

Depicting Socio-Psychological Profile of COVID-19 Vaccination Hesitators and Rejecters

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Abstract


Vaccination hesitation and rejection is one of the major health risks in the epidemics of any infectious diseases with profound implications for public health in general. In order to provide a deeper insight into vaccine hesitation and rejection, we collected the data from individuals who did not take the COVID-19 vaccine in Serbia ($N = 534$), since the recently ended pandemic also confirmed the importance of these issues. We analyzed the associations between future vaccination intention and several psychological constructs including conspiracy ideation, concerns about contracting a disease and having major health problems, conservatism, pro-vaccination immediate social surroundings and empathy. An increased possibility for future vaccination was negatively related to conspiracy ideation and conservatism measures but positively associated with vaccination support from important others and threat perception of infectious disease and health concerns. Conspiracy beliefs mediated the links from both conservatism and vaccination support from important others toward future vaccinations intention, while threat perception of infection mediated the link between vaccination support and the criterion measure. Present findings enable a deeper understanding of vaccine hesitation and rejection and provide guidelines for psychologists and public health workers for facilitating vaccination against infectious disease.

Keywords: vaccine hesitancy and rejection, social conservatism, religiousness, empathy, vaccine support of important others, conspiracy beliefs

Introduction

Health behavior and compliance with official health guidelines for preventing the transmission of novel viruses became one of the most prominent issues of the modern world under the recently ended COVID-19 pandemic; presently, the vaccine uptake of the general population is still a critical issue. The intention to get a

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vaccinated against SARS-CoV-2 virus among the general population should continue to be a high priority in order to achieve population-wide protection, because the disease might have fatal consequences, especially for the vulnerable population. However, despite the well-confirmed fact that vaccination is one of the most important medical inventions of modern medicine that has saved millions of lives in the past, a large number of countries is facing vaccine rejection or hesitancy and is currently unable to reach herd immunity of their citizens. Although different vaccines against SARS-CoV-2 virus have been available since the beginning of the year 2021, immunization is still a polarized issue and existing studies in Serbia (Milošević Đorđević, Kljajić, et al., 2021) have reported that less than half of the adult population is willing to get vaccinated or has received the vaccine. Latest data about vaccination rate according to John Hopkins University was that 38.88% of population receiving at least one dose¹.

Previous academic studies mapped vaccine hesitancy and rejection as a complex issue driven by variety of factors (Larson et al., 2014). Studies indicated importance of vaccine and vaccination specific issues along with psychological factors (individual, social group, contextual) for vaccination intentions of population. Our study has a primarily applied goal of mapping important psychological factors of how people think and feel about vaccination (Brewer et al., 2017). Those issues are of great importance, given the fact that the data about very specific target – nonvaccinated people, is limited despite the relevance of this topic; therefore, we tried to explore and understand the psychological factors that have a role in people's decision to refuse or hesitate to be vaccinated.

Psychological Predictors of Vaccination

We included eleven different psychological factors that might determine vaccine hesitancy in our analysis, trying to cover crucial aspects of this decision. We followed the evidence from empirical studies conducted on this topic, noticing the lack of evidence about vaccine hesitant people and refuters. Therefore, we tried to broadly cover the most relevant psychological factors and examine their significance on the vaccine hesitant and rejecting population. Measured factors belong to contextual (social support from significant others) and individual factors (social ideologies, conspiracy belief, perception of health threat, empathy).

Social norms refer to rules that guide social behavior, providing appropriate guidelines in given situation. Only if positive norms towards vaccination prevail in all spheres and groups of society, we can expect high immunization coverage against any vaccine-preventable disease. Therefore, if vaccination receives an overall social support from significant others and people perceive the positive attitude of close and important others, vaccination coverage might increase. The concept of human social

¹ <https://coronavirus.jhu.edu/region/serbia>

sensors (Galešić et al., 2021) empirically confirmed the significance of social context vindicated in numerous studies. Support and encouragement received from relevant groups, professionals and/or peers (friends, relatives, co-workers) serves as a great promoter (or, if negative, a barrier) for certain behavior such as immunization behavior. Studies have confirmed that for HPV vaccination, greater support from peers, parents and doctors leads to greater vaccination intentions, mediated by more favorable attitudes towards HPV vaccination (de Visser et al., 2011; Paterson et al., 2016; Stout et al., 2020). In line with these findings, empirical data has also indicated that social norms are a robust predictor of COVID-19 vaccine uptake (Graupensperger et al., 2021). Furthermore, on a more fragmented level, attitude (dis)similarities on vaccination between close people effects the quality of those relationships, and people will perceive close friends with different vaccination attitudes less positive, than other close friends with similar vaccination intentions (Kalebić Maglica & Šincek, 2022).

