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Determinants of COVID-19 Vaccination Readiness

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Abstract

The topic of the COVID-19 vaccination is widely present, and, since many countries struggle with vaccine hesitancy, the aim of this study was to examine determinants of vaccination readiness. The study involved 1,769 participants (76.3% females, 23% males, and 0.7% other) age range from 18 to 77 years. Participants completed online questionnaires related to demographic characteristics, personality traits (neuroticism and consciousness), vaccination readiness scale, and two scenarios related to social relations in the context of attitudes towards vaccination. The results showed that demographic characteristics were significant predictors of vaccination readiness, where women, the elderly, the more educated, those with higher socioeconomic status, and those who were not ill from COVID-19 had higher vaccination readiness. Contrary to expectations, persons high in neuroticism and low in conscientiousness had higher vaccination readiness. Vaccine-acceptant individuals, when compared to vaccine-resistant and vaccine-hesitant individuals, had higher vaccination readiness. Regarding the scenario in which the close person has similar or dissimilar attitudes towards vaccination, the obtained results showed that the manipulation with similar/dissimilar attitude has led to the attribution of different characteristics to close persons. A close person with similar attitudes was assessed more positively than a close person with different attitudes. The results of this study support the fact that individual factors are important for vaccination readiness and that differences in attitudes toward vaccination can affect close social relations, which has not been investigated so far in the context of COVID-19 vaccination.

Keywords: COVID-19, vaccination readiness, demographic characteristics, personality traits, social relations

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Introduction

In December 2019, China reported the first cases of Coronavirus Disease (COVID-19), and soon after the world faced a pandemic. More than 474 million of people worldwide have become infected and more than 6 million people died (COVID-19 Map, Johns Hopkins Coronavirus Resource Center, 2022). Lockdowns, social distancing, and movement restrictions were implemented in order to abate the spread of infection (Hiscott et al., 2020). The social distance and the security measures have affected the relationship among people and their perception of empathy (Saladino et al., 2020) and feeling of helplessness (Cao et al., 2020; Li & Wang, 2020).

Vaccination is key factor in recovering from the COVID-19 pandemic (Schoch-Spana et al., 2021). If enough individuals in a community should be vaccinated, the people with acquired immunity would protect those who have reason to avoid the vaccine (e.g., for some medical reasons) or those who fail to develop an adequate immune response to the vaccine. A phenomenon called *herd immunity* would be established. The estimates of the needed vaccination rates to achieve *herd immunity* range from 67% to 95% (Anderson et al., 2020). But almost every country struggles with vaccine hesitancy, i.e. "the delay in acceptance or refusal of vaccination despite availability of vaccination services. Vaccine hesitancy is complex and context-specific, varying across time, place, and vaccines" (MacDonald & the Strategic Advisory Group of Experts [SAGE] working group, 2015, p. 1). In the sample of 7,000 Europeans, 18.9% of participants reported being unsure about getting COVID-19 vaccinated, while 7.2% indicated that they will certainly not get vaccinated (Neumann-Böhme et al., 2020). Čorkalo Biruški et al. (2021) on a Croatian sample (N = 867) show that 15.2% of participants reported that they will certainly not get vaccinated, 13.1% will probably not get vaccinated, and 14.2% is not sure yet.

Therefore, it is important to understand the determinants of individual vaccination decision. Such knowledge is very important for guiding communication in a way that increases vaccine acceptance and for understanding how to prepare for similar health problems in the future (Lindholt et al., 2021). Some reasons that are usually mentioned in discussions about vaccine refusal are the anti-vaccination movements and negative attitudes toward vaccination (Betsch et al., 2015). However, there are other reasons for vaccine refusal.

