

Article

Exploring the Link Between Religiosity and COVID-19 Vaccination Attitudes in Romania

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Abstract

This study investigates the relationship between religiosity and attitudes toward COVID-19 vaccination in Romania using nationally representative survey data from the Barometer of Religious Life (December 2021). Five survey items measuring religious beliefs and practices were used to construct a Religious Practice Index, whose reliability and one-dimensionality were confirmed through Cronbach's Alpha and factor analysis. Correlation analysis revealed a small but statistically significant negative association between religiosity and vaccination acceptance ($r = -0.106$, $p = 0.001$). Binary logistic regression further indicated that higher religiosity, younger age, lower income, and rural residence were significant predictors of reduced vaccination likelihood, while older age, higher income, and urban residence were associated with greater acceptance. Nevertheless, the model explained only 9.3% of the variance and correctly classified 64.4% of cases, suggesting modest predictive power. These findings indicate that religiosity influences vaccination attitudes but does not serve as a dominant predictor, highlighting the importance of other additional factors that were beyond the scope of this analysis and were not measured.

Keywords: COVID-19 vaccination; religiosity; vaccine hesitancy; Romania; logistic regression; public health attitudes

1. Introduction

The COVID-19 pandemic has intensified debates regarding vaccine acceptance and hesitancy, particularly in relation to religiosity and its potential influence on public attitudes toward vaccination. Globally, concerns have emerged that religious beliefs or institutions might contribute to vaccine resistance, a perception widely discussed in both public discourse and academic literature [1]. However, empirical findings remain inconsistent: while some studies associate religiosity with vaccine hesitancy, others suggest that certain religious teachings or communities can actively support public health measures, including vaccination campaigns.

Romania presents a unique case for examining this relationship. The country combines one of the highest levels of religiosity in the European Union with one of the lowest COVID-19 vaccination rates. As of early 2023, only 42.4% of the population had received two doses of the vaccine, compared to the EU average of 73%, ranking Romania second-to-last after Bulgaria [2].

Existing research on religiosity and vaccination often relies on simplified measures of religious belief or compares religious and non-religious groups without accounting for broader socio-cultural contexts. Moreover, few studies have employed nationally



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representative data to test whether individual religiosity predicts attitudes toward COVID-19 vaccination. This study addresses this gap by analyzing data from the Barometer of Religious Life in Romania [1], aiming to determine whether higher levels of religiosity are statistically associated with lower acceptance of COVID-19 vaccination.

2. Literature Review

In 2020, before the advent of the COVID-19 vaccine, one of the fears of the authorities in all the countries affected by the pandemic was related to the availability of the vaccine. The highest rates of vaccination are in the countries that are the most globalized. Globalization also means that countries that play an important role in the international markets may have faster access to COVID-19 vaccine suppliers [3]. *In the end, the biggest problem turned out to be a subjective one, namely the hesitation of the population regarding vaccination.* Practically, the COVID-19 pandemic has raised, among other issues, the need for efficient vaccination campaigns and the need for efficient communication about vaccination [4].

Vaccine hesitancy is not geographically specific, but culturally specific [3,5,6]. A study that investigates vaccine hesitancy and willingness in three countries (Israel, Japan and Hungary) states that vaccination campaigns should take into consideration cultural myths [5]. Another study carried out in Israel in 2021 on a nationally representative sample shows that psychosociological, subjective factors (perception of the vaccine and vaccination, for example) have more power to explain the attitude towards vaccination than socio-demographic characteristics [7]. A study carried out in Romania in 2021 demonstrates that there is a strong correlation between the belief that others will also be vaccinated and one's own vaccination intention [8].

