Is Religion Bad for You? Vaccine Hesitancy and Religiosity in the Pandemic Context

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Introduction

Religion has long been recognized as a significant factor influencing societal attitudes, including those related to health behaviors and medical interventions. In the context of public health crises, such as the COVID-19 pandemic, religious beliefs, and institutions can serve as both facilitators and barriers to vaccine acceptance. Religious teachings and community leaders often shape individual and collective attitudes toward medical practices, including vaccines, by providing moral guidance or reinforcing cultural traditions. These influences can manifest in diverse ways, depending on the specific theological frameworks, the role of religion in public life, and the interplay between religious and scientific discourses.

In Italy, a country with a deep-rooted Catholic tradition, the relationship between religion and vaccine hesitancy often takes on unique dimensions. While the Catholic Church has largely supported vaccination as an ethical responsibility to protect oneself and others, pockets of skepticism persist, often intersecting with broader societal concerns about vaccine safety and government trust. Understanding how religious beliefs influence vaccine

hesitancy in Italy requires an exploration of not only official religious doctrines but also the cultural and social dynamics within local communities, where religion continues to play a significant role in shaping public opinion and individual decisions.

COVID-19 vaccination and containment measures in Italy

Italy was the first European country to be affected by COVID-19 and over time the Italian government introduced several legislative measures aimed at reducing the contagion. In the context of the global response to the pandemic, the "Italian Model" represents a significant example of policy measures initially adopted in Europe to manage the spread of SARS-CoV-2 infection (Nicola 2021). As such, it serves as a first reference point for other countries grappling with combating the virus. Furthermore, besides the introduction of non-medical containment strategies (e.g., social distancing), Italy adopted a COVID-19 vaccination policy that increasingly sanctions non-compliance.

Since the end of February 2020, Italy has seen a rapid and steady increase in infection and mortality rates, particularly in the northern regions (Goniewicz et al. 2020; Indolfi and Spaccarotella 2020). Consequently, on 9 March 2020, the government proclaimed the first national lockdown. In addition to other non-medical interventions (such as social distancing and the use of face masks), the lockdown and mobility restrictions were extended further on 26 April 2020. The measures introduced also interested the religious sphere. Indeed, these legislative measures initially prohibited and then restricted access to and organization of liturgical celebrations, including church masses, funerals, and weddings. These measures constituted a containment strategy endorsed by most scientific experts, some of whom assisted the government through a dedicated Technical-Scientific Committee (TSC) and health institutions (Crabu 2021).

Following the introduction of the anti-COVID-19 vaccine, the Italian government implemented a series of legislative measures, in addition to the non-medical strategies previously outlined, to mitigate the spread of the infection. In May 2021, legislation was enacted that mandated vaccination against SARS-CoV-2 for healthcare personnel.[1] This legislation also estab-

[1] Law no. 76 of 28 May 2021, published in the Official Gazette no. 128 of 31 May 2021 (legislative implementation of Decree-Law no. 44 of 1 April 2021, published in the Official Gazette no. 79 of 1 April 2021).

lished a system of disciplinary measures for non-compliance, which included demotion, salary suspension, and termination. In June 2021, the government defined and regulated the so-called "Green Pass" or "Green Certification", which could be obtained by vaccination, recovery from the virus, or a negative result of a molecular or antigenic COVID-19 test.[2] Based on the Green Pass status, since August 2021, several personal restrictions on access to certain activities (such as restaurants, catholic rites, and public events) were introduced for people who did not have the certification.[3] Access to places of worship was not linked to the display of the Green Pass. However, the certification was required to participate in other indoor activities organized by the parish, such as parish cultural centers like the so-called "oratori" (i.e., places where minors gather to engage in various recreational activities).

Concomitantly and since then, the "No Green Pass" demonstrations have started all around Italy, with thousands of Italian citizens contesting the government's choices in managing the pandemic. Among the most controversial issues raised by the protesters are the introduction of the Green Pass – perceived as an institutional measure of control and indirect coercion –, the limitations on personal freedom, and the mandates surrounding the anti-COVID-19 vaccine.

Italy demonstrated a particularly strict approach to ensuring compliance with vaccination requirements between the end of 2021 and mid-2022. Indeed, in November 2021, as part of urgent measures for the containment of the COVID-19 pandemic and preserving the safety of socio-economic activities, a new Decree-Law was approved.[4] The main novelty introduced by this decree was the extension of the anti-COVID-19 mandatory vaccination to other professional categories: i.e., personnel of schools, police forces, public rescue, and penal institutions. Specifically, those who were not fully vaccinated against COVID-19 or did not submit the required documentation within 5 days of the invitation were suspended – with job retention for up to 6 months but without salary – until 15 June 2022. Furthermore, due to the increase in infections of the COVID-19 Omicron variant, the gov-

[2] Decree-Law No. 52 of 22 April 2021, published in the Official Gazette no. 96 of 22 April 2021; converted with amendments by Law No. 87 of 17 June 2021, published in the Official Gazette no. 146 of 21 June 2021.

[3] Decree-Law No. 105 of 23 July 2021, published in the Official Gazette no. 175 of 23 July 2021.

[4] Decree-Law No. 172 of 26 November 2021, published in the Official Gazette no. 282 of 26 November 2021.

ernment approved an additional Decree-Law,[5] which further extended the containment measures.[6] The decree-law No. 1/2022 established two main interventions. The first was the mandatory vaccination against COVID-19 for everyone over 50 years of age until 15 June 2022 and for all academic staff (regardless of age), with a penalty of 100 euros for non-compliance for those not vaccinated by 1 February 2022. The second was the requirement of the so-called "Super Green Pass" (Decree-Law No. 229/2021) – obtained by completion of the vaccination cycle or recovery from the virus – for all public and private workers from 15 February 2022 until 15 June 2022. Economic sanctions for non-compliance ranged from 600 to 1,500 euros.

On 31 March 2022, the Italian government officially decreed the end of the COVID-19 state of emergency and the related (medical and non-medical) contagion control measures. The anti-COVID vaccination requirement and sanctions for non-compliance remained in effect only for healthcare workers until 1 November 2022.[7]

Vaccine-related attitudes and religion: A theoretical overview

According to the Ministry of Health monitoring of the anti-COVID-19 vaccines, by September 2023, more than 90% of the Italian population over 12 years of age had completed the first cycle of anti-COVID-19 vaccination (i.e., first and second doses). However, part of citizens expressed the intention to refrain from being vaccinated against COVID-19, to refuse "booster" doses, or to postpone their vaccination. These attitudes fall under the concept of "vaccine hesitancy": a country-specific, heterogeneous, complex, and dynamic phenomenon that implies the postponement or refusal of one or more vaccines "despite the availability of vaccination services" (Larson 2022; MacDonald et al. 2015: 4163).