Previous literature reports potential barriers to vaccine acceptance at different levels ranging from sociocultural and political levels (e.g., availability and cost of the vaccine, trust in health officials, the role of government in vaccination) to the individual level (Schmid et al., 2017). At the individual level, studies have shown the relevance of psychological theories of behaviour for vaccine acceptance, like the Theory of planned behaviour (e.g., Betsch et al., 2015; Gerend & Shepherd, 2012; Xiao & Wong, 2020). Several models have been developed to integrate previous literature on vaccine behaviour, such as the 3C (MacDonald & the Strategic Advisory

Group of Experts [SAGE] working group, 2015), 4C (Betsch et al., 2015), 5C (Betsch et al., 2018) and 7C models (Geiger et al., 2021). Grounded in previous theoretical models, the 7C model is a useful tool for both research and practice, reflecting a broad scope of predictors of vaccination intention and behaviour. Geiger et al. (2021) in the context of 7C model have used the term vaccination readiness which includes components that increase or decrease the likelihood of getting vaccinated. The model includes seven psychological antecedents of vaccination (Geiger et al., 2021): *confidence* (the tendency to trust in the safety and effectiveness of vaccines and to trust health authorities and health officials who recommend and develop vaccines), *complacency* (perceived risk and perceived level of threat of vaccine-preventable disease), *constraints* (structural or psychological barriers that make vaccination difficulty or costly), *calculation* (personal costs and benefits of vaccination are weighted), *collective responsibility* (willingness to protect others by getting vaccinated by means of *herd immunity*), *compliance* (support of punishment for refusing vaccination and giving benefits to those who have been vaccinated), and *conspiracy* (belief in conspiracy theories and fake news related to vaccination). Confidence was found to be related to vaccinating oneself and to recommending vaccines, whereas collective responsibility, constraints, and complacency were associated only with vaccinating oneself (Neufeind et al., 2020). The tendency to believe COVID-19 related to conspiracy theories was negatively related to confidence about vaccines and the willingness to get vaccinated (Freeman et al., 2020; Romer & Jamieson, 2020). These findings indicate that the relevance of the component varies depending on the vaccine, population group, and time. Identifying the importance of each component across different contexts can serve for interventions aimed at increasing vaccine uptake (WHO Regional Office for Europe, 2020).

Regarding COVID-19 vaccination, previous studies have shown that women (Detoc et al., 2020; Dror et al., 2020; Feleszko et al., 2021), young adults (Kreps et al., 2020; Ruiz et al., 2021), unemployed individuals (Malik et al., 2020) and those with lower socioeconomic status (Sherman et al., 2021; Williams et al., 2020) are less likely to get vaccinated. Recent studies have pointed to the importance of vaccination status in vaccination readiness. Vaccination statuses are vaccine-hesitant and vaccine-resistant individuals, with the former either accepting or refusing available vaccines and the later being completely against vaccination (Walsh et al., 2022). Both types are less altruistic, conscientious, more disagreeable, emotionally unstable, and self-interested than are vaccine-acceptant individuals (Murphy et al., 2021). Besides, some other psychological factors have been explored in relation to vaccine hesitancy, e.g., personality traits. It has been consistently found that high neuroticism and low conscientiousness are related to higher vaccine hesitancy (Murphy et al., 2021; Salerno et al., 2021), although limited attention has been paid to the role of personality in willingness to get vaccination (Lin & Wang, 2020).

Taken together, the existing literature indicates that there are likely to be several

factors that distinguish those who are hesitant or resistant to a COVID-19 vaccine from those who are accepting. Besides, it is evident that the issue of vaccination has ruined social relations. Negative attitudes toward people who have different opinion about COVID-19 vaccination have been noticed even in close relationships (APA, 2021). While most research focuses on antecedents and correlates of vaccination, there is a lack of research examining how these categorizations into *vaccinated* and *unvaccinated* have affected different groups. Based on the Social Identity Theory (Tajfel, 1987; Tajfel & Turner, 1979), we can expect that in situations when group affiliation is emphasized, this aspect of social identity (vaccinated or not) will be more pronounced. The out-group will be perceived as a threat. Henkel et al. (2022) showed that clear identification with a group of vaccinated or unvaccinated contributes to polarization in vaccination readiness. According to the Social Identity Theory, it is expected that the preference of one's own group will appear, while the out-group will be less liked, but we have not found research that follows this in the context of groups that are vaccinated or not vaccinated.