Nevertheless, the psychosociological and cultural factors seem more important in this regard than the socio-demographic ones. That is why this paper also focused on religiosity, not simply on religious affiliation. This study addresses religiosity, as a factor that shapes the cultural profile of an individual, and its association with the attitude towards vaccination in the context of the pandemic. *There are studies that confirm that, in certain cultures, religiosity is associated with hesitation and refusal of vaccination, somehow confirming "the common knowledge" in this regard [9,10]. A study from Israel and Japan, however, shows that things are not so straightforward: certain forms of religiosity encourage the acceptance of vaccination, for example moderate religiosity is more likely than strong religiosity to encourage vaccination, and Judaism is more likely than Islam or Buddhism to encourage vaccination [11].*

There could also be differences between secularized societies and those in which a certain degree of religiosity is the norm. Eastern European societies, including the Romanian one, seem to be more religious than the Western European ones. So, the connection between religiosity and vaccine acceptance/hesitancy/refusal might function differently in the first type of society, compared to the other. For example, a study carried out during the pandemic in Russia (a predominantly Orthodox country, with a higher degree of religiosity than Western European countries, and with a low COVID-19 vaccination rate) states that no serious evidence of an association can be found in this case between religiosity and resistance to vaccination, other psychosociological variables being much stronger in this sense [12]. Romania shares with other post-communist Eastern European societies a legacy of low institutional trust, fragmented public authority, and ambivalent relationships between religious institutions, science, and the state. Comparative studies from countries such as Poland, Hungary, and Russia suggest that vaccine hesitancy in the region is shaped less by religiosity per se and more by the interaction between religious identity, political distrust, and exposure to misinformation [5,12]. Although religiosity emerges as a statistically significant predictor, its effect size and explanatory power remain

modest, indicating that it functions more as a contextual or mediating factor than as a primary driver of vaccination attitudes.

There is a whole pool of “beliefs” whose connection with the attitude towards vaccination has been addressed by scientific literature: religious faith, trust in authorities, trust in science (respectively in medicine), and belief in conspiracy theories [4–8]. These issues are important for this study because, including the case of Romania, there are studies that demonstrate that the profile of the people who believe in conspiracy theories (decisive factor in the refusal of vaccination) includes a segment of very religious persons [13]. For example, one study shows that social media perceptions, misinformation exposure, education, and religiosity are key predictors of vaccine-related conspiracy beliefs, while age, critical thinking, and online news consumption show no significant effect [13].

Spirituality is significantly associated with belief in religious conspiracy theories and vaccine refusal. In the Czech Republic spirituality itself, not a specific religion, was found to be linked to a higher possibility of vaccine refusal [14]. The beliefs in an engaged God (and not a certain doctrine) were in fact associated with greater mistrust and hesitancy regarding the vaccines. It appears that religiosity is negatively related to trust in scientific research [15].

Other studies show that more religious countries tend to have higher confidence in the safety, importance, and effectiveness of vaccines. So, could this be something that depends on the place of religion/church in that society, rather than just on the specific religion or denomination? One explanation would be that the role of religiosity involves a psychological mechanism that makes more religious individuals less prone to vaccine hesitancy [16]. Trust in churches is positively related with the likelihood of a vaccination. This is because some churches, like the Christian churches in Germany, supported the vaccination campaign and conducted campaigns of their own by trying to convince the congregation to get vaccinated [17]. This is why it is important to include spirituality in clinical practice for all actors involved. Spirituality is a good coping strategy and taking into consideration the spiritual needs of the patients help reduce stress, anxiety, and depression and strengthens resilience. Healthcare workers, caregivers and patients could benefit from this [18]. Religious attendance had a positive effect on the mental well-being and the socialization of the individuals, by creating a cohesive relation inside the religious community. Religion, seen as a force of solidarity, helps alleviate the feelings of loneliness [19]. Studying cults and religiosity can help us have a better understanding of vaccine hesitancy [20].

Vaccine hesitancy is not necessarily related to vaccine type either and is more linked to the source of information that the individuals consider trustworthy. However, believers in conspiracy theories are more likely to evaluate the mRNA vaccines (Pfizer and Moderna) as unacceptable and to believe that the free choice of the vaccine type is a condition mandatory for increasing the vaccination rate [21].

There is a high credibility associated with scientific authorities, more so than with spiritual actors [22]. Virtual webinars held by the scientific community could also help reduce vaccine hesitancy [23]. Religiosity can also help the pro-science discourse and contribute to a better communication with the public about scientific subjects [24]. While dealing with COVID-19, spirituality was on a descending trend among patients who did not use religion anymore as a coping tool [25]. However, the Vatican, Buddhists and Jewish formal actors had a positive stance toward vaccination, although the Vatican raised some concerns about issues regarding freedom of choice [26]. In Islam, for example, some type of derivatives, like pork, that are used in the vaccine, are forbidden from being used. It appears that religiosity influences the decision and the mentality regarding vaccines [27–29].