In addition to social support of important others, social ideologies help people shape the attitude towards numerous social and health issues. Research from the US indicates that opposition to vaccination is positively correlated with social conservatism (Samore et al., 2021). Along with these findings, there is evidence that support for Trump and right-wing authoritarianism negatively correlated with knowledge and anxiety about COVID-19 and positively correlated with anti-vaccination sentiments (Kempthorne & Terrizzi, 2021). Conservative ideologies flourish under the threat. Empirical evidence confirmed that threats of any kind, including disease threat, motivate people to adopt socially conservative values and promote socially conservative attitudes (Karwowski et al., 2020); for example, exposure to media content about the pandemic was associated to prejudice of foreign nationalities (Sorokowski et al., 2020). A psychological defense mechanisms that enables an individual to detect the potential presence of a biological threat (e.g. parasite) and to adjust behavior to avoid the risk of infection, called the behavioral immune system (BIS) (Schaller, 2016), has been associated with denial of SARS-CoV-2 and anti-vaccination attitudes (Wismans et al., 2021). Although often considered a part of conservative ideologies, religiousness was not found to be a significant predictor of vaccine uptake (Bass et al., 2021). On the other hand, in the Balkan region, the number of vaccination refusals based on religious exemption is increasing (Pelčić et al., 2016). We wanted to explore if such relationship exists and if the effects of the pandemic may result in a shift of political views toward the right in Serbia. In our study, we did not measure specific political views, but rather general social orientation through social conservatism concept and religiousness.

Empirical data suggest that lower belief in science and higher conspiracy belief are significant predictors of vaccine rejection (Milošević Đorđević, Mari, et al., 2021; Saling et al., 2021). General mindset of conspiracy mentality makes people particularly more prone to believing in various conspiracy theories, including vaccine conspiracies (Imhoff & Lamberty, 2020; Milošević Đorđević, Žeželj, et al., 2021).

Medical conspiracy theories are especially important, since they represent an umbrella that includes conspiracy theories around COVID-19 (Jolley & Douglas, 2014; Shapiro et al., 2016). Those conspiracy theories are spread among the public of almost all countries in the world (Douglas, 2021) including Serbia (Karić & Mededović, 2021; Milošević Đorđević, Kljaić, et al., 2021). Specific beliefs explaining the pandemic as a hoax or naming pharmaceutical companies as creators of the corona virus have been empirically shown as one of the barriers to vaccination intentions (Biddlestone et al., 2020; Milošević Đorđević, Kljaić, et al., 2021). Along with direct effects, conspiracy belief also has indirect effects, by lowering the level of the perceived threat of the pandemic (Romer & Jamieson, 2020) that is negatively associated with preventive distancing and vaccination intentions (Alper et al., 2021; Chayinska et al., 2021). People that demonstrate awareness of risk show more engagement in protective health behavior (Wise et al., 2020). According to Protection Motivation Theory (PMT), perceived personal risk and vulnerability to disease were significant positive predictors of the tendency to comply with non-pharmacological COVID-19 guidelines (Al-Rasheed, 2020; Hromatko et al., 2021). The higher the vulnerability people perceive, the more likely they will practice protective health behavior. Besides that, previous research also recorded that empathic responding has been associated with higher perceived threat during the pandemic, leading to the implementation of recommended health precautionary measures (King et al., 2016). On the other hand, by increasing affective (concern for vulnerable others) and cognitive empathy (understanding the perspective of vulnerable others), vaccination could become a representation of prosocial behavior that promotes altruism and caring for others (Batson, 2011).

Goals of the Present Research

Therefore, we examined different factors that may explain the hesitation or rejection of the vaccine. We explored the associations between vaccination behavior among the unvaccinated individuals and several explanatory variables: conservative social attitudes, empathy, support for vaccination of people close to them, conspiracy theories about coronavirus and vaccination, and the perceived health risk if a person is infected by coronavirus (threat perception of infection). Our main hypotheses were that conservative social attitudes and conspirative mindset regarding the pandemic would be negatively associated with the intention to get vaccinated, while empathy, vaccination support from important others, and threat perception of infection should be positively related to future vaccination intention. Furthermore, we tested the mediation model where conspirative ideation and threat perception of infection risk were analyzed as the mediators in a link between empathy, social attitudes, vaccination support from important others, and future vaccination intention. We have chosen conservatism, empathy, and environmental support as relatively stable characteristics, the former ones related to attitudes and personality while the latter represent social environment that is relevant for vaccine-related behavior. On the