In view of all the above, the goal of this study was to describe the current vaccine acceptance landscape with the aims to 1) predict COVID-19 vaccine acceptance measured by vaccination readiness using demographic characteristics (gender, age, education, socioeconomic status, and whether they had been infected with coronavirus before or not) and personality traits (neuroticism and conscientiousness), 2) examine differences between vaccination status (vaccine-resistant, vaccine-hesitant, and vaccine-acceptant individuals) in vaccination readiness with control of personality traits (neuroticism and conscientiousness), 3) examine participants' attribution of behaviour of a close person who has similar/dissimilar attitude toward vaccination in a hypothetical situation and how the relationship between the participant and close person from the story was assessed. As it has not been examined so far, we used the explanations of the Social Identity Theory (Tajfel, 1987; Tajfel & Turner, 1979) and Fincham's research on the attributions of behaviour in marital partners (Finchman, 1985; Fincham & Bradbury, 1987). Fincham assumed that differences in patterns of attributions for partners' behaviour and relationship difficulties underlie variations in marital satisfaction. Different studies (e.g., Fincham, Beach, & Baucom, 1987; Fincham, Beach, & Nelson, 1987; Fincham & O'Leary, 1983) show that, relative to nondistressed spouses, distressed spouses view the causes of their partners' negative behaviour as reflecting enduring, global characteristics of their partners (i.e., they make internal, stable, and global attributions). Distressed spouses also tend to view positive partner behaviour as situationally determined and, thus, reflecting temporary, situation-specific causes (i.e. they make external, unstable, and specific attributions). In this study, identical attributions were used to those in the study of Fincham et al. (e.g., Fincham, Beach, & Baucom, 1987; Fincham, Beach, & Nelson, 1987; Fincham & O'Leary, 1983), but in the context of similar /dissimilar attitudes of a close person towards vaccination in a hypothetical situation.

According to the aforementioned results of different studies, we can hypothesize that women, young adults, less educated, those with lower socioeconomic status, high in neuroticism, and low in conscientiousness will be less willing to get vaccinated. The three vaccination status (vaccine-resistant, vaccine-hesitant, and vaccine-acceptant individuals) will differ in vaccination readiness. Vaccine-hesitant and vaccine-resistant individuals will have a lower result on vaccination readiness with regard to vaccine-acceptant individuals. We hypothesized that participants will over-evaluate close persons with similar attitude and under-evaluate close persons with completely different attitudes toward COVID-19 vaccination. Specifically, individuals that are exposed to stories about a close person who has similar attitudes toward COVID-19 vaccination will make internal, stable, global, and intentional attributions. A close person who has different attitudes will be assessed as more selfish and more blameworthy.

Method

Participants

The study was conducted on a sample of 1,769 participants (76.3% women, 23% men, and 0.7% other) who live in different parts of Croatia. The age of participants ranged from 18 to 77 years (M = 36.06, SD = 11.59). The most participants had university level of education (39.5%) and high school (32.5%). 14.1% of participants finished post-graduate study, 13.2 had bachelor level, and 0.4% primary school. The majority of the participants were employed (69.8%).

Instruments

COVID-19 Infection. Participants were asked whether they have been infected with coronavirus before (1 – *no*, 2 – *I had mild symptoms but did not confirm it by a test*, 3 – *yes, without symptoms*, 4 – *yes, with mild symptoms*, 5 – *yes, with severe symptoms*). In further analyses, two categories of respondents were used, those who recovered from COVID-19 and those who did not have it.

Vaccination Status. Participants were asked if they were COVID-19 vaccinated (1- *yes*, 2 – *no, but I have the intention to vaccinate*, 3 – *no, and I do not have the intention to vaccinate*). The participants who were vaccinated were classified into the group of vaccine-acceptant individuals. Those who were not vaccinated but had intention to do so were classified in the group of vaccine-hesitant individuals, and those who were not vaccinated and did not have intention to vaccinate were classified in the group of vaccine-resistant individuals.