The main sources of information regarding the vaccines are the media (television, radio, and newspapers), health workers and social media platforms [30–33].

During the pandemic, the issue of some people's objection to vaccination for religious reasons has been raised, for example a US study identifies religious nationalism as a predictor of skepticism towards vaccination [34]. Another US study identifies highly religious Christians as predisposed to skepticism about vaccination [20].

Regarding Romania, studies show that declining trust in institutions and in other people appears to contribute to the erosion of compliance with public health measures. This distrust, partly rooted in the country's communist legacy and reinforced by dissatisfaction with political performance, is further amplified by the rise of nationalist and xenophobic political discourses, which exploit social insecurity and foster resistance to protective regulations [13].

As already mentioned above, the present study aims to identify whether there is a link between religiosity and skepticism towards vaccination against COVID-19. The study is strictly referring to the relationship between religiosity and the attitude towards vaccination in Romania, without looking at other cultural/psychosociological variables that may or may not be influenced by religion and religiosity. Romania is a majority Christian Orthodox country, with a population that to the extent of over 86.45% declares itself Orthodox Christian [35]. Within this vast majority, the degree of religiosity and participation varies.

3. Methodology and Data

3.1. Research Design

This study utilizes data from a nationally representative survey conducted in Romania to investigate the potential statistical relationship between religiosity and anti-vaccination attitudes. Employing statistical software, the analysis draws on a dataset originally designed to assess religious beliefs and practices, within which a specific item measuring attitudes toward COVID-19 vaccination was incorporated.

3.2. Data Collection

The empirical analysis presented here is based on secondary data obtained from the *Barometer of Religious Life in Romania*, with data collection activities falling outside the scope of the present research. The data used in this paper were collected in December 2021 as part of the *Barometer of Religious Life in Romania*, a nationally representative sociological survey conducted annually across the entire resident population of Romania. At the time, the survey was coordinated by the LARICS Group [1], a department within the Institute of Political Sciences and International Relations of the Romanian Academy. The primary objective of the barometer was to explore religious behaviors, practices, levels of religiosity, and the underlying factors shaping this multifaceted social phenomenon in Romania.

The resulting dataset forms the empirical foundation of the present analysis, with all data processing and statistical examinations conducted using IBM SPSS Statistics.

3.3. Participants and Sampling

Participants in the *Barometer of Religious Life in Romania* were randomly selected from across Romania using a probabilistic sampling approach designed to achieve national representativeness. The sample reflects the demographic structure of Romanian society, with a margin of error of $\pm 3.1\%$ at a 95% confidence level. Data were collected through the administration of a standardized questionnaire using the Computer-Assisted Telephone Interviewing (CATI) technique. For the present analysis, all 1001 respondents were included to preserve the representativeness of the dataset at the national level.

3.4. Hypothesis

The objective of this study is to investigate the relationship between individual religiosity and attitudes toward COVID-19 vaccination. To address this research question, a clear and testable hypothesis was formulated: **higher levels of religiosity are associated with higher COVID-19 vaccination skepticism.**

3.5. Statistical Analysis

From the full set of questionnaire items, five questions were selected to capture different dimensions of individual religiosity. These items were used to construct the Religious Practice Index. Specifically, respondents were asked: “Do you consider yourself a religious person?” measured on a four-point ordinal scale, “Do you go to religious services specific for your religion or denomination?” measured on a four-point ordinal scale, “Do you usually pray?” measured on a six-point ordinal scale, “How important is religion in your life?” measured on a four-point ordinal scale, and “Do you, regardless of your denomination or religion, believe in God?” measured on a ten-point ordinal scale.

The initial stage of the analysis examined potential correlations between the Religious Practice Index and attitudes toward COVID-19 vaccination. Details regarding the statistical construction and validation of the index are provided in the Results section, under The Religious Practice Index, while the corresponding correlation analyses are presented in the subsection Results of the Statistical Analysis.

The primary analysis in this study utilizes logistic regression to model attitudes toward COVID-19 vaccination as the dependent variable, incorporating the Religious Practice Index alongside key socio-demographic factors (sex, age, income, and type of locality) as independent predictors.

