | 1.01 | 0.60 | 1.68 | 1.92 | 0.86 | 4.25 | 1.90 | 0.77 | 4.70 |
| € 35,000 + (RG) | | | | | | | | | |
| *Employment status* | | | | | | | | | |
| Unemployed | 1.21 | 0.82 | 1.80 | **2.27** | **1.36** | **3.80** | **1.87** | **1.05** | **3.32** |
| Employed or student (RG) | | | | | | | | | |
| *Religion* | | | | | | | | | |
| Christian and other | 1.24 | 0.87 | 1.76 | 1.28 | 0.77 | 2.12 | 1.03 | 0.58 | 1.82 |
| No religion (RG) | | | | | | | | | |
| *Exposure to COVID-19* | | | | | | | | | |
| No | **1.62** | **1.17** | **2.25** | **3.15** | **1.98** | **5.02** | **1.94** | **1.16** | **3.26** |
| Yes (RG) | | | | | | | | | |

*Note.* Chi-square test for improvement over the null model, $\chi^2(20) = 136.60$, $p < .001$. Pearson chi-square statistic to test the goodness-of-fit, $\chi^2(594) = 606.05$, $p = .36$. Cox & Snell $R^2 = 0.11$. Nagelkerke $R^2 = 0.15$. McFadden's $R^2 = 0.08$. Statistically significant associations ($p < .05$) are highlighted in bold. MLRA = multinomial logistic regression analyses. OR = odds ratios. CIs = confidence intervals for odds ratios.

guished vaccine resistant from vaccine hesitant respondents, two variables emerged as differentiating the two groups: the vaccine resistant group reported higher rates of unemployment and less exposure to COVID-19.

### 3.3. Comparison of vaccine accepting/hesitant/resistant groups on psychological variables

Normality statistics were initially computed on the psychological variables. The resulting distributions showed that values of skewness (<|0.85|) and kurtosis (<|0.69|) falled in the range of –1 to + 1, considered acceptable to indicate univariate normality [40,41]. However, using Mahalanobis distance with $p < .001$, 15 cases were identified as multivariate outliers. Also, Mardia's multivariate kurtosis coefficient slightly exceeded the critical value. Overall, we detected 18 potential multivariate outliers (0.2%). After performing the subsequent analyses without or with these cases, we found no effect on the pattern of results. Thus, we retained these 18 cases in the final sample.

The MANOVA revealed significant multivariate effects of group membership (i.e., accepting/hesitant/resistant) on the psychological variables, Wilks' Lambda = 0.71, $F(14, 2334) = 31.36$, $p < .001$, $\eta^2 = 0.16$. Follow-up univariate analyses indicated that all dependent psychological variables differed significantly across groups, except for environmental sensitivity and depressive symptoms (see Table 3). Specifically, post-hoc Bonferroni-adjusted comparisons indicated that individuals in the vaccine hesitant and resistant groups reported significantly less perceived social support, higher levels of negative attitudes toward vaccines, and more endorsement of conspiracy beliefs compared to the vaccine accepting group. Moreover, the resistant group scored significantly lower on perception of a just government and attachment to country than the accepting group (with hesitant young adults scoring in

between), and reported more negative attitudes toward vaccines as well as endorsement of conspiracy beliefs than the hesitant group. These findings are further illustrated in Fig. 1.

## 4. Discussion

Understanding the specific sociodemographic and psychological correlates of COVID-19 vaccine hesitancy and resistance in the young adult population amid a mass immunization campaign is crucial to ensure vaccination uptake and tailor public health messaging to this specific age group. Our study revealed that 25% of the surveyed sample expressed hesitancy or refusal of a COVID-19 vaccine. Recent *meta*-analytic data concerning intended uptake and refusal of COVID-19 vaccines across 13 different countries ($n = 58,656$) found an overall 20% of people intending to refuse vaccination, with estimates varying greatly by country [42]. Similarly, another *meta*-analysis ($n = 81,173$) reported a hesitant/resistant attitude among 20–27% of the surveyed samples [43]. Hence, the proportion of young adults expressing a hesitant/refusing attitude in the present study resembles the findings of prior international research, although the data are not directly comparable due to the differential availability of vaccines across countries. The fact that one out of four young people in Italy had doubts about COVID-19 vaccine intake during vaccination rollout represents a concerning picture and an urgent public health issue to address. A possible explanation for this result is the rising skepticism surrounding some viral vector vaccines at that time due to reports of thrombotic events which were strongly emphasized by the media. Thus, despite Italian public health authorities' efforts to provide clear and empirically-based information on the development, safety, and effectiveness of different COVID-19 vaccines since their official approval, our data suggest that more efforts from policymakers and professional organizations are required to

