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ATTACHMENT AND INTELLECTUAL HUMILITY AS PREDICTORS OF ATTITUDES TOWARDS VACCINATION AND VACCINES IN THE CONTEXT OF THE COVID-19 PANDEMIC

Abstract: *Health behavior, including attitudes towards vaccination, is affected by various personal, contextual and broader social factors. This paper focuses on attachment and intellectual humility as potential predictors of attitudes towards vaccination and predictors of vaccination status in the context of the COVID-19 pandemic. The starting hypothesis of the research was that there is a significant correlation between attachment styles and intellectual humility and that attachment and intellectual humility can separately significantly contribute to explaining individual differences in attitudes towards vaccination and differences in vaccination status. The research was conducted in an online environment on an occasional sample of students attending different Croatian faculties (N = 247). Questionnaires and self-assessment scales were applied to collect general data, data on attachment styles, intellectual humility, attitudes towards vaccination and reasons for (non-)vaccination. The results of regression analyses showed that secure attachment and intellectual humility (especially openness to change of mind, i.e. independence of ego and intellect) can explain attitudes towards vaccination in part, while significant predictors of vaccination status were age, fearful attachment, independence of ego and intellect and attitudes towards vaccination. The results confirmed some previous insights about the motivation for (non-)vaccination and pointed to a small but significant role of attachment and intellectual humility in explaining both attitudes towards vaccination and health behavior in the context of the pandemic.*

Keywords: *COVID-19, attitudes towards vaccination, attachment, intellectual humility*

INTRODUCTION

We have witnessed very different COVID-19 pandemic-induced people's reactions – from paralyzing fear and great concern, through compliance with all the imposed rules, to refusing to accept the existence of such a disease and doubting the scientific data and achievements of modern science. Confronted with a new threat to human health and life as we knew it, people resorted to different strategies of thinking and behaving, depending on personal and contextual factors. Heated media and non-media debates about the existence of the disease, the effectiveness of medicine in preventing the severe consequences of the disease and the effectiveness of vaccination were everyday reality on a global scale for people of different ages, different education levels and different traits. As of June 2022, there have been 536.590.224 confirmed cases and 6.316.655 deaths, reported to WHO, and by 16 June 2022 nearly 12 billion doses of vaccine have been administered (https://covid19.who.int/). Data on attitudes towards COVID-19 vaccination differ depending on the source. For example, according to *Imperial College London YouGov Covid 19 Behaviour Tracker*

Data Hub (2022), the period from January 2021 to February 2022 saw a significant increase in the number of people who have positive attitudes towards COVID-19 vaccination and in the share of vaccinated population. On the other hand, cross-cultural research on attitudes towards COVID-19 vaccine showed that from February 2021 (which saw the start of vaccination) to June 2021, positive attitudes declined at the level of the entire sample consisting of over 5000 participants (coming from Australia, Belgium, Germany, Great Britain, France, Italy, the Netherlands, New Zealand, South Africa and Spain), whereby this decline was not recorded only in the Netherlands and Belgium. The research authors concluded that information on vaccine safety and side effects is necessary for developing positive attitudes towards vaccination (Greyling & Rossouw, 2022). Attitudes towards vaccination in general, including attitudes towards vaccination against COVID-19, are affected by various factors, including personal, contextual and broader social. Very often, one of the main determinants of a negative attitude towards vaccination is precisely the fear of vaccine side effects and/or insufficient confidence in vaccine safety, which is also indicated by Greyling and Rossouw (2022).

Among the broader social factors relevant to attitudes towards vaccination, particularly important are culture and the value system. Cross-cultural research on a sample of over 400.000 participants showed that the acceptance of COVID-19 vaccine and the intention to vaccinate is significantly higher in cultures that are collectivist and that cultivate collectivist values, which the authors interpreted in the context of showing more concern for others and empathy in these cultures, as confirmed by their results (Leonhardt & Pezzuti, 2022). Cross-cultural research involving participants from the USA, UK and Turkey has shown that belief in COVID-19 conspiracy theories and the so-called conspiracy mentality are the most important predictors of vaccine hesitancy in the three countries, while confidence in science is the most important predictor of confidence in vaccines (Salali & Uysal, preprint). Moreover, the results of the research suggest that a lack of confidence in governing structures is a significant reason for refusing vaccination (Fisher et al., 2020; Soares et al., 2021).