Vaccination attitudes (dependent variable): attitudes toward COVID-19 vaccination were measured with the item: “Do you agree with COVID-19 vaccination?”. Response options were: Definitely yes; Rather yes; Still thinking/Undecided; Rather no; Definitely no; Don’t know/No answer (DK/NA). For the regression analyses, responses were recoded into a dichotomous variable, where acceptance was coded as 1 (Definitely yes/Rather yes) and non-acceptance/indecision as 0 (Still thinking/Undecided/Rather no/Definitely no); DK/NA was treated as missing.

4. Results

4.1. The Religious Practice Index

The Religious Practice Index was developed to capture multiple dimensions of individual religiosity, based on variables from the Barometer. Because the variables were originally measured on different scales (ranging from 4 to 10 points), all items were recoded into binary variables, where 0 represented “No” and 1 represented “Yes”, with lower values, including 2 and below for the four-point scale, 3 and below for the six-point scale and 7 and below for the ten-point scale, being coded as “No”, and all higher values being coded as “Yes”.

This recoding ensured comparability across items and prevented variables with more response categories from disproportionately influencing the results. To assess the internal consistency of the items comprising the index, Cronbach’s Alpha was calculated, yielding a coefficient of 0.747. This value is generally regarded as acceptable, indicating that the items reliably measure a common underlying construct.

To assess the dimensionality of the index, a principal component analysis was conducted. The results indicated that all five items loaded onto a single factor with an eigenvalue of 2.55, accounting for 50.98% of the total variance. Factor loadings ranged from 0.586 to 0.809, demonstrating that each item was strongly associated with the underlying

factor. Based on these results, the extracted factor was conceptualized as the Religious Practice Index.

4.2. Results of the Statistical Analysis

A Pearson correlation was conducted to examine the relationship between religiosity, measured by the Religious Practice Index, and attitudes toward COVID-19 vaccination. The analysis revealed a small but statistically significant negative correlation, $r(998) = -0.106$, $p = 0.001$, indicating that higher religiosity was weakly associated with lower acceptance of COVID-19 vaccination.

A binary logistic regression examined the relationship between religiosity and COVID-19 vaccination attitudes while controlling for age, income, settlement type, sex, and marital status. **Although the logistic regression analysis revealed a statistically significant negative association between religiosity and COVID-19 vaccination acceptance, the model demonstrated limited explanatory and predictive power**, $\chi^2(22) = 71.11$, $p < 0.001$, Nagelkerke $R^2 = 0.093$, correctly classifying only 64.4% of cases.

Higher religiosity significantly predicted lower odds of vaccination ($B = -0.898$, $SE = 0.260$, $Wald = 11.94$, $p = 0.001$, $OR = 0.407$, 95% CI [0.223, 0.743]); therefore, **while the hypothesis was statistically supported, the weak predictive performance and low variance explained suggest that religiosity alone cannot meaningfully account for individuals' attitudes toward vaccination**, and additional factors likely play a substantial role.

Table 1 (see below) presents the regression coefficients, standard errors, Wald statistics, significance levels, and odds ratios with 95% confidence intervals for all predictors included in the model.

Table 1. Binary Logistic Regression Predicting COVID-19 Vaccination (0 = No, 1 = Yes).

Predictor	B	SE	Wald	<i>p</i>	OR (Exp(B))	95% CI for OR
Religiosity Index	−0.898	0.260	11.94	0.001	0.407	[0.223, 0.743]
Age: 18–24 vs. 65+	−1.097	0.313	12.30	<0.001	0.334	[0.180, 0.620]
Age: 25–34 vs. 65+	−0.918	0.241	14.51	<0.001	0.399	[0.248, 0.642]
Age: 35–44 vs. 65+	−0.683	0.223	9.38	0.002	0.505	[0.325, 0.784]
Age: 45–54 vs. 65+	−0.559	0.220	6.44	0.011	0.572	[0.369, 0.888]
Age: 55–64 vs. 65+	−0.648	0.230	7.91	0.005	0.523	[0.332, 0.823]
201–400\$ vs. No Income	1.206	0.504	5.72	0.017	3.339	[1.242, 8.974]
401–600\$ vs. No Income	0.862	0.500	2.97	0.085	2.368	[0.886, 6.328]
601–800\$ vs. No Income	1.084	0.455	5.68	0.017	2.955	[1.203, 7.261]
801–1200\$ vs. No Income	1.292	0.456	8.03	0.005	3.603	[1.467, 8.851]
>1200\$ vs. No Income	2.011	0.580	12.04	<0.001	7.474	[2.401, 23.273]
Large Urban vs. Rural	0.437	0.192	5.18	0.023	1.547	[1.061, 2.257]
Medium Urban vs. Rural	0.558	0.221	6.38	0.012	1.747	[1.136, 2.683]
Small Urban vs. Rural	0.242	0.172	1.97	0.160	1.273	[0.896, 1.809]