other hand, conspiracy beliefs and treat perception are both related to COVID-19 pandemics, and it is plausible to assume that they are partially shaped by social attitudes, empathy, and social environment (Hromatko et al., 2021; Milošević Đorđević, Kljajić, et al., 2021). Our main hypothesis was that the profile of vaccine hesitators and rejecters would be consisted of elevated conservatism (Samore et al., 2021), religiousness (Pelčić et al., 2016), conspiracy beliefs about COVID-19 and vaccination (Milošević Đorđević, Mari, et al., 2021; Saling et al., 2021), lower fear of infection and health concerns in general (Al-Rasheed, 2020; Hromatko et al., 2021; Wise et al., 2020), followed by decreased empathy as well.

Method

Sample and Procedure

The data were collected via an online study. The survey was conducted on the Google Forms platform and the survey link was sent to potential participants. The majority of data were gathered using the snowball sampling technique – psychology students from the Singidunum University in Serbia were asked to fill out the survey, and, more importantly, to disseminate the link further using social networks, emails and other forms of online communication. Participation in the study was voluntary for both students and other participants. The first page of the survey contained an explanation of the study goals and informed consent. Importantly, the first page also contained the information that participants can only be individuals who were not vaccinated at the time of data collection. This was the only exclusion criterion for participation in the study. The sampling procedure resulted in a sample composed of 534 individuals (73.4% females; $M_{\text{age}} = 29.43$; $SD = 11.76$). Participants had 15.74 years of formal schooling ($SD = 3.06$), which corresponds to third year of college in the Serbian educational system; hence, the participants had higher educational levels than average in Serbia. The survey was conducted in March-April, year 2021. We received approval from the Ethical board of the Faculty of Media and Communications. Response rate was around 80%. Detailed information about the sample is presented in Table 1.

Table 1

Structure of the sample

	%
Age range	
18 – 20	15.9
21 – 30	52.5
31 – 40	14.4
41 – 50	10.4
51+	6.8

	%
Education range	
Elementary and less	1.5
Secondary and less	9.3
University and less	55.4
MA, PhD	33.8
SES	
I do not have enough money for food	1.7
	5.5
	43.5
	33.9
Money is not a problem at all	15.4

Measures

We assessed the motivation for future vaccination using the following item: "Please express your thoughts on SARS-CoV-2 vaccination." The response scale ranged from 1 to 10 where 1 denoted "*I certainly would not get vaccinated*", while 10 denoted "*There is a possibility that I would take a vaccine against coronavirus*". This variable was labeled as *future vaccination intent*. In this study, we included only vaccine hesitant or vaccine rejecters, as this was the target group for our analysis trying to explain factors influencing vaccine hesitancy. The Cronbach Alpha of all instruments is reported in Table 2 (second column).

COVID-19 conspiracy theories were measured by the 10-item scale of the same name. The scale of COVID-19 Conspiracy belief measured on a five-point Likert scale; item example: "The implementation of 5G technology is a means of deliberately spreading Coronavirus" (Biddlestone et al., 2020).

Vaccine conspiracy theories were measured by the Vaccine Conspiracy Beliefs Scale (Shapiro et al., 2016) that is composed of 10 items measured on a seven-point Likert scale; item example: "Pharmaceutical companies cover up the dangers of vaccines".

Myths about vaccination were assessed via a scale constructed by UNICEF Serbia (UNICEF, 2018); thirteen items were administered in total, measured on a seven-point Likert scale (item example: "It is better for people to get over the disease and thus strengthen their immunity, than to get vaccinated"; "Only the first dose of the vaccine is important, the second dose (revaccination) is not significant").

Social support from important others was measured via the following scale – participants were asked: "To what extent do people in your social environment support vaccination or oppose vaccination? Please respond on a scale from 1 to 5, where 1 means that they are *completely against vaccination*, and 5 that they *fully support vaccination*." Afterwards, the four groups of close individuals were provided as the items: romantic partner, family, close friends, and close colleagues. We used

an average score on these four items as a measure of support for vaccination of important others.

Social conservatism was measured via items from the Homonymous scale (Everett, 2013). Participants were provided with the following instruction: "Please indicate the extent to which you consider the following terms positive or negative; 1 means *very negative* and 5 *very positive*." Afterwards, the following items were shown: Abortion (reversely coded), The family unit, Religion, Traditional marriage, Traditional values, Patriotism, and Military and national security. We used an average score on these items as a measure of social conservatism.