**Table 3**
Post-hoc Bonferroni-Adjusted Univariate Analysis for Vaccine Acceptance/Hesitance/Resistance Groups.

| | Vaccine accepting (n = 876, 74.4%) Mean (SD, SE) | Vaccine hesitant (n = 211, 17.9%) Mean (SD, SE) | Vaccine resistant (n = 90, 7.7%) Mean (SD, SE) | $F_{(2, 1174)}$ | $\eta^2$ |
|---|---|---|---|---|---|
| Environmental Sensitivity (scored 1 to 7) | 4.60 (0.95, 0.03) | 4.57 (0.94, 0.07) | 4.52 (0.97, 0.10) | 0.27 | 0.00 |
| Depressive symptoms (scored 1 to 4) | 1.91 (0.64, 0.02) | 1.92 (0.62, 0.04) | 1.82 (0.73, 0.07) | 0.80 | 0.00 |
| Perceived social support (scored 1 to 7) | **4.87[a]** (1.24, 0.04) | **4.53[b]** (1.25, 0.09) | **4.46[b]** (1.48, 0.13) | 9.05[***] | 0.02 |
| Negative attitudes toward vaccines (scored 1 to 7) | **3.38[a]** (1.06, 0.04) | **4.22[b]** (0.86, 0.07) | **5.40[c]** (1.00, 0.11) | 194.99[***] | 0.25 |
| Endorsement of conspiracy beliefs (scored 1 to 5) | **1.94[a]** (0.96, 0.03) | **2.28[b]** (0.92, 0.07) | **3.29[c]** (1.07, 0.10) | 86.04[***] | 0.13 |
| Perceptions of a just government (scored 1 to 7) | **3.24[a]** (1.20, 0.04) | **3.16[ab]** (1.14, 0.08) | **2.84[b]** (1.25, 0.13) | 4.67[*] | 0.01 |
| Attachment to country (scored 1 to 7) | **4.94[a]** (1.19, 0.04) | **4.80[ab]** (1.29, 0.08) | **4.61[b]** (1.42, 0.13) | 3.70[*] | 0.01 |

*Note.* A group mean is significantly different ($p < .05$) from another mean within the same row if they have different superscripts. Statistically significant comparisons are in bold. [*]$p < .05$, [***]$p < .001$.
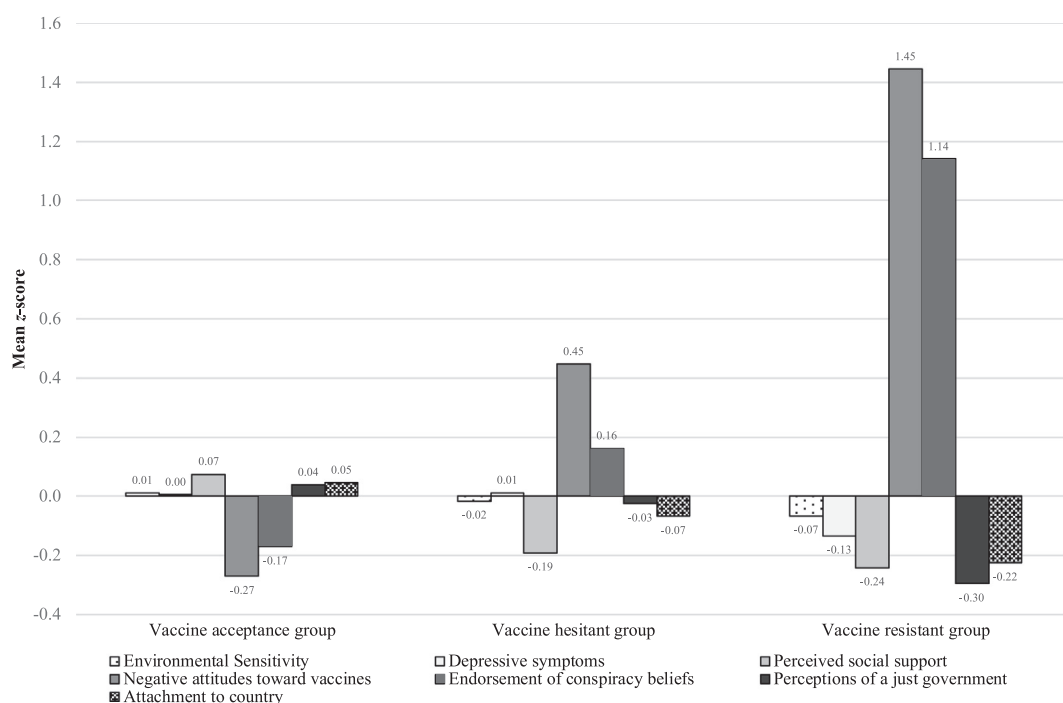