The analysis revealed that higher religiosity scores were significantly associated with lower odds of accepting COVID-19 vaccination. Specifically, for each one-unit increase in religiosity, the odds of vaccination decreased by approximately 59% ($B = -0.898$, $SE = 0.260$, $Wald = 11.94$, $p = 0.001$, $OR = 0.407$, 95% CI [0.223, 0.743]).

Age also emerged as a significant predictor. Compared to participants aged 65 years and older, all younger age groups exhibited significantly lower odds of accepting vaccination. For instance, the odds of vaccination among those aged 18–24 years were reduced by 66.6% ($OR = 0.334$, $p < 0.001$), while those aged 25–34 years had odds reduced by 60.1% ($OR = 0.399$, $p < 0.001$) relative to the oldest group.

Income level was positively associated with vaccination acceptance. Individuals with higher income levels were more likely to be vaccinated than those with no income.

For example, participants earning more than \$1200 per month had odds of vaccination approximately 7.5 times higher than those without income ($OR = 7.474, p < 0.001$), while those in the \$801–1200 range were 3.6 times more likely to vaccinate ($OR = 3.603, p = 0.005$).

Settlement type was another significant factor. Living in large or medium urban areas increased the likelihood of vaccination compared to living in rural areas. Participants from large urban areas had odds 1.5 times higher ($OR = 1.547, p = 0.023$), and those from medium urban areas had odds 1.7 times higher ($OR = 1.747, p = 0.012$) than rural residents. However, no significant differences were found between rural and small urban areas ($OR = 1.273, p = 0.160$).

Sex and marital status were not statistically significant predictors of vaccination acceptance in this model ($p > 0.05$).

Finally, we explored alternative model specifications (including logistic regression with interaction terms and additional predictive approaches) to assess whether prediction of vaccination attitudes could be improved using the same set of predictors. Overall discriminative performance remained limited; the best-performing specification achieved an AUC of 0.610, indicating weak separation between respondents with positive versus negative vaccination attitudes. Because cutoff-based metrics varied substantially and could become highly unbalanced (e.g., very high sensitivity paired with very low specificity depending on the chosen threshold), we treat these analyses as exploratory and interpret the results primarily as evidence of association rather than as a strong prediction.

5. Discussion

The regression analysis presented above revealed that religiosity, along with several socio-demographic factors, significantly predicts attitudes toward COVID-19 vaccination, although the model explains only a modest proportion of the variance (Nagelkerke $R^2 = 0.093$). Classification performance should also be interpreted cautiously: while the full model correctly classifies 64.4% of cases, the intercept-only model correctly classifies 60.5% by predicting the majority outcome, indicating that the improvement in overall accuracy is limited. In addition, classification is asymmetric (high sensitivity for “Yes” but low specificity for “No” at the 0.50 cutoff), suggesting that the model is better interpreted as an associational/inferential model rather than as a strong predictive classifier. The modest model fit suggests that while the identified factors matter, other latent variables not included in the current model (due to data constraints) likely influence vaccination attitudes.

A particularly important finding concerns religiosity. Both the bivariate correlation and the logistic regression indicate a statistically significant but modest negative association between higher religiosity and acceptance of COVID-19 vaccination ($r = -0.106, p = 0.001$; $OR = 0.407, 95\% \text{ CI } [0.223, 0.743]$). This suggests that more religious individuals are less likely to accept vaccination, even when controlling for age, income, and type of locality. These findings align with studies showing that religiosity can sometimes contribute to vaccine hesitancy in contexts where religious beliefs or community norms shape health behaviors [26], although the strength and direction of this relationship may vary across cultural and denominational settings [36]. At the same time, the modest effect size and limited model fit indicate that religiosity is one contributing correlate rather than a dominant determinant of vaccination attitudes.