As for personal factors, it is worth highlighting sociodemographic factors; a systematic review of 209 surveys on attitudes towards COVID-19 vaccination has shown that women are significantly more reluctant to vaccinate compared to men; younger compared to the elderly; less educated compared to the more educated; lower-income earners compared to those with higher incomes; persons without health insurance are more reluctant as well as those living in rural areas and members of a racial or ethnic minority (Cascini et al., 2021). Research also suggests that negative attitudes towards vaccination are more common in individuals who believe in conspiracy theories, who hold individualistic worldviews (as opposed to communitarian), value hierarchy (as opposed to equality), and experience relatively high levels of disgust about blood and injections etc. (Hornsey et al., 2018).

Attitudes towards vaccination are part of the broader concept of health attitudes and behaviors and different theoretical models are being used to explain them. According to the oldest health beliefs model designed by Hochbaum, Kegeles, Leventhal and Rosenstock (Abraham & Sheeran, 2007), health behaviors are determined by a person's views on the risks of certain diseases and their views on the effectiveness of recommended health behaviors for the prevention of that disease. For example, if a person thinks that there is a risk of suffering from a malignant disease and at the same time considers preventive examinations to be an effective way of preventing the disease and/or its severe consequences, they are likely to undergo preventive examinations within the recommended time frame. Similarly, a positive attitude towards vaccination could be expected in individuals who believe there is a significant risk of contracting the disease and consider the vaccine to be effective in preventing the development of the disease and/or its severe consequences. On the other hand, research has shown that vaccination is less likely in individuals who do not think that the vaccine will help them, that the risk of contracting the disease is small and that the disease is mild and harmless (Betsch et al., 2018; Schmid et al., 2017).

Considering the various factors involved in forming and maintaining attitudes towards vaccination, in this paper the emphasis is on personal factors from the socio-emotional and cognitive domain, where socio-emotional domain is represented through the concept of attachment and cognitive domain through the relatively recent concept of intellectual humility. For the purposes of this paper, attachment is conceptualized through the model of Bartholomew and Horowitz (1991), who assume the existence of four attachment styles in interpersonal relationships in adulthood –

secure, dismissive, preoccupied and fearful attachment. Attachment styles are based on two internal working models; a model of self that is associated with emotional dependence on others in the process of self-assessment, and a model of others, i.e. an individual's beliefs about whether others are willing to help and support them (Bretherton, 1992). The assumption of a significant role of attachment in explaining attitudes towards vaccination relies on the basic trust that is an integral part of primary attachment (Bowlby, 1988; Erikson, 1959), and is reflected in the trust that an individual has in others and the surrounding world. It is possible to assume that this trust, in case of secure attachment, is also manifested through trust in science, scientists and scientific achievements, which is an important determinant of attitudes towards vaccination. Furthermore, attachment theory can also be considered as a theory of emotional regulation (Mikulincer et al., 2003), whereby secure attachment is a resource for high emotional regulation and the possibility of managing emotional processes in stressful and challenging situations. This enables rational approach to problems and reasoning, and possibly increases intellectual humility (Jarvinen % Paulus, 2017). Intellectual humility represents the value or virtue that allows individuals to recognize their own potential fallibility when forming and/or revising attitudes (Zmigrod et al., 2019). It refers to an individual's capacity to critically value information in nonbiased ways and helps them avoid the tendency to overlook evidence and confirm prior beliefs (Zmigrod et al., 2019). Individuals who are characterized by intellectual humility or modesty are willing to be reassured by evidence, are willing to change their opinion or attitude based on new evidence, are aware of their ignorance and have no problem admitting that they do not know something. Moreover, it was found that intellectual humility is associated with cognitive analytics, but also with mental flexibility (Zmigrod et al., 2019). Unlike an intellectually arrogant individual, an intellectually humble individual is able to be flexible in thinking, overcome biased reasoning, find creative connections between past ideas and new information and adjust their attitudes to new evidence. It was found that intellectual humility is associated with openness, curiosity, tolerance of ambiguity and low dogmatism (Leary et al., 2017), cognitive flexibility and fluid intelligence (Zmigrod et al., 2019), tolerance towards other people (Krumrei-Mancuso & Rouse, 2016) and empathy, gratitude, altruism, benevolence and universalism (Krumrei-Mancuso, 2017). The latter research has shown that empathy and gratitude mediate the connection between intellectual humility and prosocial values. A study on a sample of children also confirmed the connection between intellectual humility and intelligence (Danovitch et al., 2019). Research on intellectual humility in the political context (Porter and Schumann, 2018) has shown that in hypothetical (imaginary) disputes, individuals with more intellectual humility are more open to learning about the attitudes and thoughts of opponents and are more exposed to the opinion of their political dissenters. Furthermore, intellectual humility attracted the attention of researchers of religious attitudes and behavior. Hook et al. (2017) found that intellectual humility is a significant predictor of religious tolerance, even when controlling for conservatism and religious commitment. The same research has shown that exposure to religious diversity is positively related to religious tolerance only for participants who reported a high level of intellectual humility.

