

# Kognitivni prediktori oklijevanja s cijepljenjem protiv bolesti SARS-CoV-2 među mladima u Hrvatskoj

## */ Cognitive Predictors of SARS-CoV-2 Vaccine Hesitancy Among Young People in Croatia*

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Cilj ovog istraživanja je proučiti kognitivne prediktore oklijevanja s cijepljenjem protiv bolesti SARS-CoV-2 među mladima u Hrvatskoj. U kontekstu globalne pandemije COVID-19 cijepljenje je postalo ključno za suzbijanje širenja virusa i zaštitu populacije. Međutim, u Hrvatskoj je udio cijepljenih relativno mali u usporedbi s drugim europskim zemljama. Oklijevanje s cijepljenjem, odnosno odbijanje ili odugovlačenje s cijepljenjem unatoč dostupnosti cjepiva, je ozbiljan izazov za javno zdravlje. Podatci su prikupljeni na prigodnom online uzorku od 398 sudionika i obrađeni hijerarhijskom logističkom regresijom. Zanima nas mogu li i u kolikoj mjeri kognitivni čimbenici poput korištenja različitih izvora informiranja i svjetonazora predviđati vjerojatnost oklijevanja s cijepljenjem. Rezultati pokazuju kako su se skloniji cijepiti stariji sudionici koji procjenjuju svoju političku orijentaciju više lijevo, a važnost vjere manjom. Nadalje, skloniji su se cijepiti oni koji informacije dobivaju putem TV-a i od drugih ljudi, kao i oni koji pokazuju znanstveni svjetonazor i ne vjeruju u teorije zavjera.

*/ The aim of this study was to analyse the cognitive predictors of SARS-CoV-2 vaccine hesitancy among the young people in Croatia. Within the context of the COVID-19 global pandemic, vaccination has become crucial to prevent the spread of the virus and protect the population. However, the proportion of vaccinated people in Croatia is relatively small compared to the other European countries. Vaccine hesitancy, i.e. vaccine refusal or delay in vaccination despite the availability of vaccines, represents a serious challenge for public health. The data were collected based on an online convenience sample of 398 participants and were processed using hierarchical logistic regression. Our aim was to determine whether and to what extent cognitive factors such as access to different sources of information and points of view can predict the likelihood of vaccine hesitancy. The results indicate that older participants who consider themselves to be politically more left-oriented and regard religion as less important are more likely to get vaccinated. Furthermore, individuals who obtain information through television and from other people, as well as those who display a scientific worldview and do not believe in conspiracy theories, are more likely to get vaccinated.*

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Globalna pandemija COVID-19 prouzrokovana virusom SARS-CoV-2 proširila se svijetom od prvih slučajeva zabilježenih krajem 2019. godine. Do kraja lipnja 2023. godine ukupno je zabilježeno gotovo 800 milijuna slučajeva, kao i gotovo 7 milijuna smrti (1). Bolest se pokazala posebno opasnom za starije ljude kao i one s ranijim zdravstvenim problemima. Pandemija je postala javno-zdravstveno pitanje od iznimne važnosti i veliki izazov za zdravstvene sustave širom svijeta (2). Brojne vlade uvele su restrikcije na kretanje, obveze nošenja maski, kao i brojne druge mjere u pokušaju da se uspori širenje virusa. Stoga dugoročne posljedice pandemije nisu samo fizičke (3), već i mentalne (4). Opaženo je otežanje ranijih psihijatrijskih simptoma kao i smanjenje dobrobiti kod zdrave populacije (5). Autori navode povećanje anksioznih i depresivnih simptoma kod djece i mladih (6) poput samoozljeđivanja (7).

U nedostatku efikasnog lijeka razvijeno je cjepivo koje je moglo potencijalno smanjiti pritisak na zdravstvene sustave ali i smanjiti vjerojatnost fatalnog ishoda kod ugroženih skupina. Općenito, cijepljenje je jedno od najvažnijih napredaka u povijesti medicine i zaslužno je za smanjenje smrtnosti kao i gotovo potpuno istrijebljenje nekih bolesti poput dječje paralize, ospica ili tetanusa (8). Cijepljenje, kao i bilo koja medicinska procedura, nosi sa sobom određene rizike i nuspojave, pa je u demokratskim zemljama odluka o cijepljenju protiv bolesti COVID-19 prepuštena pojedincu. Različite su vlade provodile akcije kojima bi potaknule ljude na cijepljenje, što je u kombinaciji s različitim socijalnim normama rezultiralo različitim razinama procijepljenosti ovisno o zemlji i regiji (9).