Other socio-demographic factors also proved significant. Older adults were more likely to vaccinate compared to younger age groups, while individuals with higher incomes and those living in large or medium urban areas showed greater acceptance of vaccination compared to residents of rural communities. These results echo broader public health research linking age, socioeconomic status, and urbanization to differences in access to healthcare, exposure to health campaigns, and perceived vulnerability to disease [12].

Despite the statistical significance of these predictors, the model's moderate explanatory power and classification performance point to important limitations. First, the cross-sectional design prevents causal interpretations: while religiosity correlates with vaccine hesitancy, we cannot conclude that it directly causes it. Second, religiosity itself is a multidimensional phenomenon shaped by denominational teachings, individual beliefs, and broader social contexts. For example, although the Romanian Orthodox Church officially supported vaccination, issuing statements consistent with governmental health recommendations, some local religious leaders and community voices expressed skepticism. Similar divergences occurred among local authorities and healthcare professionals in certain rural areas, complicating the public health messaging landscape.

Finally, the Romanian context introduces additional complexity. Romania entered the COVID-19 pandemic as a highly religious society with relatively low trust in institutions and a polarized public opinion on vaccination. The government's mixed policy approach—ranging from initial restrictions for certain professional groups to a more relaxed framework following public protests—likely shaped vaccination attitudes in ways not fully captured by religiosity or the socio-demographic variables analyzed here [37,38].

6. Conclusions

This study examined the relationship between religiosity and attitudes toward COVID-19 vaccination in Romania using nationally representative survey data. Both correlation analysis and binary logistic regression indicated that higher levels of religiosity were significantly associated with lower odds of accepting vaccination. However, the explanatory power of the model remained modest, accounting for only a small proportion of the variance (Nagelkerke $R^2 = 0.093$) and correctly classifying 64.4% of cases.

Socio-demographic factors such as age, income, and urbanization also emerged as significant predictors. Older adults, individuals with higher incomes, and residents of large or medium urban areas demonstrated greater acceptance of vaccination compared to younger, lower-income, and rural respondents. Yet, despite these associations, the overall predictive capacity of the model remained limited, indicating that vaccination attitudes are shaped by a broader and more complex set of factors than those captured in this analysis.

These findings suggest that, contrary to some public debates and expectations, religiosity alone does not constitute a dominant or direct determinant of vaccine hesitancy. Its influence appears nuanced, context-dependent, and likely mediated by additional variables such as institutional trust, exposure to misinformation, and political polarization—factors not included in the present study.

Future research should therefore adopt a more comprehensive approach, incorporating psychosocial and contextual variables, as well as longitudinal and cross-cultural comparisons, to better understand the mechanisms linking religiosity and vaccination attitudes. Such studies would provide a clearer picture of how religious beliefs and practices interact with broader social, political, and cultural factors to shape public health behaviors during health crises.

6.1. Limitations

Several limitations must be acknowledged. First, the data are cross-sectional, preventing causal inferences about the directionality of the relationship between religiosity and vaccination attitudes. Second, religiosity itself is a complex, multidimensional construct, encompassing beliefs, practices, and institutional influences that were only partially captured by the Religious Practice Index. Third, additional contextual factors—such as political polarization, exposure to misinformation, or societal responses to pandemic restrictions—were beyond the scope of this analysis but may substantially influence vaccination attitudes.

6.2. Future Research

Further studies should investigate the mechanisms linking religiosity and health behaviors by incorporating additional predictors such as trust in religious and political institutions, perceived risk, and exposure to misinformation. Comparative research across European countries could reveal whether the relationship between religiosity and vaccination attitudes differs in more secularized versus more religious societies. Finally, longitudinal data would help clarify whether changes in religiosity over time influence shifts in vaccination behavior, especially during public health crises.

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Informed Consent Statement: The respondents were informed that no personal data were collected and that their anonymity was guaranteed. Participation was voluntary and each respondent provided informed consent before starting the interview/the survey.

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