Since this paper aims to examine the relationship between attachment, intellectual humility and attitudes towards vaccination in the context of COVID-19, it should be pointed out that Jarvinen and Paulus (2017), on a sample of adult participants (N = 1204), established a connection between secure attachment and cognitive openness to counterarguments as a feature of intellectual humility. The authors investigated the effect of the attachment condition (prompted by recalling appropriate childhood attachment patterns according to scenarios) on the possibility of changing the direction and valence of attitudes after listening to counterarguments. The attitudes related to three questions: "Is there a God?; Is abortion morally acceptable?; Is it morally more acceptable to spend money on your own entertainment or helping the hungry?". The results showed that in the test situation related to the belief in the existence of God, openness to counterarguments was significantly higher in participants primed in a secure attachment condition. No significant differences were found in the other two test situations (Jarvinen and Paulus, 2017). One of the objectives of the research was to examine whether the participants with different self-assessed attachment conditions (three categories according to the Hazan and Shaver model, 1987) differ in the Big-five trait openness, and the results also showed that participants primed in a secure attachment condition exhibited significantly highest trait openness (Jarvinen and Paulus, 2017). The authors conclude that secure attachment represents the capacity to regulate emotions and consequently tolerate threats due to new information, which leaves the

individual cognitively open, while, on the other hand, insecure attachment patterns limit the individual's capacity for cognitive openness (Jarvinen and Paulus, 2017).

Very recent evidence on the correlation between attachment and attitudes towards vaccination is presented in the research by Lu et al. (2022), who showed on a sample of N = 401 adult participants that dependency and closeness, as dimensions of adult attachment, significantly predict the intention to vaccinate against COVID-19. This relationship was mediated by the dependency-oriented help-seeking style (for example, when an individual seeks help even before attempting to solve the problem on their own). It was found that higher scores in the Close dimension and lower scores in the Anxiety dimension of attachment predict the COVID-19 vaccination intention and this relationship was mediated by different help-seeking styles (so-called autonomy-oriented where priority is given to solving the problem independently, i.e. turning to experts) (Lu et al., 2022).

RESEARCH OBJECTIVE AND HYPOTHESIS

The objective of this research was to examine whether attitudes towards vaccination and vaccines in the context of the COVID-19 pandemic can be predicted based on the dimensions of attachment in interpersonal relationships and intellectual humility. Also, one of the research objectives was to translate and check the psychometric characteristics of the scale of intellectual humility, since, as far as the authors of this paper are aware, there is still no instrument for testing this construct in the Croatian language. The research also sought to check whether there is a connection between attachment styles and aspects of intellectual humility, as well as to investigate the different motives for (non-)vaccination against COVID-19. The research started from the hypothesis that there is a significant correlation between attachment styles and intellectual humility and that attachment and intellectual humility can separately significantly contribute to explaining individual differences in attitudes towards vaccination in the context of the pandemics.

RESEARCH METHOD

Participants

A total of N = 247 students aged 19–30 (M = 22.13 years; SD = 2.11) from different Croatian universities participated in the survey. The sample included significantly more female students (95%) than male students (5%), while four participants did not declare gender. The share of the vaccinated against COVID-19 was 30.4%. All mandatory vaccines according to the vaccination calendar were administered to almost 92% of participants, and in addition to the mandatory ones, 39% of participants stated that they were vaccinated with at least one other optional vaccine (e.g. HPV, influenza, pneumococcus, etc.). The sample included 6.48% of participants who reported belonging to risk groups for the development of a more severe form of COVID-19 disease.

Instruments

The following questionnaires or self-assessment scales were used in the research: General Data Questionnaire; Interpersonal Relationships Questionnaire (Bartholomew and Horowitz, 1991), Intellectual Humility Scale (Krumrei-Mancuso & Rouse, 2016), Attitudes Towards Vaccination and Vaccines Questionnaire, and a list of reasons for (non-)vaccination that partly differed for vaccinated and non-vaccinated participants. The vaccinated assessed the importance of nine different motives for vaccination, such as information from the media, attitudes of family members, etc., while the unvaccinated assessed ten motives, such as fear of side effects, etc. The assessments were expressed on a 1–5 scale where 1 meant no reason at all and 5 a very important reason.

The General Data Questionnaire consisted of five closed-ended questions that collected data on age, gender, mandatory vaccination, additional vaccination and vaccination against COVID-19.