Religiousness was operationalized via shortened scale consisting of 5 items taken from the Religiosity scale of Arizona Life History Battery (Figueredo, 2007) on a seven-point Likert scale; shortened scale is often used in Serbian context; item example: "I'm a very religious person."

We measured several beliefs regarding the threat perception of contracting infectious diseases. The first is *Perceived infectability*; it represents a subscale of the Perceived Vulnerability to Disease Questionnaire (Duncan et al., 2009). It has 7 items on a seven-point Likert scale; item example: "I am more likely than the people around me to catch an infectious disease."

We assessed the *Perceived probability of infection* by a single item: "In your opinion, what is the probability that you will be infected with the COVID-19 virus in the next year?" The response scale ranged from 1 to 5, where 1 denoted "*Highly unlikely*" while 5 denoted "*Highly likely*."

Health concerns were measured via a single item on a scale from one to five, as follows: "Do you believe that your health will be seriously endangered if you become infected with the SARS-CoV-2 virus?" The response scale was the same as for the previous question.

We used two subscales from the Interpersonal Reactivity Index (Davis, 1983) to assess individual differences in cognitive and affective empathy: *Perspective taking* (item example: "I try to look at everybody's side of a disagreement before I make a decision") and *Empathic concern*, respectively (item example: "I often have tender, concerned feelings for people less fortunate than me"). Both scales were composed of 7 items. Means scores for all multi-item scales are used in the analyses.

Other measured socio demographic data were: gender, age, education, working status, economic status.

The Plan of Data Analysis

First, we analyzed the bivariate associations between the examined variables: Pearson's correlation coefficients are calculated as the measures of these associations. Secondly, we wanted to explore what the best predictors of future vaccination intention are. Therefore, we built a multivariate linear regression model where participants' sex, age, education, attitudes, and other personal attributes were

simultaneously entered as the predictors of future vaccination intentions. Finally, we tested the structural model where future vaccination intention was set as the criterion measure once again. Structural model provided additional advantages in the data analysis: Firstly, we included latent variables in the analysis for several reasons: there are both conceptual and empirical reasons (as seen in the correlation analysis) that some of our explanatory variables tap the same latent constructs; hence, including the latent variables in the analysis should increase the validity of measurement. Furthermore, this way we reduced the number of the variables in the analysis, which resulted in a more parsimonious model. Finally, structural model enabled us to analyze mediator effects when explaining future vaccination intention. Conservatism, and support for vaccination from important others are analyzed as predictors in the structural model; variables related to perceived threat of infection and beliefs about the coronavirus are modeled as mediators because they are beliefs and opinions more related to actual epidemics.

Results

Correlations between Analyzed Variables

First, we showed descriptive statistics, reliabilities, and the correlations between all analyzed variables (Pearson's correlation coefficients were calculated): these data are shown in Table 2. In addition to the means and standard deviations for all measures, we provide the percentage of participants who responded via different categories on our criterion measure: 1 – 21%; 2 – 13.6%; 3 – 16%; 4 – 20.3%; 5 – 14.6%; 6 – 5.7%; and 7 – 8.9% ($M = 3.40$, $SD = 1.84$). Hence, we can say that about a fifth of our participants believe that they certainly would not get vaccinated; on the other hand, there were no participants who stated that they will certainly take a vaccine in future or even that there is a high probability for that outcome (since last three categories are absent from the data).

Correlation analysis showed that individuals who believe that they might get vaccinated in future have low levels of conspiracy belief and myths about vaccination, and they are less conservative and religious. On the other hand, their social environment is in favor of vaccination, and they believe that they can contract coronavirus in future with more severe consequences to their health. Two empathy measures were not related to future vaccination intention. Scales' reliabilities are shown in Table 2 as well: we can see that two scales (Perceived infectability and Emphatic concern) have relatively lower reliabilities, however, having in mind that these are scales with low number of items, these reliabilities can be considered satisfactory.