Uncertainty around vaccines results from a complex entanglement of concerns. These concerns include fear of vaccines' negative impact on one's health, pharmaceutical companies' power centralization, rising trends of excessive med-

[5] Decree-Law No. 1 of 7 January 2022, published in the Official Gazette no. 4 of 7 January 2022.

[6] The decree-law No. 1/2022 increased the containment measures already provided by decree-law No. 229/2021 (Decree-Law No. 229 of 30 December 2021, published in the Official Gazette no. 309 of 30 December 2021).

[7] Decree-Law No. 162 of 31 October 2022, published in the Official Gazette no. 255 of 31 October 2022.

icalization, and vaccine efficacy. Vaccines thus acquire a "hybrid character" in the public debate because they involve not only the techno-scientific sphere – e.g., how the vaccine is made – but also the political, economic, and cultural ones – e.g., how vaccination campaigns are communicated (Bucchi and Neresini 2006). The hybrid character of vaccines became particularly apparent during the COVID-19 pandemic. This was a period during which the intricate and multifaceted interconnections between institutional and non-institutional stakeholders from a vast array of societal domains came to the fore. Regarding the anti-COVID-19 vaccine, the decision to postpone or refuse it was based on various motivations, not solely or necessarily related to the safety and efficacy of the vaccines. Indeed, among the most cited reasons for the postponement or refusal of the vaccine are the rushed approval process for anti-COVID-19 vaccines and a general distrust in pharmaceutical companies (Bucchi et al. 2022).

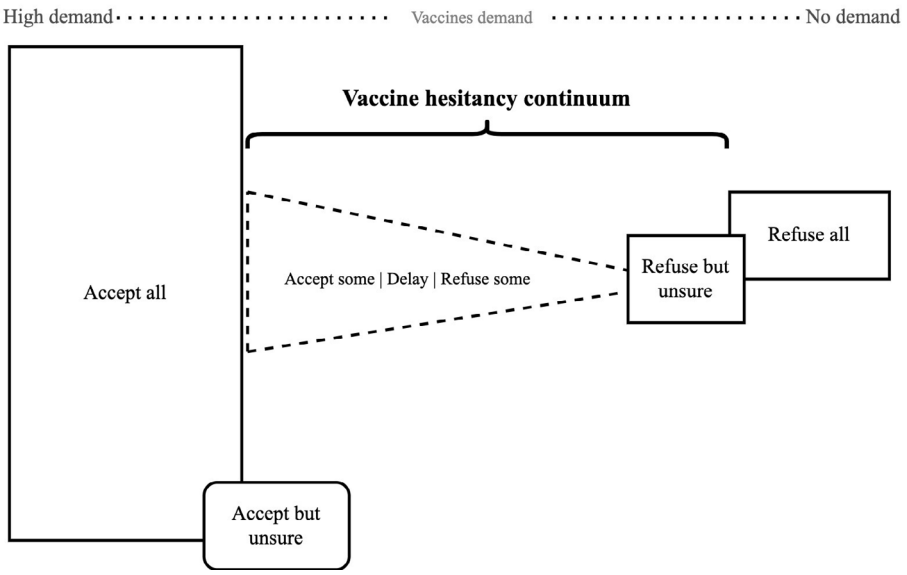
The hybrid character of vaccines in the public debate exerts a profound influence on a fundamental element that can give rise to vaccine-hesitant attitudes: the perception of risk (Kahan 2013; Slovic and Peters 2006). Both disease and vaccination can be associated with "risk," as individuals may perceive the potential for adverse effects, whether direct or indirect, to be heightened in the context of either a disease or a vaccine. As observed by Ward et al. (2017), the fact that both vaccination and vaccine refusal are not free of risk means that individual perceptions of risk can have a significant impact on decisions about vaccination. Risk perception is typically specific to a particular threat and incorporates a range of information gathered through a combination of deliberative, affective, and experiential processes (Ferrer and Klein 2015; Slovic et al. 2004). In the case of a novel disease such as the SARS-CoV-2 infection, during the initial stages of what subsequently became a pandemic, the quantity of accessible information was constrained. It can therefore be reasonably assumed that the experience of being infected by the virus may have influenced individual risk perception. Consequently, risk perception may influence both decisions regarding vaccination and support for mandates related to the anti-COVID-19 vaccine.

Vaccination skepticism is *not* a monolithic and homogeneous entity comprising only those who are opposed to vaccines – often pejoratively labeled as "No-Vaxxers" or "anti-vaxxers." No-Vaxxers are generally portrayed as a group of anti-science, ignorant, and conspiracy-driven citizens. This misconception, which is often reinforced by the media as well as by political and health institutions, has contributed to polarizing the vaccine-related debate (Vanderslott et al. 2022). This polarization was particularly evident during the pandemic, taking the form of two starkly contrasting positions: on one end of the spectrum, those

who choose not to vaccinate, and on the other, those who support vaccination, often (positively) referred to as "Pro-Vaxxers". In the context of attitudes toward vaccines, it is possible to identify at least three main positions: No-Vax, Free-Vax, and Pro-Vax. The latter category encompasses all individuals who adhere to the conviction that vaccines represent an indispensable and efficacious instrument for the prevention of infectious diseases. Consequently, they regard the implementation of a vaccination obligation as a beneficial and desirable measure. Those who reject vaccines as an effective preventive health practice, and thus do not accept any legislative obligation in this regard, are referred to as "No-Vaxxers." In contrast to those who hold a "No-Vax" position, "Free-Vaxxers" are not opposed to vaccines per se but are against the introduction of any vaccination obligation.

The polarization in media and institutional debates on vaccines, where those opposed to vaccination (No-Vaxxers) and those in favor of vaccination (Pro-Vaxxers) appear diametrically opposed, becomes inconsistent when vaccine attitudes are considered on a continuum. MacDonald et al. (2015) highlighted that vaccine hesitancy manifests on a continuum between high and no demand for vaccines (Figure 1). It is crucial to notice that a low demand for vaccines does not necessarily equate to vaccine hesitancy. Indeed, while individuals or communities may demonstrate complete acceptance of vaccines, this does not necessarily indicate the existence of a demand for them.

Figure 1. Vaccine attitudes continuum.



Source: MacDonald et al. (2015).