The 7C of Vaccination Readiness Scale (Geiger et al., 2021). This measure has been developed to assess predictors of people`s intention to (not) get vaccinated. The measure builds on and extends the 5C antecedents of the vaccination scale (Betsch

et al., 2018). The scale consists of 21 items. Each of Cs – Confidence, Complacency, Constraints, Calculation, Collective Responsibility, Compliance, and Conspiracy – is captured with three items. Answers are given on a seven-point Likert scale (1 – *strongly disagree*, 7 – *strongly agree*). The scale was adapted to specifically focus on COVID-19 vaccination. All items are scored in a way that a higher score indicates a higher degree of the C dimension. Croatian translation was performed by two native Croatian speakers individually, after which a consensus meeting took place. The Croatian version was translated back to English. The structure of the 7C on this sample of respondents was tested by confirmatory factor analyses (Šincek et al., 2022). The obtained results show identical seven-factor structure as in the original work proposed by Geiger et al. (2021). Correlations between confidence, constraints, compliance, collective responsibility, conspiracy, and complacency were very high (from .74 to .84), so vaccination readiness as a total measure was used in further analyses. Descriptive statistics and reliability coefficient for vaccination readiness will be presented in Result section.

Big Five Inventory (BFI; John et al., 1991). Only the two dimensions of BFI which show a consistent correlation with vaccination readiness were used - conscientiousness (e.g., "I see myself as someone who is a reliable worker") and neuroticism (e.g., "I see myself as someone who worries a lot"). Participants rated each of the 17 items (8 for neuroticism and 9 for conscientiousness) on a scale ranging from 0 (*strongly disagree*) to 4 (*strongly agree*), with higher score corresponding to greater levels of that specific personality domain. Previous research showed its appropriateness for measuring the Five-factor model of personality in the Croatian language (Hudek-Knežević & Kardum, 2009; Kardum & Hudek-Knežević, 2012). Descriptive statistics and reliability coefficients of each dimension will be presented in Result section.

Social Relations in the Context of Attitudes towards Vaccination. Two vignettes were designed for the purpose of this study based on Finchman's et al. study on marital couples (Finchman, 1985; Fincham & Bradbury, 1987). Therefore, we used three types of attributions in this study: locus, stability, and globality. Also, we examined the extent to which participants made less benign attributions (saw behaviour as intentional, worthy of blame, and reflective of selfish concerns). The vignettes were used to examine participants' attribution of behaviour of a close person who has a completely similar or completely dissimilar attitude about COVID-19 vaccination with regard to respondents. Half of the participants had a description of a person with similar, and half with dissimilar attitude. The participants were asked to imagine following situation: *An extremely close person (best friend, close family member) has* ***completely dissimilar / completely similar*** *views from yours regarding the COVID-19 vaccination. This topic often becomes part of your conversations and leads to dissension and discomfort.* After reading, participants were given six items (1. *The behaviour and attitudes of the close person are determined by something in himself/herself*; 2. *The reasons why a person close to me has such attitudes and*

behaviour are unlikely to change; 3. *The reasons a close person has such attitudes and behaviours significantly negatively affect our relationship as a whole*; 4. *The attitudes and behaviours of the close person are intentional and under her control*; 5. *The attitudes and behaviours of a close person are determined by selfish, not selfless motives*; 6. *The close person deserves the condemnation of others because of the attitudes and motives he/she has*). Answers were given on a six-point Likert scale, ranging from 1 (*strongly disagree)* to 6 (*strongly agree).* Finally, participants answered on one item which referred to the assessment of relationship disturbance between the respondents and a close person due to their attitudes (*Please estimate how much the described behaviour and opinion of a close person would affect your relationship on a scale of -5 - the relationship broke down completely and ended*, 0 *- there is no change in our relationship*, +5 - *the relationship has greatly improved*).

Procedure

An online questionnaire was used to examine basic demographic characteristics (gender, age, education, working status, and socioeconomic status), information on whether they recovered from the COVID-19 or not, if they were COVID-19 vaccinated or not, the 7C of Vaccination Readiness Scale, Five-factor personality traits (neuroticism and consciousness), and two vignettes which were used to examine participants' attribution of behaviour of a close person who has similar/dissimilar attitude towards vaccination. Half of the participants had person with similar, and half with dissimilar attitudes. Convenience sampling was used in this study. Participation was voluntary and anonymous with no incentives offered. Participants were given as much time as needed to complete the questionnaires (approximately 20 minutes). All participants reviewed a letter of information, were provided with informed consent, and then completed the questionnaires. This study was part of a project that was reviewed and approved by the University of Rijeka. Data were collected from January 6th to January 13th, 2022.