Table 1

Descriptive parameters of the measures used

	N	M (SD)	range	Cronbach α	skewness	kurtosis
Secure attachment	1	3.85 (1.86)	1-7	-	-.05	-1.16
Fearful attachment	1	4.19 (2.00)	1-7	-	-.18	-1.26
Preoccupied attachment	1	3.81 (1.98)	1-7	-	.11	-1.22
Avoidant attachment	1	3.27 (1.90)	1-7	-	.41	-1.00
Independence of the intellect and ego	4	15.27 (3.76)	4-20	.86	-.73	.01
Openness to change of mind	5	20.36 (3.14)	10-25	.76	-.46	-.28
Respect for others' opinions	6	26.93 (3.10)	11-30	.81	-1.33	2.77
Lack of excessive intellectual self-confidence	6	16.40 (3.92)	7-26	.71	.07	-.43
Risk of vaccination and vaccines	5	13.44 (4.99)	5-25	.88	.07	-.77
Confidence in vaccination and vaccines	4	14.91 (4.12)	4-20	.86	-.71	-.17

The Interpersonal Relationship Questionnaire (Bartholomew and Horowitz, 1991) examines attachment styles of romantic partners in adulthood and consists of descriptions of four attachment styles (secure, preoccupied, fearful and dismissive) based on two dimensions – anxiety (a model of self) and avoidance (a model of others). The task of the participants was to assess how many each of the descriptions (attachment styles) refers to them, whereby the higher number on a seven-degree scale indicates more agreement with the description (1 – does not correspond at all to my style of behavior in close relationships; 7 – completely corresponds to my style of behavior in close relationships). Average values and other descriptive indicators are shown in Table 1.

The Intellectual Humility Scale (Krumrei-Mancuso and Rouse, 2016) examines four aspects of intellectual humility, i.e. independence of intellect and ego (five items, for example *When someone disagrees with ideas that are important to me, I feel like they are attacking me*); openness to change my mind (five items, for example *I am willing to change my position on an important issue if there are good reasons for doing so*); respect for someone else's opinion (six items, for example *I am glad that there are different ways of thinking about important topics*) and lack of excessive intellectual self-confidence (six items, for example *I prefer to rely on my knowledge on most topics rather than ask others for their opinions*). The authors of the original scale reported satisfactory predictive, convergent and discriminative validity of the scale determined on different samples (Krumrei-Mancuso and Rouse, 2016). Since the authors of this paper did not find a Croatian translation of the scale or its previous use on a Croatian sample, the double translation method was applied, and the structure of the scale was checked by confirmatory factor analysis (*GFI* = .87; *CFI* = .88; *NNFI* = .86; *RMSEA* = .07; relative chi-square = 2.07). Due to the extremely low reliability of the first factor, item 21 was omitted, which significantly contributed to the reliability of the subscale. With the omittance of this item and based on CFA data indicating acceptable compliance of the data with the four-factor model, four total results were formed in accordance with the instructions given by the authors of the original scale. Average values, reliability coefficients and other descriptive indicators are shown in Table 1.

The Attitudes Towards Vaccination and Vaccines Questionnaire was designed for the purposes of this research and it consisted of nine items. The exploratory factor analysis of the items indicated the existence of two factors – confidence in vaccination and vaccines and low vaccination risk – that together explain 70% of variance. The factor matrix is shown in Table 2. With respect to satisfactory reliability coefficients, after reverse scoring of negative items (so that higher values on both variables show a more positive attitude towards vaccination and vaccines), two total results were formed, the descriptive parameters of which are shown in Table 1.

Table 2

Matrix of factor saturation scale of attitudes towards vaccination and vaccines

		F1 -low risk	**F2 -confidence**
1.	Vaccines are useful.	.33	**.83**
2.	I consider vaccines to be one of the greatest medical achievements.	.18	**.85**
3.	Vaccines aren't safe enough.	**.72**	.42
4.	Vaccines have a high risk of side effects.	**.83**	.29
5.	The possible vaccine side effects are not sufficiently known.	**.83**	.21
6.	Vaccines are primarily a source of income for pharmaceutical companies.	**.72**	.27
7.	In the background of most vaccines, there are various conflicts of interest.	**.74**	.24
8.	I vaccinated / I would vaccinate my children according to the mandatory vaccination calendar.	.27	**.75**
9.	I have high confidence in scientists in the field of epidemiology and immunology.	.37	**.74**

% of explained variance	37%	33%

Procedure and Data Analysis

The research was conducted in autumn 2021, during the third wave of the COVID-19 pandemic. Vaccination in the Republic of Croatia began in early 2021, and most citizens started to get vaccinated in spring 2021. The survey was conducted in a virtual environment, using a questionnaire transformed into an online form via the g-suite platform. Students were recruited via e-mails and notifications on the intranet sites of higher education institutions, thus forming an occasional, unrepresentative sample. They had three weeks to complete the questionnaire after which it was no longer possible to access the document, and it was ensured that the questionnaire can only be completed once from one user profile. The data collected were analyzed using the statistical application STATISTICA13. Since kurtosis and skewness parameters fell within the range of -1.33 to +1.26 for almost all measures, parametric procedures were applied in the data analysis. In addition to measures of central values and data dispersion, Pearson's correlation coefficient r and procedures of hierarchical regression analysis were used in the analysis.