Whether a vaccination program succeeds depends on several elements that can impact vaccine confidence, such as trust in vaccine-related policies, the products, the providers, and the infrastructures that support those programs (Goldenberg 2021; Larson et al. 2015; Pertwee et al. 2022). Trust in key actors – including scientific experts – and vaccine safety and efficacy are indeed important factors when deciding whether to be vaccinated and/or to vaccinate (Larson et al. 2018). Media, political, and health institutions tend to attribute vaccine hesitancy to either a general lack of trust in science or a general skepticism towards vaccination (Askvall et al. 2021; Bucchi et al. 2022; Peretti-Watel et al. 2015). However, this is an unproductive approach based on misconceptions. In fact, on the one hand, being vaccine-hesitant does not necessarily imply being against vaccines; on the other, research shows a consistent increase in trust in science over the past few years, with a further rise observed during the pandemic both in Italy and in other European countries (Bucchi et al. 2024; Lazarus et al. 2020).

Furthermore, when studying vaccine hesitancy and, in general, vaccination decisions, research has focused mainly on vaccine uptake measures such as vaccination coverage rates. Focusing mainly on these measures, it has often been taken for granted that vaccine uptake and acceptance are the same (Dubé et al. 2021). Consequently, the equation "high vaccine uptake rates = high vaccination acceptance = low vaccine hesitancy" has frequently been assumed to be true by political and health institutions. Nevertheless, it is erroneous to assume that vaccine uptake, defined as the proportion of individuals who receive a specific vaccine, is necessarily indicative of vaccine acceptance. Indeed, high vaccine uptake levels do not necessarily indicate the absence of vaccine hesitancy (Dudley et al. 2020). This indicates that individuals may opt to receive the vaccine and/or vaccinate their children despite exhibiting vaccine hesitancy. Since vaccine uptake and acceptance are not synonymous, it is impossible to adequately estimate vaccine hesitancy levels or vaccine acceptance within a country based solely on vaccine uptake rates (Dubé et al. 2021). In order to address the issue of vaccination acceptance, it is also necessary to consider the level of support people have for specific vaccination policies.

The implementation of mandatory vaccination policies varies considerably across countries. These policies encompass a range of approaches, from those that allow for personal exemptions based on religious beliefs to those that exclusively accept medical exemptions and impose finan-

cial penalties for non-compliance. Nevertheless, the implementation of mandatory vaccination programs does not necessarily result in an increase in vaccine uptake or acceptance (MacDonald et al. 2018; Shachar and Reiss 2020). As highlighted by Ward et al. (2022, p. 233) in their study about the introduction of the Health Pass in France, this measure "has encouraged vaccination of many who were hesitant or reluctant, but it has not reduced hesitancy itself". Further, the number of people who received the anti-COVID-19 vaccine and had doubts about its efficacy increased from 44% to 61% after the Health Pass was introduced. Thus, being vaccinated against SARS-CoV-2 during a health emergency does not necessarily imply an absence of hesitancy.

Among the elements often considered in analyzing vaccine hesitancy, but not deeply investigated before the onset of the COVID-19 pandemic, are religiosity and religious affiliation. Nevertheless, religion has long been recognized as an important element influencing various aspects related to public health (Levin et al. 1996; Ransome 2020). Just like science, religion is considered a "cultural authority" that can shape perceptions and influence citizens' opinions and decisions. Cultural authorities are all those widely acknowledged sources of reliable knowledge and values, that can be invoked and used to make decisions, legitimate ideas, and guide behaviors (Gieryn 1999; O'Brien and Noy 2018). During periods of major threats such as the COVID-19 pandemic, people can use religion as a coping strategy to try to deal with newly emerging and increasingly pressing feelings of insecurity (Norris and Inglehart 2011). As Edgell and Hull (2017) have noted, when individuals are confronted with an unfamiliar phenomenon, such as the Coronavirus, they tend to form their opinions and make decisions based on the information they glean from either religious or scientific sources. Analyses conducted in the Italian context (Molteni et al. 2020) show that during the pandemic citizens who experienced severe cases of SARS-CoV-2 contagion in their families were also those who exhibited heightened institutional religious engagement – e.g., attending religious masses – during the pandemic.

As far as the relationship between religiosity and vaccine hesitancy goes, the research conducted so far has led to ambiguous results. While some authors evidence a positive association between religiosity and conspiracy beliefs leading to a negative effect of religiosity on vaccine acceptance, others highlight a positive association between religious beliefs and support to vaccination and vaccination campaigns. De Figueiredo et al. (2020) conducted a retrospective analysis of vaccine confidence

between 2015 and 2019, with a particular focus on the relationship between religiosity and vaccine uptake. The researchers indicated that when a correlation could be identified between vaccine uptake and religious affiliation, individuals belonging to a minority religious group demonstrated a reduced likelihood of receiving the vaccine. Furthermore, Eriksson and Vartanova (2021) showed that high religiosity, defined by the authors as the perceived significance of religion, is associated with enhanced confidence in the safety, efficacy, and importance of vaccines. This correlation can be attributed to the fact that the primary characteristics of anti-vaccination arguments are not always aligned with traditional religious beliefs. As noted by Lane et al. (2018), globally the characteristics associated with vaccine hesitancy include – besides vaccine safety concerns, gender, culture, and socio-economic factors – religious stances. However, an examination of the relationship between religious affiliation and vaccination skepticism reveals that vaccine refusal is often a reflection of concerns about vaccine safety or individual beliefs "among a social network of people organized around a faith community, rather than theologically based objections per se" (Grabenstein, 2013, p. 2011).

The formation and representation of conflicts is a common feature of major conspiracy theories about the broader world and specific events – as in the case of the COVID-19 pandemic. These representations may occur within or outside of a religious movement (Butter 2014). Religion and conspiracy theories are typically perceived as encompassing distinctive sets of thought and ideas (Robertson et al. 2018). The scientific literature on the topic, indeed, attributes quasi-religious characteristics to conspiracy theories (Franks et al. 2013). Moreover, it demonstrates parallels between the content and structure of conspiracy theories and those of religions, also from a psychological perspective (Robertson and Dyrendal 2018). Based on these shared characteristics, the relationship between religion and conspiracy theories can lead to contrasting conclusions (Frenken et al. 2023): to the extent that conspiracy beliefs can fulfill the same needs that have traditionally been met by religion – such as dealing with uncertainty, as in the case of the pandemic –, individuals should be inclined to embrace either religious beliefs or conspiratorial ones. This would result in a negative correlation. Conversely, if both religion and conspiracy theories reflect fundamental underlying assumptions or other shared ideologies, it would be expected that the same individuals would be inclined to espouse both beliefs, resulting in a positive correlation. However, the existing research on religion and

conspiracy theories has shown mixed results. Some studies suggest that religious people might be more likely to believe in conspiracy theories because of shared psychological mechanisms (Ward and Voas 2011), while others argue that traditional religion provides a framework for resilience that reduces the appeal of conspiracies and that heightened conspiracism is more likely to be associated with alternative forms of religiosity (Ladini 2022).