Table 2

Correlations between the Explanatory Variables and the Future Vaccination Intention

	<i>M (SD)</i>	α	1	2	3	4	5	6	7	8	9	10	11
1. COVID-19 Conspiracy Theories	2.56 (0.91)	.90											
2. Vaccine Conspiracy Theories	4.44 (1.75)	.95	.69**										
3. Myths About the Vaccination	3.56 (1.37)	.92	.74**	.84**									
4. Vaccination support from important others	2.74 (0.91)	.75	-.44**	-.55**	-.51**								
5. Social Conservatism	3.58 (0.79)	.80	.23**	.23**	.22**	-.13**							
6. Religiousness	3.27 (1.44)	.82	.27**	.23**	.27**	-.15**	.57**						
7. Perceived Infectability	4.38 (1.09)	.67	-.24**	-.24**	-.33**	.20**	-.14**	-.09*					
8. Perceived Probability of Infection	3.13 (1.13)	/	-.13**	-.09*	-.16**	.16**	-.06	-.11**	.28**				
9. Health Concerns	2.69 (1.24)	/	-.17**	-.22**	-.24**	.24**	-.03	-.05	.39**	.27**			
10. Perspective Taking	5.20 (1.01)	.76	-.15**	-.11*	-.14**	.03	-.01	-.03	.06	.05	-.03		
11. Empathic Concern	5.31 (1.00)	.63	.07	.12**	.06	-.08	.09*	.00	.08	.06	.05	.35**	
12. Future Vaccination Intention	3.40 (1.84)	/	-.37**	-.53**	-.46**	.45**	-.17**	-.19**	.26**	.13**	.28**	-.01	-.04

Note. * $p < .05$; ** $p < .01$.

Regression Model for the Prediction of Future Vaccination Intention

Next, we fitted the linear regression model where Future vaccination intent was set as the criterion variable, while the remaining analyzed variables were entered as the predictors; participants' sex, age, and education were controlled in the model as well. All predictors were entered together in the model. The model was statistically significant ($F = 22.67$, $df = 520, 14$; $p < .01$) and 38% of the criterion's variation was explained. The predictors with significant contribution were participants' age ($\beta = .18$; $p < .01$), education ($\beta = -.12$; $p < .01$), vaccine conspiracy theories ($\beta = -.41$; $p < .01$), support of vaccination of important others ($\beta = .18$; $p < .01$), and Perceived infectability ($\beta = .09$; $p < .05$). The regression model can be seen in Table 3.

Table 3

The Regression Model for the Prediction of Future Vaccination Intention

Predictors:	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>
Sex	0.16	0.15	.04	1.05	.29
Age	0.03	0.01	.18	4.66	<.01
Education	-0.07	0.02	-.12	-3.14	<.01
COVID-19 Conspiracy Theories	0.04	0.11	.02	0.35	.73
Vaccine Conspiracy Theories	-0.43	0.07	-.41	-6.04	<.01
Myths About the Vaccination	-0.01	0.10	-.01	-0.07	.95
Vaccination support from important others	0.37	0.09	.18	4.21	<.01
Social Conservatism	-0.04	0.10	-.02	-0.42	.68
Religiousness	-0.07	0.06	-.05	-1.24	.22
Perceived Infectability	0.15	0.07	.09	2.27	<.05
Perceived Probability of Infection	0.04	0.06	.02	0.62	.54
Health Concerns	0.10	0.06	.07	1.59	.11
Perspective Taking	-0.09	0.07	-.05	-1.27	.21
Empathic Concern	0.05	0.07	.03	0.73	.47

Note. *B* – unstandardized regression coefficient; *SE* – standard error; β – standardized regression coefficient.

Structural Model for the Prediction of Future Vaccination Intention

Finally, we constructed a structural model where Future vaccination intent was set as a criterion variable. Explanatory variables were modeled both as latent and observable ones. Two variables were modeled as predictors: Social support from significant others and Conservatism (empathy was firstly included in the model but the data showed it was unrelated to the criterion or mediator variables). The latter is modeled as the latent variable with Social conservatism and Religiousness as its observable indicators; Social conservatism and Religiousness are two positively interconnected social attitudes (e.g., Bouchard, 2009) but Conservatism is more broad and comprehensive, therefore, we labeled this latent variable as Conservatism. Social support from significant others was modeled as observed variable. The model