RESULTS

Table 3 presents the matrix of correlations of all variables in the survey. Although secure attachment was not correlated with measures of intellectual humility, insecure attachment styles were correlated with certain aspects of intellectual humility. Specifically, a significant negative correlation was found between fearful attachment and respect for others' opinions; between preoccupied attachment and independence of intellect and ego and respect for others' opinions. A positive correlation between preoccupied attachment and a lack of excessive intellectual self-confidence was also found. Confidence in vaccination and vaccines was positively correlated with secure attachment and openness to change of opinion, and the perception of low vaccination and vaccines risk was positively correlated with secure attachment and independence of intellect and ego.

Table 3

Matrix of correlations of the examined variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. age										
2. secure	.14*									
3. fearful	-.06	-.36*								
4. preoccupied	-.13	-.19*	.16*							
5. dismissive	.00	-.21*	-.06	-.26*						
6. independence of ego and intellect	-.02	.08	-.09	-.15*	.06					
7. openness to change of mind	.10	.01	-.03	-.04	.04	.15*				
8. respect for others' opinion	.09	.09	-.13*	-.18*	-.02	.33*	.27*			
9. lack of…	-.11	.02	-.01	.17*	-.23*	.06	.13*	-.04		
10. low vaccination risk	.14	.15*	-.02	-.11	-.11	.14*	.08	-.10	.05	
11. confidence in vaccination	.12	.18*	-.08	.00	-.10	.12	.19*	-.10	.09	.65*

*p < .05

To examine whether attachment characteristics and intellectual humility contribute to attitudes towards vaccination and vaccines, two hierarchical regression analyses were conducted with confidence in vaccines and vaccination and low risk of vaccination and vaccines as criterion variables. The age variable was introduced in the first step, attachment styles in the second, and aspects of intellectual humility in the third. The results of these analyses are shown in Tables 4 and 5.

Table 4

HRA results with confidence towards vaccination and vaccines as a criterion

Step	1	Step 2		Step 3	
Age	.11	Age	.09	Age	.09
R (R^2)	.11 (.01)	Secure attachment	.16*	Secure attachment	.15*
F (df)	3.01 (1.245)	Fearful attachment	-.02	Fearful attachment	-.02
		Preoccupied attachment	.03	Preoccupied attachment	.02
		Avoidant attachment	-.06	Avoidant attachment	-.07
		R (R^2)	.21 (.05)	Independence of intellect and ego	.12
		ΔR^2	.03*	Openness to change of mind	.20**
		F (df)	2.29* (5.241)	Respect for others' opinions	-.13
				Lack of excessive intellectual self-confidence	.04
				R (R^2)	.32 (.10)
				ΔR^2	.06**
				F (df)	3.06** (9.237)

*p < .05 **p < .01

The results with confidence as a criterion variable showed that secure attachment, introduced in the second step of the analysis, is a significant predictor of confidence in vaccines and vaccination, and it remained significant also after the introduction of aspects of intellectual humility in the third step. Intellectual humility increased the percentage of explained variance by a significant 6%, and the selected predictors explained a total of 10% of the variance criteria. Among the aspects of intellectual humility, the only significant independent predictor was openness to change of mind.

Table 5

HRA results with low risk of vaccination as a criterion

Step 1		Step 2		Step 3	
Age	.15*	Age	.13	Age	.14*
R (R^2)	.15 (.02)	Secure attachment	.10	Secure attachment	.09
F (df)	5.70* (1.245)	Fearful attachment	.04	Fearful attachment	.04
		Preoccupied attachment	-.12	Preoccupied attachment	-.13
		Avoidant attachment	-.11	Avoidant attachment	-.11
		R (R^2)	.24 (.05)	Independence of intellect and ego	.15*

ΔR^2	.03	Openness to change of mind	.06
F (df)	2.96* (5,241)	Respect for others' opinions	-.11
		Lack of excessive intellectual self-confidence	.05
		R (R^2)	.30 (.09)
		ΔR^2	.03*
		F (df)	2.59** (9.237)

*p < .05 **p < .01

Older age and independence of intellect and ego proved to be significant predictors for perceiving vaccines and vaccination as being low-risk. The predictors together explained the 9% variance, and the attachment styles did not prove predictive.