Since the onset of the COVID-19 pandemic, the focus on conspiracy theories has been particularly relevant. In their study, van Mulukom et al. (2022) found a series of antecedents (including factors such as uncertainty) and consequences (including vaccination willingness), that are associated with belief in COVID-19-related conspiracy theories. Several studies have indeed highlighted a negative correlation between believing in pandemic-related conspiracy theories and infection-preventing behaviors, including vaccination refusal (Enders et al. 2022). Also, Bierwiaczonek et al. (2022) pointed out in their study that conspiracy beliefs were associated with lower vaccination rates.

Methodological note

The data analyzed in this chapter were collected during waves five and six of the ResPOnsE COVID-19 survey (Vezzoni et al. 2024). ResPOnsE COVID-19 is a Rolling Cross-Section survey targeting the Italian population aged 18 and older. The fifth wave was conducted between November 7, 2022, and December 22, 2022, while the sixth wave took place from June 6, 2023, to July 6, 2023. Data collection employed the Computer-Assisted Web Interviewing (CAWI) format. Although the core questionnaire is generally repeated across each wave, the survey includes rotating thematic modules that address a range of topics, such as religion, artificial intelligence, biodiversity, attitudes toward war, etc. Due to time and resource constraints, a probabilistic sampling method could not be employed. Instead, participants were recruited from an online panel provided by a market research institute. To enhance representativeness, the sample was stratified by geographic region and adjusted using gender and age quotas. Weighting techniques were subsequently applied to make the sample more reflective of the general population.

While various vaccine-related items were included in the survey, it was only in the fifth wave that vaccinated respondents were asked to

elaborate further on their decision to get vaccinated. These participants rated, on a scale from 0 ("free choice") to 10 ("forced choice"), how freely they felt they had made their decision to be vaccinated. This item is particularly significant for the analysis, as it sheds light on the diversity of views within the vaccine-compliant majority – a group often assumed to uniformly align with a "Pro-Vax" stance. Unfortunately, unvaccinated respondents during this period were not asked to elaborate on their decision, making it difficult to distinguish nuances within this specific sub-category.

Although the core questionnaire gathers information on religious affiliation and frequency of attendance of religious services, additional items on religion were included only in the first, third, and sixth waves of the survey. These supplementary items could, in principle, allow for the construction of a more nuanced religiosity index. However, for the purposes of this chapter, frequency of church attendance outside of weddings, christenings, and funerals arguably serves as a sufficient proxy for individual religiosity. To maintain an adequate sample size and reduce confidence intervals, the analysis includes data from both the fifth and sixth waves of the ResPOnsE COVID-19 survey. As such, the examination of religious factors is limited to aspects of religious affiliation and religious practices.

The conspiracism index was calculated as the average score of three survey items. Respondents were asked to rate their agreement with the following statements on a scale from 0 ("completely false") to 10 ("completely true"): "There are secret organizations that greatly influence political decisions," "Apparently unrelated events are often the result of secret activities," and "Government agencies closely monitor all citizens." Principal component factor analysis revealed a simple underlying structure, with a single factor exhibiting an eigenvalue above 1 and accounting for 84% of the observed variance. All three items demonstrated high factor loadings (above 0.90) and low uniqueness (below 0.20). The scale achieved a Cronbach's alpha of 0.91 and an average inter-item correlation of 0.77. The resulting index has a mean of 4.82 and a standard deviation of 2.86.

Defining hesitancy

The COVID-19 pandemic posed unprecedented global challenges. During this period, vaccine hesitancy was one of the most discussed is-

sues that clearly highlighted the social tensions that were already present in the Italian context. While hesitation toward vaccines, as previously noted, was not a new phenomenon, the global health crisis in combination with the Italian government's legislative responses increased the public visibility of vaccine-hesitant attitudes. Vaccine hesitancy went from being a relatively underground phenomenon to quickly becoming a salient part of the public debate. In this context, the media became echo chambers, amplifying and fueling a somewhat superficial distinction between "No-Vax" and "Pro-Vax" positions.

Vaccination uptake is a key indicator that offers valuable insight into vaccine hesitancy. However, this simple dichotomy – whether an individual chose to get vaccinated or not – fails to capture the complexity behind people's decisions. The reality of vaccine hesitancy is more nuanced, encompassing a spectrum of attitudes and emotions, from outright refusal to reluctant acceptance.

While the decision to vaccinate may seem like a straightforward choice, it is influenced by many factors, including personal beliefs, social pressure, government mandates, and the perceived risks and benefits of vaccination. The binary measure of vaccine uptake oversimplifies these complexities. For example, some individuals who chose to get vaccinated did so only under significant pressure, such as legal requirements, social expectations, or the fear of losing their jobs or access to certain services. In such cases, vaccination does not necessarily reflect a belief in the vaccine's efficacy or safety, but rather a decision driven by external pressures. An individual who actively sought the vaccine because they believed in its protective benefits differs markedly from someone who complied due to workplace mandates or access restrictions. Yet, in many studies and discussions, both individuals would be classified simply as 'vaccinated,' thereby obscuring the varying degrees of acceptance or reluctance that influenced their decisions.

To better understand the different nuances of vaccine hesitancy, it is crucial to combine the binary measure of vaccine uptake with a metric that captures the subjective experience behind the decision-making process. In the context of the COVID-19 pandemic, respondents who received the vaccine were asked to rate, on a scale from 0 to 10, the extent to which they perceived their decision as voluntary. A response of 0 would indicate a sense of complete autonomy in the choice to get vaccinated, while a response of 10 would reflect a feeling of being entirely forced.