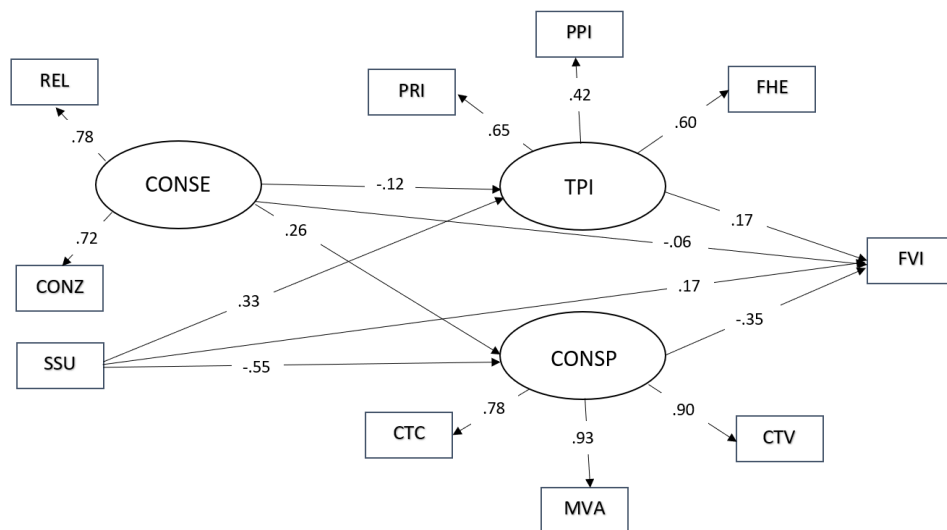
contained two latent mediator variables: Threat perception of infection and Conspiracy beliefs. The former is measured by Perceived infectability, Perceived probability of infection, and Health concerns; these measures all cover similar psychological content and are positively associated; hence they can be viewed as indicators of the same latent construct. The latter is represented by COVID-19 Conspiracy theories, Vaccine conspiracy theories, and Myths about vaccination as its observed indicators; all these beliefs are related to coronavirus and vaccination against it, furthermore, they are highly intercorrelated thus forming a homogenous latent variable. Participants' age and education were the socio-demographic variables that were related with the criterion measure, and they were also included in the model (although, they are not shown on the diagram in order to save space). It should be noted that social support from important others may be viewed as a mediator having in mind that it refers to vaccination against COVID-19. However, in that case, the paths from conservatism and empathy towards social support for vaccination of important others should be modeled. We believe that these paths are conceptually unconvincing: it is unlikely that our personal dispositions would influence the decisions of people from our inner social environment to get vaccinated; on the other hand, it is quite easy to assume that opinions of other influence our beliefs about coronavirus and perceived threat about infection (Hromatko et al., 2021). Hence, we modeled social support for vaccination of important others as the predictor variable. The model can be seen in Figure 1.

This model had good fit indices ($\chi^2(44) = 159.08; p < .01$; CFI = .944; TLI = .920; RMSEA = .070; SRMR = .058). We can observe that the measurement model optimally described the latent variables – all observed indicators had high and statistically significant loadings on their latent variables, a finding that confirmed our placing of the latent variables and their empirical indicators in the model. Furthermore, all modeled paths between predictors, mediators, and the criterion measure were statistically significant, except one: the direct link between conservatism and the criterion measure. The path from threat perception of infection to future vaccination intent was positive, while the opposite can be said for conspiracy beliefs. Conservatism was positively related to conspiracy beliefs and (although marginally) negatively to threat perception of infection. Conversely, vaccination support from important others was positively associated with threat perception of infection and negatively with conspiracy beliefs. Perspective taking was negatively associated with conspiracy beliefs as well; it did not show associations with threat perception of infection. All indirect effects were significant except one: conservatism was not indirectly related to the criterion measure via threat perception of infection ($\beta = -.02; p > .05$). Hence, threat perception of infection mediated the relation between social support from significant others and future vaccination intent ($\beta = .06; p < .01$) while conspiracy theories mediated the pathways from vaccination support of important groups ($\beta = .20; p < .01$) and conservatism ($\beta = -.09; p < .01$) toward the criterion measure. Participants' age ($\beta = .19; p < .01$)

and education ($\beta = -.13$; $p < .01$) also had significant paths to the future vaccination intention.

Figure 1

Structural Model of the Prediction of Future Vaccination Intention



Note. CONZ = Social conservatism; REL = Religiousness; CONSE = Conservatism; CTC = COVID-19 conspiracy theories; CTV = Vaccine conspiracy theories; MVA = Myths about the vaccination; CONSP = Conspiracy beliefs; PRI = Perceived infectability; PPI = Perceived probability of infection; FHE = Health concerns; TPI = Threat perception of infection; FVI = Future vaccination intention; SSU = Social support from significant others. Standardized coefficients are shown in the diagram. All coefficients are significant on the $p < .01$ level except the path between Conservatism and Threat Perception of Infection ($p = .06$) and the path from Conservatism to Future vaccination intention which is not statistically significant ($p = .17$).

Discussion

COVID-19 pandemic had a detrimental impact not only on the health aspects but also on other aspects of life (such as the financial or educational). Therefore, it has become increasingly evident that besides medical research, psychological investigations of vaccination intentions require urgent scientific attention.