Results

Data analysis was conducted by IBM SPSS Statistics (version 27). The hierarchical regression analysis was performed to examine if demographic characteristics and personality traits predict vaccination readiness. We used analysis of covariance (ANCOVA) to test differences between the three vaccination statuses (vaccine-resistant, vaccine-hesitant, and vaccine-acceptant individuals) in vaccination readiness with control of personality traits (neuroticism and conscientiousness). The differences in participants' attribution of behaviour of a close person with regard to similar or dissimilar attitude toward vaccination were analysed by independent sample *t*-tests.

In Table 1 descriptive statistics for vaccination readiness and Big-five personality traits (neuroticism and consciousness) are presented.

Table 1

Descriptive Statistics and Reliability Coefficients for Vaccination Readiness and Big-Five Personality Traits (Neuroticism and Consciousness)

	N of items	*M*	*SD*	Min-max	Alpha
Vaccination readiness	21	85.08	34.08	21-147	.95
Neuroticism	8	13.35	6.29	0-32	.85
Consciousness	9	26.07	5.78	7-36	.82

Descriptive statistics presented in Table 1 show that vaccination readiness is moderately expressed, same as consciousness. The respondents rate their neuroticism as low. All Cronbach's alpha coefficients are high.

Correlations between demographic characteristics (gender, age, education, socioeconomic status, and whether they had been infected with coronavirus before) and personality traits (neuroticism and consciousness) with vaccination readiness are presented in Table 2.

Table 2

Correlations between Demographic Characteristics and Personality Traits with Vaccination Readiness

	Gender	Age	Education	Socioeconomic status	Infection with coronavirus	Neuroticism	Consciousness
Vaccination readiness	-.08**	.09**	.08**	.10**	-.21**	.19**	-.14**

Note. Gender: 1 – female, 2 – male; $^{**}p < .01$.

Correlations presented in Table 2 show that the women, elderly, more educated, those with higher socioeconomic status, those who were not ill, persons low in consciousness and high in neuroticism have higher vaccination readiness. Although correlations are significant, they are quite low, and probably significant because of the large number of participants.

First aim of our study was to predict COVID-19 vaccine acceptance measured by vaccination readiness using demographic characteristics (gender, age, education, socioeconomic status, and whether they had been infected with coronavirus before) and personality traits (neuroticism and conscientiousness). The hierarchical regression analysis was performed. In the first step of regression analyses, demographic characteristics (age, gender, education, socioeconomic status, and whether they had been infected with coronavirus before) were controlled because of heterogeneous sample. In the second step of regression analyses, neuroticism and consciousness were entered. The results of hierarchical regression analysis are presented in Table 3.

Table 3

Results of Hierarchical Regression Analysis for the Vaccination Readiness

Predictors	*Vaccination readiness*		
	β	ΔR^2	R^2
1. Step		.10**	.10**
Age	.10**		
Gender	-.05*		
Education	.06**		
Socioeconomic status	.11**		
Infection with coronavirus	-.26**		
2. Step		.05**	.15**
Conscientiousness	-.13**		
Neuroticism	.14**		

Note. Gender: 1 – female, 2 – male; *$p < .05$; **$p < .01$.

The results showed that demographic variables significantly explain only 10% of the variance. All demographic characteristics were significant predictors of vaccination readiness, where the women, elderly, more educated, those with higher socioeconomic status, and those who were not ill have higher vaccination readiness. Personality traits (neuroticism and conscientiousness) above demographic characteristics additionally significantly explain vaccination readiness (5%). Persons high in neuroticism and low in conscientiousness have higher vaccination readiness. The total percentage of explained variance is 15%. By this set of variables was not explained 85% of the variance.