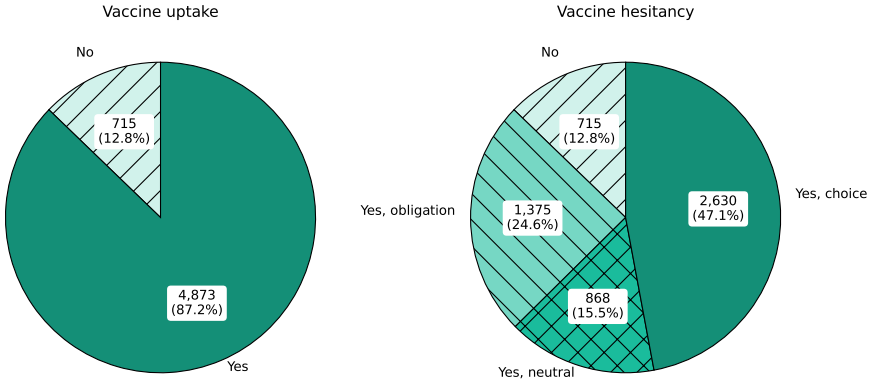
By combining vaccination uptake with this additional variable, we identified four distinct categories:

1. *Vaccinated, free choice*: Individuals in this category saw their decision to get vaccinated as primarily their own. They are more likely to view vaccination as an effective and necessary measure for both personal and public health.
2. *Vaccinated, felt neither forced nor completely free*: This group includes individuals whose decision to get vaccinated was neither entirely voluntary nor completely coerced. They may have weighed the pros and cons without feeling strongly influenced in either direction.
3. *Vaccinated, but felt forced*: These individuals complied with vaccination but felt pressured by external factors, such as legal mandates, workplace requirements, or social coercion. They may harbor significant doubts about the vaccine's necessity or efficacy.
4. *Not Vaccinated*: Individuals who chose not to receive the vaccine despite external pressure, often due to strong personal beliefs, mistrust in the vaccine, or doubts about the severity of the pandemic.

Categorizing individuals along this spectrum helps clarify how people's decisions were influenced by a complex interplay of internal and external factors. It also emphasizes that vaccine hesitancy is not synonymous with vaccine refusal. Rather, hesitancy encompasses a range of feelings that can lead to delayed acceptance, selective acceptance, or, in some cases, reluctant compliance. For instance, many individuals who felt pressured to get vaccinated may still harbor significant concerns about vaccine safety or the broader implications of mandatory health policies.

This more granular approach to understanding vaccine attitudes highlights that hesitancy can persist even among those who ultimately accept vaccination. It also underscores the importance of considering the social and legal context in which vaccine decisions were made. During the COVID-19 pandemic, many countries implemented strict measures to encourage or enforce vaccination, such as the "Green Pass" in Italy, which restricted access to workplaces and public spaces for the unvaccinated. For some, these measures served as a compelling motivation to vaccinate, but they did not necessarily foster trust or acceptance of the vaccine itself.

Figure 2. Vaccine uptake (left) and vaccine hesitancy (right) during the COVID-19 pandemic in Italy.



Not only are vaccine uptake and vaccine hesitancy two distinct concepts, but vaccine uptake does not necessarily imply a lack of vaccine-hesitant attitudes. While the left side of Figure 2 indicates a high overall vaccine uptake of 87.2% compared to 12.8% who did not receive the vaccine, focusing solely on this measure risks obscuring the nuanced picture of vaccine hesitancy. Indeed, the right side of Figure 2, which combines vaccine uptake with the subjective perception of the COVID-19 vaccine choice, reveals that hesitancy is much more prevalent than the uptake data alone might suggest. Specifically, 24.6% of respondents felt obliged to get vaccinated, 15.5% felt neither obliged nor completely free, and only 47.1% perceived their decision as the result of a free choice. This illustrates that even among those who received the vaccine, a significant portion harbored vaccine-hesitant attitudes. This distinction is important because vaccine hesitancy not only influences the initial decision to get vaccinated but also affects the willingness to receive subsequent booster doses.

Table 1. Vaccine-hesitant attitudes by vaccine uptake among individuals who received at least one dose of COVID-19 vaccine, Italy, November 2022 – July 2023 (N=4,873).

Vaccine hesitancy	Vaccine uptake				Total (%)	N
	Yes, 1 dose	Yes, 2 doses	Yes, 3 doses	Yes, 4 doses		
Yes, choice	0.6	8.3	58.8	32.4	100.1	2,630
Yes, neutral	3.0	22.2	63.6	11.2	100.0	868
Yes, obligation	2.8	25.0	65.8	6.3	99.9	1,375

Table 1 underscores the impact of perceived autonomy on vaccine adherence. Indeed, individuals who perceived vaccination as a free choice demonstrated a considerably higher likelihood of receiving additional doses of vaccine. This difference is particularly evident in the odds ratio for four doses, which shows a significantly greater uptake compared to those who felt obligated or neutral. Conversely, respondents with higher degrees of hesitancy are significantly more likely to receive only one or two doses before discontinuing further vaccination. The odds ratios for one and two doses suggest that perceived obligation correlates with lower sustained vaccine uptake. Additionally, the odds for respondents who were neutral in their perception of vaccination were found to align more closely with those who felt obligated than with those who perceived vaccination as a free choice.

Vaccine hesitancy and religion: Two sides of the same coin?

Understanding the factors that shape vaccine hesitancy is critical in addressing public health challenges, particularly during global health crises. Vaccine hesitancy, a complex and multifaceted phenomenon, is influenced by various social, cultural, and psychological factors. Among these, religious behavior, particularly churchgoing, has frequently been identified as a potential determinant of vaccine-related attitudes. Religious communities often act as influential social networks that shape trust, authority, and perceptions of health interventions. Simultaneously, other belief systems, such as conspiratorial thinking, contribute to vaccine hesitancy by fostering mistrust in science and medical institutions.

This section examines the relationship between churchgoing and vaccine hesitancy using a multinomial logistic regression framework. Vaccine hesitancy is conceptualized as a continuum, ranging from individuals who perceived their vaccination as entirely voluntary to those who outright rejected vaccination, with intermediate positions reflecting relative neutrality or a sense of coercion. This nuanced approach allows for a detailed analysis of how religiosity and other key variables influence varying levels of vaccine hesitancy. These analyses aim to illuminate the complex interplay between religious behaviors, belief systems, and institutional trust, offering insights for public health communication and policy development.

Table 2. Relative Risk Ratios for levels of COVID-19 vaccine hesitancy in Italy: Stepwise multinomial logistic regression models (N=3032, November 2022 – July 2023).