**Fig. 1.** Z-scores of Environmental Sensitivity, Depressive Symptoms, Perceived Social Support, Negative Attitudes Toward Vaccines, Endorsement of Conspiracy Beliefs, Perceptions of a Just Government, and Attachment to Country for Vaccine Acceptance/Hesitance/Resistance Groups.

develop effective communication strategies for promoting COVID-19 vaccine acceptance in this particular segment of the population [44].

Our study indicated that several sociodemographic characteristics were associated with COVID-19 vaccine hesitancy and resistance. Specifically, individuals with lower levels of education and income and who did not know any friend or relative diagnosed with COVID-19 were less likely to be vaccine accepting. This pattern broadly aligns with other research indicating that impoverished educational and socioeconomic conditions may negatively affect people's ability to discern fake news, access medical sources of information, and trust institutions and government [10]. Furthermore, less exposure to COVID-19 is often linked to fewer concerns about contracting the infection which, in turn, lead to greater vaccine hesitancy and resistance [45]. We also found some inter-

esting age differences. In particular, hesitant (vs. accepting) individuals were more likely to belong to the 30–40 years (vs. 18-29 years) age group, a finding that is in contrast with most of the COVID-19 literature reporting greater hesitancy among younger people [7]. An explanation refers to the specific features of the Italian context, whose population is characterized by the largest proportion of older adults in Europe (23% aged 65 + ), a strong emphasis on family connectedness, and the tendency of young adults to live at home with their parents until their early thirties [46,47]. These factors, together with a desire to return to normal life, may have resulted in less hesitancy among individuals aged 18–29 years [48]. In addition, it should be noted that our data were collected in June 2021, when COVID-19 vaccine allocation was beginning to be extended to young adults aged less than 29 years. Thus, our findings may also mirror youths' enhanced motivation to

receive a vaccine as a means to gain more freedom of movement both in Italy and abroad in view of the summer holidays.

The vaccine-resistant group was more likely to reside in North Italy (compared to the acceptance group) and to be unemployed (compared to the other two groups). These results mirror the higher presence of anti-vax movements in the northern regions of the country [49], and the fact that not having an occupation is frequently associated with a number of stressors which impede to prioritize health-related behaviors such as immunization [50]. Furthermore, media coverage of vaccine-skeptic politicians belonging to right-wing, populist parties that are highly supported in this geographical region may have contributed to fueling antivaccination attitudes [51]. Indeed, the politicization of COVID-19 vaccination campaigns has been found to be an influential aspect in shaping people's intentions to receive a vaccine [52,53].

In terms of psychological variables characterizing the three groups, our study revealed both communalities and differences between vaccine-hesitant and resistant young adults in comparison to their accepting counterparts. For instance, hesitant individuals reported significantly higher levels of conspiracy theories related to the origins and spread of COVID-19 and negative attitudes toward vaccines in general than vaccine accepting individuals, but these scores were also significantly lower than those found in the resistant group. However, hesitant and resistant young adults perceived similar levels of social support that were significantly lower than those reported by their accepting counterparts. Thus, social support from family and friends seems to play a relevant role in shaping young adults' attitudes toward COVID-19 vaccines, possibly because a sense of connectedness to one's social network facilitates information gathering, feelings of self-efficacy, and engagement in preventive action [54]. This underlines the importance of taking care of social dimensions during a health emergency that forces the population to keep a physical distance for safety reasons. Public health prevention and intervention efforts should aim at finding and supporting alternative ways to maintain and restore social connections and networks that may have been eroded among young adults because of social distancing and confinement measures in place during the pandemic [18].