Udio ljudi koji su se odlučili cijepiti protiv COVID-19 je u Hrvatskoj relativno mali, pogotovo u usporedbi s ostatkom EU. Skandinavske zemlje i zemlje zapadne Europe predvode ljestvicu procijepljenosti od oko 80 %, dok je ta vrijednost u Hrvatskoj tek oko 55 % (9). Zbog

Since the first cases recorded in late 2019, the global pandemic of COVID-19 caused by the SARS-CoV-2 virus has spread worldwide. Until the end of June 2023, a total of nearly 800 million cases were recorded, including almost 7 million deaths (1). The disease proved to be especially dangerous for the elderly and for those with pre-existing health problems. The pandemic became an extremely important public health issue and a major challenge for health systems worldwide (2). Numerous governments imposed movement restrictions, mandatory face masks and many other measures in an attempt to slow the spread of the virus. The long-term consequences of the pandemic are, therefore, not only physical (3), but also mental (4). An aggravation of previous psychiatric symptoms has been observed, as well as a decrease in the well-being of the healthy population. (5). The authors indicate that there has been an increase in the occurrence of anxiety and depressive symptoms, such as self-injury (7), in children and youth (6).

In the absence of an effective drug, a vaccine was developed that could potentially reduce the pressure on healthcare systems and also minimise the risk of fatal outcomes in vulnerable groups. In general, vaccination is one of the greatest advances in the history of medicine and has contributed to reducing mortality rates, in addition to almost completely eradicating certain diseases such as polio, measles or tetanus (8). Like any medical procedure, vaccination carries certain risks and may cause side effects, so in democratic countries the decision to vaccinate against the COVID-19 disease was left to the individuals. Different governments implemented campaigns aimed at encouraging people to get vaccinated, which, combined with different social norms, resulted in varying levels of vaccination depending on the country and the region (9).

The proportion of people who decided to get vaccinated against COVID-19 in Croatia is relatively small, especially when compared to the rest of the

dalekosežnih posljedica za pojedinca, njegovu blisku okolinu ali i šire društvo, odluka hoće li se cijepiti ili ne trebala bi biti rezultat kompleksnog procesa vaganja rizika i potencijalnih pozitivnih ishoda. Cijepljenje bi stoga trebalo biti i osobno i društveno pitanje te bi trebalo povlačiti određenu dozu odgovornosti prema zajednici. Iz perspektive društva, visoka procijepljenost je veliki plus i odbijanje cijepjenja je rizik za društvo i najugroženije pojedince.

Oklijevanje s cijepljenjem (eng. *vaccine hesitancy*) je pojava da ljudi odugovlače s cijepljenjem ili ga odbijaju, iako je ono dostupno (10). Ovaj je fenomen Svjetska zdravstvena organizacija (WHO) 2019. godine, netom prije početka pandemije, proglasila jednom od 10 najvećih prijetnji globalnom zdravlju (prema 11). Problem je u tome što sve veći broj ljudi cijepjenje vidi kao nepotrebno ili čak nesigurno, pa se broj onih koji oklijevaju s cijepljenjem povećava (8,12).

Odbijanje cijepjenja je kompleksan fenomen s mnogo potencijalnih uzroka. U fokusu istraživača prije globalne pandemije bilo je odbijanje cijepjenja djece od njihovih roditelja ili skrbnika, no istovjetni se razlozi mogu primijeniti i na oklijevanje s vlastitim cijepljenjem protiv bolesti poput gripe ili COVID-19 (13). Istraživači su se usmjerili na demografske čimbenike, osobnost, svjetonazor (skup uvjerenja o svijetu) te povjerenje prema institucijama i zdravstvenim djelatnicima kao glavne determinante odluke o cijepljenju (npr. 14-16). U obzir se trebaju uzeti i specifičnosti vezane uz konkretno cjepivo kao i ekonomska odnosno politička situacija u kojoj se cijepjenje odvija.