	M1		
	Yes, neutral	Yes, obbligation	No
Churchgoing (0-6)	1.0182	0.9637	0.8539
Conspiracism index (0-10)			
Churchgoing#Conspiracism			
Experienced severe COVID-19 effects [ref: No]			
Trust in science (0-10)			
Religious affiliation [ref: None]			
Catholic	1.4427	1.6704*	0.9855
Other religious denomination	5.4288***	2.3026*	3.3556
Don't know	0.6970	2.1528	0.9322
Age (centered around the mean)	0.9691***	0.9777***	1.0035
Gender [ref: Female]			
Male	0.6091**	0.7044*	0.1798***
Education [ref: Low]			
Medium	0.6415	0.6829	0.9367
High	0.4869**	0.5080**	0.3767*
Area [ref: South/Islands]			
Center	1.2960	0.7006	0.5436
North	0.8563	0.8385	0.5208
Size of town (0-5)	0.9777	1.0632	0.8184
Constant	0.5026*	0.7100	0.5764
Model's statistics:			
R2	0.055		
N	3,032		

Note: *p<0.05; **p<0.01; ***p<0.001.

	M2			M3			M4		
	Yes, neutral	Yes, obbligation	No	Yes, neutral	Yes, obbligation	No	Yes, neutral	Yes, obbligation	No
	1.0055	0.9297	0.8005	1.0147	0.9641	0.8918	1.1317	1.0817	0.6176
	1.1042**	1.2397***	1.5277***	1.1058**	1.2523***	1.5432***	1.1474**	1.2945***	1.5057***
							0.9783	0.9790	1.0452
				0.9671	0.6930*	0.5892	0.9744	0.6977*	0.5898
				0.8303***	0.7429***	0.5813***	0.8329***	0.7451***	0.5831***
	1.3080	1.3931	0.8016	1.2505	1.3017	0.7513	1.1982	1.2573	0.7730
	5.1886***	1.9835	2.5174	3.5083**	1.0998	1.2344	3.3041**	1.0392	1.3593
	0.6873	2.2484	1.2125	0.7442	2.3395	1.0574	0.7454	2.3419	1.0447
	0.9663***	0.9709***	0.9875	0.9658***	0.9690***	0.9811	0.9650***	0.9682***	0.9811
	0.5909**	0.6692*	0.1690***	0.6178**	0.6917*	0.1651***	0.6137**	0.6906*	0.1664***
	0.6347*	0.6853	0.9071	0.6680	0.7469	1.1351	0.6557	0.7332	1.1750
	0.5085**	0.5666*	0.4631	0.5649*	0.6801	0.6977	0.5508*	0.6635	0.6945
	1.3250	0.7577	0.6524	1.2683	0.7261	0.6259	1.2699	0.7275	0.6279
	0.8942	0.9401	0.5869	0.8511	0.9040	0.5244	0.8398	0.8921	0.5328
	0.9800	1.0608	0.7922	0.9907	1.0803	0.8433	0.9936	1.0838	0.8479
	0.3466**	0.2831***	0.0693*	1.3188	2.3406	1.6101	1.1451	2.0231	1.8890
	0.091			0.143			0.145		
	3,032			3,032			3,032		

Model 1 (M1) is the simplest of the reported models. It includes churchgoing (used as an indicator of overall religiosity), religious affiliation, and a series of socio-demographic control variables related to age, gender, education, area of residence, and town size. Model 2 (M2) is identical to Model 1 but introduces an index of conspiracism based on individuals' agreement with the following three statements: "There are secret organizations that greatly influence political decisions"; "Apparently unrelated events are often the result of secret activities"; and "Government agencies closely monitor all citizens." Model 3 (M3) adds two more variables to control for respondents' experience with severe consequences of COVID-19 (i.e., hospitalizations and/or deaths among acquaintances, family members, or both) and their level of trust in science. Finally, Model 4 (M4) introduces an interaction term between churchgoing and the conspiracism index to test whether the effect of religiosity is moderated by conspiracism.

Regardless of the outcome considered, the effect of churchgoing observed in M1 is never statistically significant. While the absence of statistical significance does not necessarily confirm that the considered variable does not have an effect on the outcome, it means that there is not enough evidence to confirm that the effect in question ultimately exists (see Amrhein et al. 2019). Similarly, the effects associated with area of residence and town size are also not significant. The only statistically significant effects in M1 are those related to religious affiliation, age, gender, and education. Catholics are 67.0% more likely than unaffiliated respondents to get vaccinated out of obligation rather than perceiving their decision as a free choice. The effects for other religious denominations are particularly strong, likely due to the low number of respondents in this category combined with a skewed distribution of observations. The unitary effect of age is -3.1% for the neutral outcome and -2.2% for obligated vaccination, suggesting that older respondents are generally more likely to fall into these intermediate forms of vaccine hesitancy. The effect of gender ranges from 29.6% to 82.0%, indicating that women are consistently more likely than men to be vaccine-hesitant. This difference is especially strong among those who chose not to get vaccinated. Finally, while individuals with an intermediate level of education do not significantly differ from those with a low level of education, higher education mitigates vaccine hesitancy. The effect ranges from 49.2% to 62.3%, showing that highly educated individuals are generally more likely to get vaccinated and to perceive their decision as their own free choice. It is important to note, however, that the model's R-squared of 0.055 means that only 5.5% of the observed variance is explained by the model. This suggests

that, on its own, the explanatory power of religious indicators is fairly limited. Indeed, when only churchgoing and religious affiliation are included, the R-squared drops to 0.017.

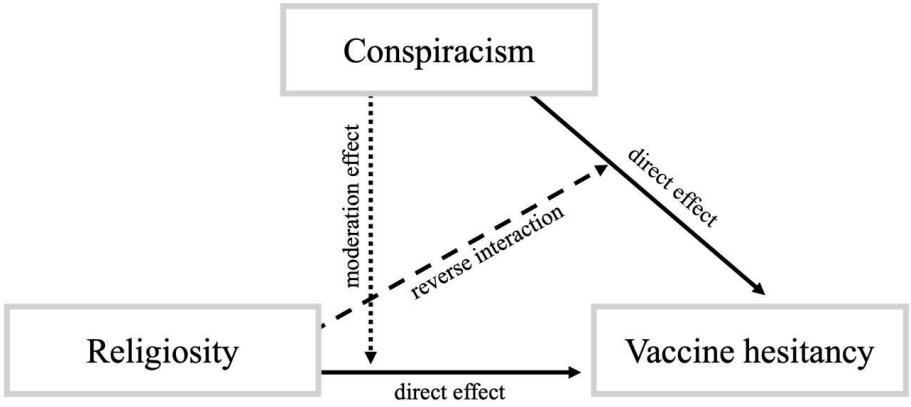
When conspiracism is introduced in the model in M2, the R-squared increases to 0.091, the magnitude of the effects for gender and education slightly decreases, and the previously observed effect associated with Catholic affiliation becomes statistically not significant. This is particularly important because it shows that the effect of religious affiliation is no longer significant once the relationship is controlled for conspiracism. The newly introduced conspiracism index is statistically significant, and the magnitude of its unitary effect increases from 10.4% (indicating an increase in the probability of getting vaccinated and perceiving the decision as neither free nor forced) to 24.0% (indicating an increase in the probability of getting vaccinated out of obligation) and 52.8% (indicating an increase in the probability of not getting vaccinated). This does *not* mean that vaccine hesitancy is rooted in conspiracy theories, but rather that respondents who are more inclined to believe in conspiracy theories are also more likely to display vaccine-hesitant attitudes.