Table 6

HRA results with vaccinated – non-vaccinated as a criterion

Step 1		Step 2		Step 3		Step 4	
Age	-.21**	Age	-.20**	Age	-.20**	Age	-.13*
R (R^2)	.21 (.04)	Secure attachment	-.11	Secure attachment	-.11	Secure attachment	-.05
F (1.245)	11.40**	Fearful attachment	-.14*	Fearful attachment	-.13	Fearful attachment	-.12*
		Preoccupied attachment	.01	Preoccupied attachment	.02	Preoccupied attachment	-.02
		Avoidant attachment	-.02	Avoidant attachment	-.01	Avoidant attachment	-.07
		R (R^2)	.25 (.06)	Independence of intellect and ego	.06	Independence of intellect and ego	.14*
		ΔR^2	.02	Openness to change of mind	-.05	Openness to change of mind	.10
		F (5.241)	3.31**	Respect for others' opinions	.04	Respect for others' opinions	-.02
				Lack of excessive intellectual self-confidence	.02	Lack of excessive intellectual self-confidence	.05
				R (R^2)	.27 (.07)	Confidence in vaccines	-.21**
				ΔR^2	.01	Low risk of vaccination	-.32**
				F (9.237)	2.05*	R (R^2)	.53 (.28)
						ΔR^2	.21**
						F (11.235)	8.26**

*p < .05 **p < .01

Table 6 shows the HRA results with the criterion variable vaccinated – non-vaccinated against COVID-19. In the first step, the age variable was introduced that has remained significant until the final step. In the second step, attachment styles were introduced, among which only fearful attachment achieved a significant predictive coefficient. Still, the difference in the percentage of explained variance was not significant, as well as the difference in the third step in which the variables of intellectual humility were introduced. In the last step of the analysis, with the introduction of attitudes towards vaccination, the percentage of explained variance increased by a significant 21%, and all predictors together explained 28% of the variance criteria. In the last step, significant predictors were age, fearful attachment, independence of ego and intellect, and attitudes towards vaccination. It is more likely that vaccinated were those of older age, less fearfully attached, with more independence of ego and intellect, higher confidence in vaccines and vaccination, and those who perceive a lower risk of vaccination.

Table 7 and 8 show the average results of motivation for vaccination/non-vaccination, as well as the differences between securely and insecurely attached participants in assessing the importance of different reasons for (non-)vaccination. Among the vaccinated, the most important reason for vaccination against COVID-19 is their personal desire to protect someone close to them from developing a serious disease; this is followed by a personal desire to contribute to the eradication of the disease and a personal desire to protect themselves from a serious disease. As the least important reason, participants cited being conditioned by their employer and receiving information from the media. The most important reason for not getting vaccinated, as stated by the participants who have not been vaccinated, is that not all experts agree on the benefit/harm of the vaccine. This reason is followed by the fear of side effects, imposing the vaccine primarily for other reasons than health and not seeing the point in vaccinating that will not eradicate the disease. In the reasons for vaccination, a difference was found between securely and insecurely attached participants in only one variable, namely the attitudes of friends/colleagues which those securely attached assessed more important than those with insecure attachments patterns. Among the unvaccinated, in a number of reasons, a difference was found with regard to the attachment. Thus, the securely attached, in relation to the insecurely attached, among less important reasons for their non-vaccination list information from the media, the non-compliance of experts on the benefits/harms of the vaccine, indecisiveness and health contraindications.

Table 7

Importance of different motives for COVID-19 vaccination (1–5) and differences between securely and insecurely attached participants

	M	**C**	**SD**	**M_{sec}**	**M_{insec}**	**t**
information from the media	2.08	1	1.32	2.44	1.98	-1.35
information from professional and scientific literature	3.46	4	1.49	3.61	3.60	-.02
attitudes of family members	3.01	3	1.46	3.50	3.09	-1.09
attitudes of friends/colleagues	2.60	3	1.35	3.28	2.52	-2.16*
personal desire for protection against a serious form of the disease	3.73	4	1.57	4.35	3.90	-1.18
personal desire to protect a close person from developing a serious form of the disease	4.06	5	1.48	4.67	4.18	-1.42
personal contribution to disease eradication	3.82	5	1.54	4.56	3.95	-1.66
being conditioned by their employer or conditioning their workers' rights	2.01	1	1.43	2.28	1.88	-1.02
being able to perform certain activities (travel, etc.)	3.32	4	1.65	3.50	3.59	.21

*p < .05

Table 8

Importance of different motives for COVID-19 non-vaccination (1–5) and differences between securely and insecurely attached participants