Second aim of the study was to examine differences between vaccination status (vaccine-resistant, vaccine-hesitant, and vaccine-acceptant individuals) in vaccination readiness measured by the 7C of Vaccination Readiness Scale. Analysis of covariance was performed, and at the covariate level are included neuroticism and conscientiousness. Vaccine-hesitant and vaccine-resistant individual are described in the literature as being less altruistic and conscientious, and more disagreeable, emotionally unstable, and self-interested than vaccine-acceptant individuals (Murphy et al., 2021). So, this is the reason why the examined personality traits were controlled. Independent variable was vaccinated status, i.e. vaccine-hesitant, vaccine-resistant, and vaccine-acceptant individuals. Dependent variable was vaccination readiness.

Table 4

Differences in Vaccination Readiness Considering Vaccination Status

	Vaccine-acceptant (n = 1083)		Vaccine-hesitant (n = 82)		Vaccine-resistant (n = 631)		*df*	*F*	η^2	Differences between groups[a]
	M	*SD*	*M*	*SD*	*M*	*SD*				
Vaccination readiness	106.77	23.82	77.63	20.13	85.08	34.08	2, 1791	1532.20**	.63	1-2-3 2-3

Note. **$p < .01$; [a] Bonferroni post-hoc test.

The obtained results show that there are differences in vaccination readiness between the three groups when neuroticism and consciousness were controlled. Persons who were vaccinated (vaccine-acceptant) have a higher vaccination readiness compared to persons who did not vaccinate but have intention (vaccine-hesitant) and persons who did not vaccinate and do not have intention to do so (vaccine-resistant). Persons who did not vaccinate but have intention (vaccine-hesitant) have a higher vaccination readiness compared to those who did not vaccinate and do not have intention to get vaccinated (vaccine-resistant).

Third aim of our study was to examine participants' attribution of behaviour of a close person who has a similar/dissimilar attitude towards vaccination with regard to respondents. Six *t*-tests for independent sample were performed. Independent variable was a description of the situation with similar or different attitude of a close person. Dependent variables were six dimensions of attribution: locus, stability, globality, intention, behaviour reflecting selfish motives, and deserves blame. In order to examine whether the two groups of respondents (similar/dissimilar story) differ in assessing whether their relationship with the close person from the story has been disrupted because of their attitudes, one *t*-test for independent samples was conducted. The last variable (relationship assessment) was recoded (-5 to 1, 0 to 6, and +5 to 11).

Results of independent sample *t*-tests for six dimensions of attributions and assessment of relationship disturbances due to similar or dissimilar attitudes are presented in Table 5.

Table 5

Results of Independent Sample t-Tests for Six Attributions and Assessment of Relationship Disturbances Due to Similar or Different Attitudes

		N	*M*	*SD*	*t*	*df*	Cohen *d*
Locus	Similar	841	4.40	1.47	2.88**	1794	0.13
	Dissimilar	955	4.21	1.42			
Stability	Similar	841	4.61	1.32	2.61**	1794	0.12
	Dissimilar	955	4.45	1.28			
Globality	Similar	841	3.02	1.54	2.43*	1794	0.11
	Dissimilar	955	2.84	1.58			
Intention	Similar	841	4.64	1.48	8.51**	1794	0.40
	Dissimilar	955	4.08	1.33			
Selfish motives	Similar	841	2.52	1.66	8.77**	1794	0.41
	Dissimilar	955	3.18	1.52			
Blame	Similar	841	1.62	1.13	7.18**	1794	0.34
	Dissimilar	955	2.06	1.46			
Relationship disturbance	Similar	841	6.29	1.42	12.27**	1788	0.58
	Dissimilar	955	5.44	1.51			

Note. Bonferroni correction was used to test the differences between the groups, but due to the convention the usual level of significance was shown; $^{*}p < .05$; $^{**}p < .01$.

Participants who read a story about a close person with similar attitudes toward vaccination attributed the close person's behaviour as more internal, stable, global, intentional, and less selfishly motivated than the participants who read a story about a close person with dissimilar attitudes towards vaccination. Also, those with the story about a close person with dissimilar attitudes believed that behaviour of the close person is more blameworthy than participants in condition with similar attitudes. While those in condition with similar attitude expected that their relationship with close person would not change, those in condition with dissimilar attitudes expected that relation with close person would slightly worsen.