With the addition of trust in science and experience with severe COVID-19 consequences, the R-squared of M3 increases to 0.143, and the previously observed effect of education becomes both weaker and more circumscribed. The results from M3 reveal that several factors significantly influence individuals' vaccination attitudes, with conspiracism and trust in science being among the most consistent predictors. Higher levels of conspiracism are associated with an increased likelihood of adopting vaccine-hesitant stances, suggesting that those with stronger conspiratorial beliefs tend to either reject vaccination or support it out of obligation or neutrality. Conversely, trust in science consistently decreases the probability of rejecting vaccination, with individuals who have higher trust in science being less likely to adopt hesitant stances. The magnitude of the effect for both conspiracism and trust in science tends to increase as the observed outcome deviates further from the baseline position (i.e., people who got vaccinated out of their own free will). Experience with severe COVID-19 effects also plays a role, as those who have experienced severe effects are less likely to get vaccinated out of obligation. Demographically, men are significantly less likely to be vaccine-hesitant compared to women, indicating that men are more likely to have favorable attitudes toward vaccination. Age has a small but significant negative effect on hesitancy, but only for outcomes that do not involve the decision to reject vaccination altogether. Education

indicates that individuals with higher education levels are generally less likely to adopt a neutral stance. As in the previous model, neither churchgoing nor religious affiliation appear to significantly impact vaccination choices. Overall, the results emphasize the importance of conspiracism and trust in science in shaping vaccination attitudes.

To explore the relationship between religiosity and vaccine hesitancy more thoroughly, it is important to consider the possibility that the effect of churchgoing on vaccine hesitancy might be moderated by conspiracism, as shown in Figure 3. While churchgoing itself may not be statistically significant in the current model, its effect on vaccine-related attitudes may vary depending on an individual's level of conspiratorial beliefs. In this context, an interaction effect would test whether the influence of church attendance on vaccine hesitancy changes as the level of conspiracism increases. If conspiracism moderates the effect of churchgoing, it could mean that individuals with higher levels of conspiratorial thinking who attend church may be more or less hesitant about vaccination than those with lower levels of conspiracism. To test this hypothesis, a new model that includes an interaction term between churchgoing and conspiracism would help determine if the relationship between church attendance and vaccine hesitancy is conditional on an individual's level of conspiratorial beliefs.

Figure 3. Graphical representation of the moderation effect.

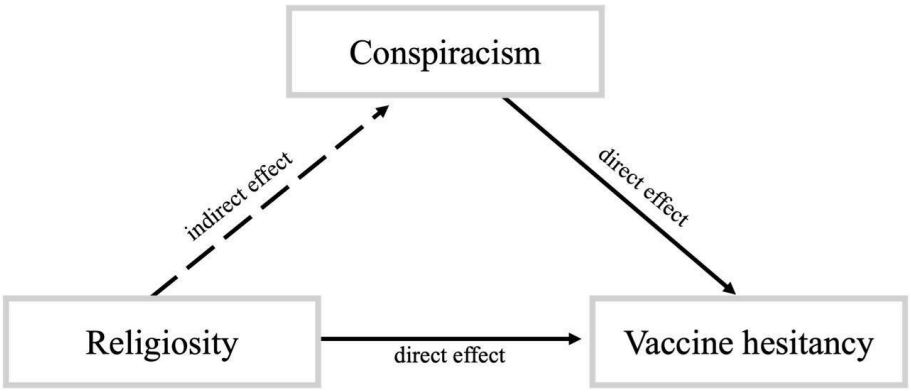


The introduction of the interaction term between churchgoing and conspiracism in M4 did not yield statistically significant results and did not substantially alter the model's outcomes. The R-squared value changed very

little, and none of the previously observed relationships showed significant shifts. This suggests that conspiracism does not significantly moderate the effect of churchgoing on vaccine hesitancy. Therefore, the hypothesis that the relationship between churchgoing and vaccine hesitancy is conditional on conspiratorial beliefs is not supported. Additionally, since the effect of churchgoing on vaccine hesitancy was not statistically significant, these results further reinforce the idea that churchgoing does not have a substantial influence on vaccine-hesitant attitudes, regardless of an individual's level of conspiracism.

Before concluding that there is no evidence that religiosity influences vaccine hesitancy, there is another hypothesis to consider, aside from the moderation hypothesis tested in M4 of Table 2. The data shows that conspiracism is positively correlated with both churchgoing and vaccine hesitancy. It is therefore possible that religiosity affects vaccine hesitancy indirectly by increasing the level of conspiracism, which in turn influences hesitancy. In other words, the effect of religiosity may be mediated by conspiracism, as shown in Figure 4.

Figure 4. Graphical representation of the mediation effect.



To test the mediation hypothesis, a bootstrapping analysis was conducted. Bootstrapping is a resampling technique used to assess the significance of indirect effects in mediation models (see Preacher and Hayes 2004). It involves repeatedly sampling from the dataset, with replacement, to create thousands of "bootstrap samples." For each of these samples, the mediation model is re-estimated, producing an empirical distribution of the indirect effect (i.e., the effect of religiosity on vaccine hesitancy via conspiracism). This method does not rely on the assumption of normality, making

it particularly suitable for indirect effects, which often have skewed distributions. By examining the confidence intervals derived from the bootstrap distribution, it is possible to assess whether the estimated indirect effect is statistically significant or not. If the confidence interval does not include zero, this provides evidence that conspiracism mediates the relationship between religiosity and vaccine hesitancy.

Table 3. Bootstrap analysis of the indirect effect of religiosity on COVID-19 vaccine hesitancy via conspiracism, Italy (N=3032, November 2022 – July 2023).

	RRR	Observed coefficient	Bootstrap std. err.	z	P>z	95% Confidence Interval	
Yes, neutral	1.0034	0.0034	0.0069	0.49	0.627	-0.0102	0.0170
Yes, obligation	1.0112	0.0111	0.0194	0.57	0.567	-0.0269	0.0492
No	1.0318	0.0313	0.0562	0.56	0.578	-0.0788	0.1414

Note: *p<0.05; **p<0.01; ***p<0.001.