	M	C	SD	M_{sec}	M_{insec}	t
fear of the vaccine side effects	3.98	5	1.39	3.97	4.13	0.65
this is a disease that should not be prevented with the vaccine	3.33	3	1.47	3.49	3.40	-0.34
I do not see the point in vaccination that will not eradicate the disease	3.80	4	1.37	4.11	3.79	-1.28
this vaccine was imposed primarily for reasons other than health	3.86	4	1.41	3.70	4.06	1.48
attitudes of family members	1.75	1	1.15	1.65	1.77	0.58
attitudes of friends/colleagues	1.51	1	.99	1.46	1.50	0.21
information from the media	2.13	2	1.29	1.73	2.22	2.09*
experts disagree on the benefit/harm of the vaccine	4.03	5	1.29	3.81	4.28	2.25*
I still can't make up my mind	2.29	1	1.59	1.73	2.45	2.48*
I cannot get vaccinated because of health contraindications	1.66	1	1.30	1.22	1.73	2.26*

*p < .05

DISCUSSION

We will first comment on the reasons for (non-)vaccination and the difference between securely and insecurely attached participants in their motivation for (non-)vaccination. Although one of the most important reasons for our participants' non-vaccination was the fear of side effects, which corresponds to the findings of previous studies (Greyling & Rossouw, 2022), the lack of experts' agreement about the benefits/harms of the vaccine proved to be the key reason. This indicates the need for more direct and clear communication of medical evidence to the public in situations that require responsible health behavior, such as the COVID-19 pandemic. Experts who received media attention saturating the media with vague information, encouraging citizens' suspicions about the scientific evidence for the usefulness of the vaccine and its side effects, as well as suspicions related to information about the disease, certainly contributed to creating negative attitudes towards vaccination among a part of Croatian citizens. Given the relatively low confidence of Croatian citizens in state institutions, especially political ones (Bovan & Baketa, 2022), negative attitudes towards vaccination and the still relatively small share of the vaccinated population compared to EU countries
(https://vaccinetracker.ecdc.europa.eu/public/extensions/covid-19/vaccine-tracker.html#uptake-tab)
are not surprising. In fact, previous research has shown that a lack of trust in the governing structures is a significant reason for refusing vaccination (Fisher et al., 2020; Soares et al., 2021). The reason number three for non-vaccination, according to participants, is because they believe that the vaccine was imposed primarily for other reasons than health. This answer can be associated with conspiracy theories that have developed around the disease itself, but also around vaccines. Earlier research has already shown that belief in conspiracy theories and the so-called "conspiracy" mentality is associated with negative attitudes towards vaccination or vaccine hesitancy, i.e. refusal of vaccines (Salali & Uysal, preprint; Hornsey et al., 2018).

Although the vaccinated and the unvaccinated do not differ significantly in the share of securely and insecurely attached, the results of regression analyses showed that attachment contributes to the intention of vaccination, but also to attitudes towards vaccination. In the analysis with the vaccination status against COVID-19 as the criterion, significant predictors in the last step were age,

fearful attachment, independence of ego and intellect, and attitudes towards vaccination. More people are vaccinated at an older age, which is in line with the expectations and results of previous studies (Cascini et al., 2021), and which is probably due to a higher probability of suffering from a more severe disease in older age. Although the sample was relatively homogeneous in terms of age, even in such a small age range (19–30), a higher probability of vaccination was reported in slightly older young people. Fearful attachment was a negative predictor of vaccination, which means that people with a fearful attachment pattern are less likely to be vaccinated. Fearful attachment is determined by a negative model about the self and others, i.e. high anxiety and high avoidance as fundamental dimensions of attachment. It is possible that both dimensions, which are highly pronounced in fearfully attached participants, increase distrust in the vaccine and vaccination, i.e. they represent a kind of barrier to the acceptance of information from the environment. The result according to which attitudes towards vaccination (confidence and low risk) are significant predictors of vaccination is expected since attitudes are important proximal determinants of behavior. These results are also in line with the model of health beliefs according to which health behaviors are determined also by the views on the effectiveness of recommended health behaviors for disease prevention (Abraham & Sheeran, 2007). Finally, a significant predictor of vaccination is the higher level of independence of ego and intellect as an aspect of intellectual humility. Individuals who feel less at risk if someone disagrees with their ideas, or who in communication with others do not perceive opposing ideas and opinions as attacking their personality and integrity, are more likely to be vaccinated. When it comes to attitudes towards vaccination, i.e. confidence in vaccines and vaccination, significant predictors were secure attachment and openness to change of opinion as a feature of intellectual humility. Secure attachment involves positive models about self and others, and securely attached individuals achieve low scores on both anxiety and avoidance dimension. In the context of a psychoanalytic approach, the securely attached approach others with confidence and have no difficulty with either dependence on others or autonomy. Given the better emotional regulation of the securely attached, earlier research has shown that they are more prone to cognitive openness, willingness to listen to counterarguments, appreciation of others' opinions, etc. (Jarvinen & Paulus, 2017). Although this research has not found a significant correlation between aspects of intellectual humility and secure attachment, the established correlations between patterns of insecure attachment and, for example, respect for the opinions of others or the independence of ego and intellect suggest the need for further detailed research into the relationship between these concepts. Moreover, the significant independent contribution of secure attachment and openness to changing the opinion on confidence in vaccines and vaccination confirms the initial hypothesis according to which secure attachment and intellectual humility are relevant determinants of attitudes towards vaccination and health behavior in the context of the pandemics. In a new and unfamiliar situation such as the pandemic, especially at its beginnings, it was probably easier for securely attached individuals to cope with it and to develop more positive attitudes towards vaccination considering this a realistic plan to overcome the new situation. Earlier research has shown that securely attached individuals are more positive towards seeking new information and tend to revise their own cognitive schemes in the face of new information, which makes them cognitively more flexible and helps them adapt to changes (Mikulincer, 1997). In this context, it is worth mentioning the research on the relationship between attachment and sense (Dewitte et al., 2019), which showed that it is secure attachment that represents a coherent set of representations on which the individual relies, and thus can maintain or re-establish a sense of order and sense in challenging circumstances such as the pandemic.