Dubé i suradnici (8) predlažu konceptualni model oklijevanja s cijepljenjem koji odluku o cijepljenju doživljava kao kontinuum od odbijanja do prihvaćanja na koji utječu osobinski faktori poput znanja i informiranosti, ranijih iskustava, doživljene važnosti cjepiva, procjene rizika, subjektivnih normi ali i moralnih odnosno religijskih uvjerenja. S druge strane na odluku utječu i povjerenje prema javno-zdravstvenom sustavu,

EU. Scandinavian and Western European countries lead the rankings with the vaccination rates of about 80%, while these figures in Croatia only amount to about 55% (9). Due to the long-term consequences for individuals, their immediate surroundings and the wider society, the decision whether or not to get vaccinated should be the result of a complex process of weighing the risks and the possible positive outcomes. Vaccination should, therefore, be both a personal and a social issue, and should entail a certain amount of responsibility towards the community. From the perspective of society, high vaccination rates are a great advantage, while vaccine refusal represents a risk for the society and the most vulnerable individuals.

Vaccine hesitancy refers to a delay in acceptance of vaccination or refusal thereof despite the availability of vaccines (10). Shortly before the pandemic started, in 2019, the World Health Organization (WHO) identified this phenomenon as one of its top ten threats to global health (according to 11). The fact that an increasing number of people considers vaccination to be unnecessary, or even unsafe, thus increasing the number of people hesitating to get vaccinated, represents a problem (8,12).

Vaccine refusal is a complex phenomenon with many potential causes. Before the global pandemic, researchers focused on the parents or caretakers who refused to vaccinate their children, however the same reasons may be applied to the hesitation to vaccinate oneself against diseases such as influenza or COVID-19 (13). Researchers focused on demographic factors, personality, worldview (a set of beliefs about the world) and the trust in institutions and healthcare professionals as the main determinants when making a decision about vaccination (e.g. 14 - 16). The specificities relating to a particular vaccine and the economic, i.e. political situation in which the vaccination process takes place, should also be taken into consideration.

Dubé et. al (8) propose a conceptual model of vaccine hesitancy that views the decision to get

povjerenje prema preporukama zdravstvenih djelatnika i povjerenje prema informacijama iz medija i ostalih komunikacijskih kanala.

Pod okriljem Svjetske zdravstvene organizacije (prema 16) razvijen je teorijski model 3C (engl. *complacency, convenience and confidence*) koji razloge za odbijanje cijepljenja svrstava u tri kategorije. *Complacency* se odnosi na pretjeranu opuštenost koja proizlazi iz činjenice da se neka bolest smatra pod kontrolom u populaciji (zbog visoke procijepljenosti), pa pojedinac doživljava da cijepljenje nije nužno. Paradokсно, što je kampanja cijepljenja uspješnija, to će kod ljudi više prevladati strah od nuspojava u odnosu na strah od same bolesti. *Convenience* se odnosi na dostupnost cijepljenja (u smislu geografske blizine, cijene i sl.), kao i kvalitetu te prikladnost te usluge. *Confidence* se odnosi na uvjerenja da je cijepljenje efikasno i sigurno, na povjerenje prema zdravstvenim djelatnicima i vladama koje donose odluke o cijepljenju.

Upravo je ovaj zadnji skup razloga u fokusu ovog istraživanja, kao i osobinski faktori iz modela Dube i sur. (8). U podlozi i jednog i drugog seta čimbenika nalazi se svjetonazor pojedinca koji se može odrediti kao set pretpostavki o fizičkoj i društvenoj stvarnosti koji može imati snažne posljedice na obrasce razmišljanja i ponašanje pojedinca (17). Svjetonazor se može promatrati kao interpretativna leća pomoću koje ljudi spoznaju svijet i svoje mjesto u njemu (18). Kao relevantne manifestacije svjetonazora odabrani su povjerenje u znanost i sklonost vjerovanju u teorije zavjere, kao konstrukti koji bi mogli biti povezani s odbijanjem cijepljenja.