With 1,000 bootstrap replications, the analysis reported in Table 3 revealed that none of the estimated indirect effects reached statistical significance. This result indicates insufficient evidence to support the mediation hypothesis that religiosity influences vaccine hesitancy indirectly through conspiracism. Consequently, the findings suggest that the relationship between religiosity and vaccine hesitancy is not mediated by conspiracism, at least within the limits of this dataset and analysis.

In conclusion, neither religious affiliation nor religiosity, as measured by churchgoing, appears to significantly affect the likelihood of respondents being vaccine-hesitant in the context of COVID-19 vaccines in Italy. Although conspiracism is positively related to both religiosity and vaccine hesitancy, the analysis showed that the effect of religiosity on vaccine hesitancy is neither moderated nor mediated by the conspiracism index. Religiosity does not have a statistically significant effect on vaccine hesitancy. Far from being two sides of the same coin, vaccine hesitancy and religion seem to be two entirely different currencies altogether.

Final considerations

The relationship between religion and vaccine hesitancy in Italy during the COVID-19 pandemic reveals the complexity of decision-making processes in a highly charged social and health context. By distinguishing between vaccine uptake and vaccine hesitancy, this analysis emphasizes that getting vaccinated does not necessarily reflect full acceptance of vaccines. Many individuals may comply due to external pressures such as mandates, workplace requirements, or societal norms, rather than out of voluntary agreement. This conclusion reflects on the findings and their broader implications for public health and societal behavior.

The study categorized individuals into four distinct groups based on their anti-COVID-19 vaccination choices to capture the nuances of vaccine hesitancy: those vaccinated by free choice, those who felt neither free nor forced, those vaccinated under perceived compulsion, and those who remained unvaccinated. This categorization revealed significant differences in the motivations and attitudes underpinning vaccination decisions.

Churchgoing, used as a measure of religious practice, was not statistically significant in predicting vaccine hesitancy across the categories. Religious affiliation, however, initially showed a positive association with the likelihood of being vaccinated under perceived obligation. This suggested a potential link between religious identity and the influence of external pressures on vaccination decisions. However, the explanatory power of the model, as indicated by the low R-squared value, highlighted the need for additional variables to account for the complexity of vaccine hesitancy.

The inclusion of a conspiracism index significantly improved the model's explanatory power and offered critical insights. Conspiratorial beliefs were strongly associated with vaccine hesitancy, with the effects intensifying as hesitancy increased (i.e., from voluntary acceptance to perceived coercion and non-vaccination). This finding underscores the influence of distrust in institutions, official narratives, and scientific consensus on health behaviors during a pandemic.

The introduction of conspiracism into the analysis also diminished the statistical significance of religious affiliation. This indicates that the initial association between religious identity and vaccine hesitancy was likely confounded by underlying conspiratorial tendencies. It is important to note, however, that the findings do not suggest that vaccine hesitancy stems solely or necessarily from conspiracy theories; rather, they point to an increased

likelihood of holding vaccine-hesitant attitudes among those who share skepticism toward authority and institutional trust.

The inclusion of variables related to personal experience with COVID-19 and trust in science further enhanced the model's explanatory power. Experience with severe consequences of SARS-CoV-2 infection, such as hospitalizations or deaths among acquaintances and family members, was associated with a reduced likelihood of being vaccinated under perceived obligation. This suggests that direct exposure to the virus's severe impacts may reduce the influence of external pressures, promoting a sense of voluntary action.

In line with other studies focusing on the Italian context (Bucchi et al. 2022), trust in science emerged as a particularly robust predictor. Higher levels of trust in scientific expertise and institutions consistently reduced the likelihood of vaccine-hesitant attitudes, especially in categories further removed from voluntary acceptance. This finding underscores the central role of public trust in shaping health behaviors, suggesting that efforts to foster trust in scientific institutions and evidence-based practices could be crucial in addressing vaccine hesitancy.

Given the observed relationships between religiosity, conspiracism, and vaccine hesitancy, mediation and moderation hypotheses were tested to explore potential underlying mechanisms. The mediation hypothesis proposed that conspiracism might act as a pathway through which religious orientation influences vaccine hesitancy. However, no significant indirect effect was observed, indicating that conspiracism does not mediate the relationship between religiosity and vaccine hesitancy. Similarly, the moderation hypothesis, which posited that conspiracism might amplify or diminish the influence of religiosity on vaccine attitudes, yielded no significant results.

These findings suggest that, although religiosity remains an important aspect of social identity, it played a limited role in determining vaccine hesitancy during the COVID-19 pandemic in Italy. The initial association between religious affiliation and hesitant stances appears to have been confounded by more influential factors, such as conspiratorial beliefs and levels of trust in science.

The findings highlight the multifaceted nature of vaccine hesitancy and offer valuable insights for public health strategies. Personal experiences with the pandemic, particularly exposure to its severe consequences, also play a role in shaping vaccine attitudes. This highlights the relevance and the need to take into account also experiential elements when designing public health interventions. The findings also challenge assumptions about the centrality

of religiosity in shaping vaccine attitudes. While religion remains a significant social and cultural force, its influence on health behaviors may be mediated by broader psychological, cultural, and informational factors. Policymakers and health practitioners should consider the diversity of influences on vaccine hesitancy and develop interventions that address these complexities.

This analysis has several limitations. The reliance on self-reported data may introduce biases, particularly on sensitive topics such as vaccination and personal beliefs. Additionally, the categorical classification of vaccine hesitancy, while useful for capturing key distinctions, may not fully encapsulate the complexity of individual attitudes and decision-making processes. Finally, this categorization needs to be further refined to more granularly distinguish the differences within the sub-category of respondents who did not get vaccinated.

Future research could benefit from longitudinal data to track changes in vaccine attitudes over time, especially in response to evolving pandemic conditions and public health policies. Further exploration of the interplay between religiosity, political ideology, media consumption, and other sociocultural factors could provide deeper insights into the drivers of vaccine hesitancy.

In summary, the analysis reveals that vaccine hesitancy during the COVID-19 pandemic in Italy was consistently shaped, among other possible con-causes, by factors such as conspiratorial beliefs and trust in science rather than religiosity. Although religion is a significant aspect of social identity in Italy (Molteni et al. 2020), its influence on vaccine attitudes was limited when accounting for other variables. By disentangling the complex web of influences on vaccine decision-making, the findings contribute to a nuanced understanding of the challenges and opportunities in addressing vaccine hesitancy during a public health crisis.

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