Social identity theory provides a theoretical background of how intergroup relations and social cohesion have important implications for perception of the world in the pandemic (Abrams et al., 2021; Drury et al., 2021). The authors ask for more objective research that is needed to better understand how vaccination support from important others may foster responsible health behavior. Recent findings confirm

that the level of vaccination support from close others represents an important determinant of likelihood of COVID-19 vaccination (Jaspal & Breakwell, 2021), indicating strong influence on human behavior and decision-making (Galešić et al., 2021) including vaccination. Our study, in line with this call, robustly pointed out that support of vaccination from important others was a strong direct predictor of vaccine intentions, among all other measured variables; furthermore, it kept this direct link with the vaccination intention in the structural model as well, but it had indirect associations via enhanced experience of infection threat and lower conspiracy ideation, too. Therefore, support for vaccination of important others such as family members and close friends, can derive a more accurate description and prediction of future vaccination behavior.

However, vaccination behavior also depends on other different factors, social attitudes among them. Compliance with official health recommendations and vaccination against SARS-CoV-2 has become a highly politically polarized issue worldwide, especially in the US (Stroebe et al., 2021), in addition to cultural characteristics such as collectivism that promote prosocial concern and vaccination intentions (Biddlestone et al., 2020; Leonhardt et al., 2021). Findings from the US describe that, over time, political conservatism was inversely associated with perceived health risk and compliance with health-protective behaviors (Stroebe et al., 2021). In our study, the effects of social conservatism and religiousness on vaccination have been confirmed, and their influences are mediated by health concerns (but in a low magnitude) and conspiracy beliefs (with a high effect) – conservatives and religious people tend to hold greater conspiracy beliefs and are less willing to vaccinate. In our data conservatism had only indirect path to the vaccination intention, i.e., the association between conservative attitudes was completely mediated by experienced infection threat and conspiracy theories. Interestingly, conservatism is positively associated with fear, including the effects of mortality salience and threat perception (Jost et al., 2017); these links may suggest that the relation between conservatism and COVID-19 threat perception should be positive as well, however, the present findings indicated the opposite. Conservative individuals believe to a lower extent that the virus is dangerous (negative association with perceived infectability) or that it even exists (reflected in systematic positive correlations with COVID-19 conspiracy theories, vaccine conspiracy theories, and myths about the vaccination). Hence, the fear-related reaction to coronavirus in conservatives is different than to other threats, which in fact may be expected having in mind the complex psychological aspects of vaccination against coronavirus. Conspiracy belief has been confirmed as a strong predictor of disobedience to the official health recommendations in the pandemic including vaccination (Biddlestone et al., 2020; Chayinska et al., 2021; Jolley & Douglas, 2014; Imhoff & Lamberty, 2020); our study replicated these findings; conspiracy belief has both direct effect and as a mediator on vaccination intentions. In addition, we tested several types of conspiracy beliefs in our study (vaccination related conspiracies and myths about vaccines in general, along with the conspiracies about COVID-19, more

specifically). Results revealed that all types of conspiracy beliefs (general and specific) have a strong negative effect on vaccination intentions.

One of the consequences of holding conservative attitudes toward vaccines might be a lower perception of health risks. People that perceived less threat of disease may be less willing to engage in preventive health behavior including vaccination. Studies have shown that undermining the threat of infection with SARS-CoV-2 represents a barrier to achieving herd immunity (Hromatko et al., 2021; Leonhard et al., 2021). This was confirmed in our study: lower perceived infectability, probability of infection and health concerns are associated with a lower tendency to vaccinate. In the present study we measured both perceived infectability in general and subjective probability to be infected by coronavirus; these two measures could be viewed as interchangeable, and thus, redundant. However, it can be expected that responses to these two measures would be different because individuals are more habituated (in the psychological sense) to the existing viruses; on the other hand, COVID-19 pandemic was a novel event that encompasses several other aspects of social functioning (lockdowns, containment-related behavior, novel vaccines) and therefore provokes different psychological reactions. Relatively low positive correlation between these two measures represents evidence for their empirical differences – these two measures apparently cannot be viewed as interchangeable.

The intention to get vaccinated against COVID-19 in order to reach herd immunity might be increased by empathy for those most vulnerable in the pandemic (Pfattheicher et al., 2021). Previous studies found that vaccination intentions can be enhanced by increasing empathy and solidarity (Pfattheicher et al., 2021), although our data did not confirm this effect. One of the reasons for this result may be the lower variability of the Empathic Concern scale. Cognitive empathy was systemically negatively associated only with the conspiracy ideation measures. Therefore, our findings show that empathy had the lowest explanatory power in understanding future vaccination intent. There is an apparent reason why the present results differ from the existing data: previous studies (Pfattheicher et al., 2021) measured empathy for individuals who were most vulnerable to the virus, while we administered general measures of empathy: our data suggest that the latter ones are not specific enough to explain future vaccination intention in vaccine hesitators or rejecters.