Discussion

COVID-19 vaccine hesitancy has been recognized as a problem in many countries. The present study examined willingness to receive a COVID-19 vaccine. More specifically, the first goal of the research was to predict vaccination readiness using demographic characteristics (gender, age, education, socioeconomic status, and whether they had been infected with coronavirus) and personality traits (neuroticism and conscientiousness). Second aim was to examine differences between vaccination status (vaccine-hesitant, vaccine-resistant, and vaccine-acceptant individuals) in vaccination readiness with control of neuroticism and conscientiousness. Third aim was to examine participants' attribution of behaviour of a close person who has a similar/dissimilar attitude towards vaccination.

With regard to demographic characteristics, the obtained results show that women, elderly, more educated, those with higher socioeconomic status, and those who were not ill have higher vaccination readiness. Obtained results are consistent with those cited in the literature (e.g., Kreps et al., 2020; Murphy et al., 2021; Ruiz et al., 2021; Sherman et al., 2021; Williams et al., 2020), except for those related to gender differences (Detoc et al., 2020; Dror et al., 2020; Feleszko et al., 2021; Zintel et al., 2022). While some earlier research indicates a greater willingness of men to be vaccinated, the result of this research is different - women have a higher vaccination readiness. It is possible that the initial fear of COVID-19 vaccination due to various side effects (e.g., fertility problems or the occurrence of clots) was replaced by an obligation to possess COVID certificates and/or fear of the more severe consequences of the disease that have manifested themselves over time. Women are more likely to be health and social care workers who are at high risk of contracting and passing on COVID-19 (Zintel et al., 2022). In addition, they mostly work in schools, kindergartens, nursing homes and other institutions which have made COVID certificates mandatory for their employees.

The results of this study also show that neuroticism and conscientiousness above demographic characteristics significantly explain vaccination readiness, where neuroticism is positive, and conscientiousness is a negative predictor. The

obtained results are not in line with expectations. Studies show that high neuroticism and low conscientiousness are related to higher vaccine hesitancy (Murphy et al., 2021; Salerno et al., 2021). In this study, we obtained completely opposite results - more neurotic and less conscientious people are more prone to vaccination. As far as neuroticism is concerned, it is possible that this uncertainty about coronavirus disease lasts for too long and that it has become too stressful and threatening for individuals high in neuroticism and they are, therefore, more willing to be vaccinated. The fear of vaccines has been replaced by the fear of uncertainty for which it is unknown how long it will last. A recent meta-analysis showed that individuals high in neuroticism have a significantly greater generalization of fear of safe and novel cues and contexts (Sep et al., 2019). Some earlier studies showed significant associations between neuroticism and adverse emotional outcomes in stressful life experiences (Penley & Tomaka, 2002). Persons high in neuroticism also have a high susceptibility to psychological distress (Watts et al., 2019), inefficient coping with stress, and an inability to control urges (Ormel & Wohlfarth, 1991). Conscientiousness is a trait that is commonly associated with awareness. Typically, unconscientious people are not well organized, do not demonstrate self-control and cannot plan their time very well. Instead of thinking through an action to its conclusion, an unconscientious person may act spontaneously. For instance, where conscientious people would weigh up the benefits and costs of COVID-19 vaccination, an unconscientious person with preferences for a person who is advocating vaccination may go ahead and vaccinate. Some more explanations of the obtained results may relate to the fact that a high level of conscientiousness has been related to anxiety-related stressors. Specifically, low levels of conscientiousness are related to obsessive-compulsive disorder (OCD), and as such can characterize individuals whose pre-existing cleanliness OCD has been triggered with calls to spend more energy on sanitizing and personal hygiene. In this case, vaccination is protection. A low level of conscientiousness has also been shown to indirectly relate to depressive disorders. This suggests that those with already lowered levels of self-efficacy, or a negative self-image, are particularly vulnerable to experiencing the current situation with COVID-19 as hopeless and never-ending (Mental Health Education, 2022). The obtained inconsistent results related to neuroticism and conscientiousness definitely should be checked in future research.