Finally, perceiving vaccination as low-risk can be predicted by older age and independence of ego and intellect. In this regression equation, attachment did not prove to be a relevant factor. As stated earlier, although the research included a relatively homogeneous age sample, older participants, compared to younger ones, believe that the risk of vaccination is small, which can be attributed to their better knowledge and greater experience. A higher level of independence of ego and intellect as an aspect of intellectual humility also contributed to forming this attitude.

In the end, several shortcomings of the conducted research should be addressed. The first refers to a biased and relatively homogeneous sample (student population), and thus the research hypotheses should be tested on a more heterogeneous sample of young people and adults. In this research, attachment was examined by a short measure consisting of a description of each attachment pattern in romantic relationships, and since the participants are students, it is possible that some lack

the experience of romantic relationships on the basis of which they could assess attachment patterns. The concept of intellectual humility used in this research is relatively new, as well as the accompanying measuring instrument that needs to be further validated on samples of our participants. Despite these shortcomings, the results of the research have confirmed some previous findings on motivation for (non-)vaccination and pointed to a small but significant role of attachment and intellectual humility in explaining attitudes towards vaccination and health behavior in the context of the pandemic.

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PRIVRŽENOST I INTELEKTUALNA PONIZNOST KAO PREDIKTORI STAVOVA PREMA CIJEPLJENJU I CJEPIVIMA U KONTEKSTU PANDEMIJE COVID-19 BOLESTI

Sažetak: *Zdravstveno ponašanje, uključujući stavove prema cijepljenju, determinirano je različitim osobnim, kontekstualnim i širim socijalnim čimbenicima. U fokusu ovoga rada su privrženost i intelektualna poniznost kao potencijalni prediktori stavova prema cijepljenju i cijepnog statusa u kontekstu pandemije COVID-19 bolesti. U istraživanje se krenulo od pretpostavke da postoji značajna povezanost između stilova privrženosti i intelektualne poniznosti te da privrženost i intelektualna poniznost mogu zasebno značajno doprinjeti objašnjenju individualnih razlika u stavovima prema cijepljenju te cijepnom statusu. Istraživanje je provedeno u on-line okruženju na prigodnom uzorku studenata s različitih hrvatskih fakulteta (N = 247), a primijenjeni su upitnici i skale samoprocjene za prikupljanje općih podataka, podataka o stilovima privrženosti, intelektualnoj poniznosti, stavova prema cijepljenju te razlozima za (ne)cijepljenje. Rezultati regresijskih analiza su pokazali da je stavove prema cijepljenju moguće dijelom objasniti sigurnom privrženošću i*

intelektualnom poniznošću (posebno otvorenošću za promjenu mišljenja, odnosno neovisnošću ega i intelekta), dok su značajni prediktori cijepnog statusa bili dob, bojažljiva privrženost, neovisnost ega i intelekta te stavovi prema cijepljenju. Rezultati su potvrdili neke dosadašnje spoznaje o motivaciji za (ne)cijepljenje te uputili na malu, ali značajnu ulogu privrženosti i intelektualne poniznosti u objašnjenju kako stavova prema cijepljenju tako i zdravstvenog ponašanja u kontekstu pandemije.

***Ključne riječi**: COVID19, stavovi prema cijepljenju, privrženost, intelektualna poniznost*