As regards government-related variables, resistant individuals reported significantly lower levels of attachment to country and perceptions of a just government compared to accepting ones, with hesitant young adults scoring in between. This finding resembles prior research indicating that perceptions that the government does not operate fairly may contribute to beliefs that the state cannot ensure protection, leading to less compliance with social norms and prescriptions [37]. In a similar vein, the less young adults identify with and commit to their own nation, the more they endorse antisocial beliefs and behaviors [55]. This is especially true in conditions of impoverished social capital, which may exacerbate feelings of exclusion and lead to social polarization phenomena that have also been observed during the current pandemic [56].

Overall, our study supports the idea that during vaccination rollout, young adults with a hesitant attitude toward COVID-19 vaccines show a more nuanced and somewhat less extreme psychological profile than their resistant counterparts, and that further differentiating within this age group is necessary to take the complexities characterizing this developmental phase into account and maximize intervention efficacy. Specifically, the lower propensity to accept a COVID-19 vaccine found among 30–40 year-olds is attributable – at least in part - to a constellation of factors, including heightened concern about possible side effects of pharmacological treatments, worries about the effects of vaccines on one's own and other family member's health, and the achievement of a relatively stable social position (along with a specific ideology) that may lead individuals to become less receptive to change [57]. Public health communication efforts during the COVID-19 vaccination campaign should use research-based messages addressing these specificities by facilitating identification with a relevant social group, presenting real-life experiences of this demographics, and emphasizing collective responsibility in addition to personal benefits to boost COVID-19 vaccination uptake.

### 4.1. Strengths, limitations and future research

Drawing on a large sample of young adults in Italy, the current study expands existing knowledge of the factors involved in COVID-19 vaccine hesitancy and resistance in the midst of the vaccination campaign by focusing on a specific age range and including dimensions related to personal, family/social, and governmental characteristics in an effort to provide a more nuanced picture of a phenomenon that undergoes continuous change. The findings have implications for policymakers and professionals alike, paving the way for interventions that may positively impact on rolling vaccination campaigns across countries.

Yet, several limitations need to be acknowledged. First, the study is based on a cross-sectional design which does not allow to establish the directionality of effects. Second, we used a convenience sample that is not representative of the general young adult population in Italy and therefore may possess different characteristics from those who respond to an online survey. Third, our group of accepting participants (i.e., vaccinated and who intended to vaccinate as soon as possible) may have included individuals on a continuum of acceptance of the COVID-19 vaccine, since from our data we cannot infer the reasons that contributed to their decision to vaccinate. However, from a public health perspective, findings on what variables differentiate people who are vaccinated and who intend to vaccinate as soon as possible from those who express hesitancy or refuse vaccination are essential to inform on ways to respond to the needs of different groups and adjust public policies and interventions accordingly. Fourth, the lack of differentiation among available COVID-19 vaccines impedes a more fine-grained analysis of vaccine hesitancy/resistance, as some studies have shown that attitudes toward immunization may differ according to the type of vaccine (i.e., viral vector vs. mRNA) [58]. Furthermore, the explained variance of the final model is relatively modest, although it aligns with previous research analyzing the demographic and psychosocial correlates of vaccine hesitancy across Europe [10]. This pattern is partly attributable to the uneven distribution of categories concerning the dependent variable in this study, with the vaccine-accepting category being represented the most (73%), thus resulting in overall lowered variability. Further research is warranted to investigate the possible role of other sociodemographic (e.g., ethnic minority status, underlying health conditions) and psychological variables (e.g., altruism, collective responsibility, problematic social media use) in explaining young adults' COVID-19 vaccine hesitancy and resistance. More studies would also be beneficial to tackle time-related changes in attitudes toward vaccines given the large number of factors (e.g., pandemic situation, restrictions, scientific information on vaccine safety and long-term effectiveness) involved in the evolution of this public health crisis [45].

### 4.2. Conclusions

In spite of these limitations, this study provides novel evidence concerning the sociodemographic and psychological variables characterizing COVID-19 vaccine hesitant and resistant young adults during a mass vaccination campaign in one of the countries that was hit hardest at the early stages of the pandemic. In particular, the findings highlight the need to use a holistic approach when designing strategies to optimize participation in COVID-19 immunization campaigns by considering the specific developmen-

tal period of these individuals, their socioeconomic conditions, as well as the importance of social connectedness dimensions (i.e., family and friend support, attachment to country). This is particularly important in the current historical period marked by increasing socioeconomic disparities, structural racism, and mistrust in governmental institutions [59], as well as by a massive resurgence of infections that is leading many countries to offer booster doses of COVID-19 vaccines in order to reduce infection rates.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.vaccine.2022.03.018.

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