Vaccination status (vaccine-acceptant, vaccine-hesitant, and vaccine-resistant individuals) is also important for vaccination readiness. The results of this study show that there are differences in vaccination readiness between these three categories when neuroticism and consciousness were controlled. Vaccine-acceptant individuals have a higher vaccination readiness compared to vaccine-hesitant and vaccine-resistant individuals, and vaccine-hesitant individuals have a higher vaccination readiness compared to vaccine-resistant individuals. Neuroticism and conscientiousness are included in the analyses as covariates, since the profiles described in the literature contain certain characteristics that coincide with the stated dimensions of the Five-factor model (Murphy et al., 2021). Perhaps the obtained

results may seem intuitive – *"If I am vaccinated, I will have a greater vaccination readiness."*. However, the intention was to examine the differences in vaccination status in the seven dimensions of vaccination readiness (confidence, complacency, constraints, calculation, collective responsibility, compliance, and conspiracy). The results from that analysis could be used in increasing awareness of vaccine-hesitant and vaccine-resistant individuals about coronavirus vaccination and encouraging them to be vaccinated. Unfortunately, in this study we could not analyse the differences in each of the 7C dimension because of high correlations between those dimensions. Future research should certainly address the structure of the 7C scale and correlations between dimensions.

From the literature, it is evident that the issue of COVID-19 vaccination has a negative impact on social relations (APA, 2021). Therefore, in our study we used two scenarios with descriptions of a close person who has similar or dissimilar attitudes towards vaccination. We examined how respondents attribute the close person's behaviour with respect to different dimensions (locus, stability, globality, intention, blame, and selfish concerns). Results show that the participants who read a story about a close person with similar attitudes towards vaccination estimate that the close person's behaviour is more internal, stable, global, influenced by intention, and that their relationship with that person would not change significantly. On the other hand, participants who read a story about a close person with dissimilar attitudes toward vaccination believe that behaviour of the close person reflect more selfish motives and deserves blame. The obtained results are in line with expectations, both in the context of the Social Identity Theory (Tajfel, 1987; Tajfel & Turner, 1979) and in the context of Finchman et al.'s research (Finchman, 1985; Fincham & Bradbury, 1987). Social interactions, even with close persons, are impaired if there are different attitudes about vaccination. Obviously, the topic of vaccination is very important in terms of the increasing polarization in attitudes. Not only are certain traits attributed to close people depending on what their attitude is, but there are also differences in expectations of what the relationship would be like; would it break down, stay the same, or will it be repaired. Respondents who were given a story about a close person with similar attitudes estimate that their relationship with that person would remain unchanged. On the other hand, respondents who were given a story about a close person with dissimilar attitudes are more likely to estimate that the relationship would worsen. To our knowledge, this is the first research on this topic, so further studies are definitely needed. However, we can conclude that the pandemic disrupted social interactions, leading people to emphasize belonging to their in-group (vaccinated or unvaccinated group) and evaluate it more positively as opposed to the out-group.

Several limitations of this study are noteworthy and might be addressed in the future studies. It is a convenience sample of participants who completed the online questionnaire, therefore, generalization of results is not possible. The future research should use more representative samples of participants. Besides, the topic of

COVID-19 vaccination is controversial, considering the political and health realities and pressures from the public and the media. It is possible that the online questionnaire was completed only by those individuals who are very interested in the topic of vaccination and motivated to express opinion. Future research should examine the 7C questionnaire and correlations between dimensions of vaccination readiness. It would be more informative to use 7C dimensions because better insight would be gained into determinants of vaccination readiness. When interpreting the results, it should be considered that significant correlations were obtained, but they are quite low, and probably significant because of the large number of participants. Also, the included set of variables explained only 15% of the variance, which opens up space for the inclusion of other variables in the explanation of vaccination readiness. Only stories including (dis)similar attitudes of close persons were presented. Future research should explore whether the attribution would be different if the person in the story was a stranger.

Despite some limitations, this research supports the general conclusion that demographic factors and personality traits are important in explaining vaccination readiness. The contribution of this paper is also evident in examining the consequences of differences in attitudes towards COVID-19 vaccination in the context of a close relationship. The paper contributes to the literature by offering insight into the empirical findings from Croatia by providing a test of whether the results hold beyond the other countries where they were originally established.

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