Limitations and Future Directions

Like other studies, ours also has some limitations. The sample structure was not representative and future research could benefit from cross-cultural studies on representative samples. The data was collected in a cross-sectional survey and, therefore, we cannot establish causal relations between the variables. Despite the fact that all measures had appropriate reliability coefficients, Empathic Concern was

measured with diminished reliability. Building on the present research, more empirical data is needed for other possible factors of vaccine rejection such as moral attitudes or collective societal orientation. Due to the length restrictions of our questionnaire some subscales were excluded from our study. Future research could focus on more qualitative analysis of the exact reasons for vaccine rejection.

Conclusion

Albeit the end of SARS-CoV-2 pandemic has been declared, it is still essential to limit the transmission of SARS-CoV-2 viruses. Blocking the transmission is most effective by implementing mass vaccination. However, opposition to voluntary vaccination against SARS-CoV-2 exists in almost every country of the world, especially in developed countries. It is clear that the present situation calls for a rapid and continuous investigation of the factors influencing vaccine rejection and a huge amount of academic research in recent years has explored vaccine rejection. The findings of the present study provide insights in individual differences associated with intentions to get vaccinated among the vaccine hesitant and refuters. Besides greater understanding of vaccine hesitancy and rejection along with motivation for vaccination, the present data indicate some directions for practical interventions aimed to facilitate vaccination like strengthening support of important groups for vaccination and diminishing conspiracy beliefs about coronavirus. The practical implications of this study are reflected in confirmation of existing guidelines for vaccination communication especially towards hesitant people and refuters: debunking false information and wrong myths, including dispelling fears of vaccine and side effects. Vaccine hesitant and rejecters should be encouraged to ask for official information in media and online platforms, and interact more with people who want to get vaccinated. Therefore, barriers to vaccination could be reduced using social media: a) to produce massive positive immediate surroundings for people toward vaccination, b) to make this issue permanently prompt and important. The extent of the risk of disease, which can be fatal, must be clearly communicated to the public. Shaping the desirable health behavior, might be further improved, by providing incentives or implementing sanctions.

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Prikaz sociopsihološkoga profila osoba koje se oklijevaju cijepiti i odbijaju cijepljenje protiv bolesti COVID-19

Sažetak

Oklijevanje u cijepljenju i odbijanje cijepjenja glavni su zdravstveni rizici u epidemijama bilo koje zarazne bolesti, a koji imaju ozbiljne posljedice za opće javno zdravlje. Da bismo pružili dublji uvid u oklijevanje u cijepljenju i odbijanje cijepjenja, prikupili smo podatke od pojedinaca koji se nisu cijepili protiv bolesti COVID-19 u Srbiji ($N = 534$) jer je i nedavno završena pandemija potvrdila važnost tih pitanja. Analizirali smo povezanost između budućih namjera cijepjenja i nekoliko psiholoških konstrukata, uključujući vjerovanje u teorije zavjera, zabrinutost zbog potencijalne zaraze bolešću i ozbiljnih zdravstvenih problema, konzervativizam, neposredno društveno okružje koje podržava cijepljenje te suosjećanje. Povećana mogućnost budućega cijepjenja bila je negativno povezana s vjerovanjem u teorije zavjera i mjerama konzervativizma, ali pozitivno povezana s potporom cijepljenju važnih drugih osoba i percepcijom veće prijetnje od zaraznih bolesti i zdravstvenih problema. Vjerovanja u različite teorije zavjera posredovala su u vezama između konzervativizma i potpore cijepljenju važnih drugih osoba prema budućim namjerama cijepjenja, dok je percepcija prijetnje od zaraze posredovala u vezi između potpore cijepljenju i kriterijske mjere. Te spoznaje omogućuju dublje razumijevanje oklijevanja u cijepljenju i odbijanja cijepjenja te psiholozima i javnozdravstvenim djelatnicima daju smjernice za poboljšavanje obuhvata cijepjenja protiv zaraznih bolesti.

Ključne riječi: oklijevanje u cijepljenju i odbijanje cijepjenja, društveni konzervativizam, religioznost, suosjećanje, podrška cijepljenju važnih drugih osoba, vjerovanja u teorije zavjere

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