Povjerenje u znanost je skup vjerovanja o znanstvenoj metodi i filozofskim postulatima empirijske znanosti kao najkvalitetnijim putevima koje ljudi imaju za spoznaju svijeta oko sebe. Prema nekim istraživanjima (19) ovaj se konstrukt sastoji od dva povezana elementa: povjerenju prema metodama i principima s jedne, te povjerenju prema znanstvenim institucijama s druge strane. Više rezultate na ljestvicama

vaccinated as a continuum spanning from refusal to acceptance, influenced by personality factors such as knowledge and level of information, previous experiences, perceived importance of vaccination, risk assessment, subjective norms and moral, i.e. religious beliefs. On the other hand, the decision-making process is also influenced by the trust in the public health system and the recommendations issued by healthcare professionals, as well as in the information reported by the media and other communication channels.

The 3C model theory which classifies the reasons for vaccine refusal into three categories (complacency, convenience and confidence) was developed under the auspices of the World Health Organization (according to 16). *Complacency* refers to the exaggerated unconcern arising from the fact that a disease is considered to be under control in the population (due to high vaccination rates), so the individual does not perceive vaccination as necessary. Paradoxically, the more successful the vaccination campaign, the more people will fear the side effects rather than the disease itself. *Convenience* refers to the availability of vaccination (in terms of geographical proximity, price, etc.), as well as the quality and suitability of the service. *Confidence* refers to the belief that vaccination is effective and safe, and to the trust in the healthcare professionals and governments making decisions about vaccination.

It is this last set of reasons that is the focus of this study, in addition to the personality factors referred to in the model presented by Dubé et al. (8). Underlying both sets of factors is the worldview of each individual, which can be defined as a set of assumptions about the physical and social reality that can have a strong impact on the thinking patterns and behaviour of an individual (17). Worldview can be seen as an interpretive lens through which people perceive the world and their place in it (18). Trust in science and a tendency to believe in conspiracy theories were selected as relevant manifestations of a worldview, as constructs that could be associated with vaccine refusal.

povjerenja u znanost postižu mlađi sudionici muškog spola i liberalne političke orijentacije (prema 20). Ljudi koji vjeruju u znanost kao pristup i koji vjeruju znanstvenicima općenito i medicinskim znanstvenicima specifično bi trebali biti otvoreniji prema cijepljenju.

Teorije zavjera su pokušaji objašnjavanja uzroka važnih društvenih i političkih događaja pomoću tajnih dogovora malog broja jako moćnih pojedinaca ili organizacija (21). One često podrazumijevaju ideje o tome kako različite tajne organizacije i društva pokušavaju kontrolirati ljude koristeći se nedozvoljenim sredstvima poput ugradnje mikročipova ili prskanja kemikalija iz aviona. Mentalitet zavjera (engl. *Conspiracy mentality*) je set bazičnih uvjerenja koji se nalazi u podlozi vjerovanja u specifične teorije zavjera. Ovaj mentalitet odražava stabilne individualne razlike između ljudi u tome da se značajni događaji pripisuju zlokožnim uzrocima ili tajnim zavjerama (22). Istraživanja pokazuju kako pojedinci s razvijenijim mentalitetom zavjera zaista vjeruju i u više specifičnih teorija zavjera (23, 24).

Vjerovanje u teorije zavjera može imati brojne negativne posljedice za pojedinca i društvo u cjelini (25). Ljudi koji vjeruju u teorije zavjera manje su skloni uključivati se u društveno korisne aktivnosti poput aktivnosti za sprječavanje klimatskih promjena (26) ili pridržavanja propisanih mjera za kontrolu pandemije (27,28). I prije COVID-19 pandemije postojale su brojne teorije zavjere povezane s cijepljenjem. Vjerojatno je najraširenija ideja da su nuspojave cijepljenja puno veće nego se prikazuje u službenoj medicinskoj literaturi (29). S cijepljenjem protiv COVID-19 najviše se povezuju teorije zavjere o korištenju cjepiva kako bi se ljudima ubrizgali mikročipovi za praćenje i kontrolu. Vjerovanje u ove teorije zavjere, kao i teorije zavjere o COVID-19 općenito, pokazalo se povezanim s oklijevanjem s cijepljenjem (30,31). S druge strane, neki nalazi pokazuju da su namjeru za cijepljenje predviđale specifične teorije zavjere povezane s cijepljenjem, a ne općenite teorije zavjere povezane s pandemijom (32).

Trust in science is a set of beliefs relating to a scientific method and philosophical postulates of empirical science as the best ways in which people can perceive the world around them. According to some studies (19), this construct consists of two related elements: trust in the methods and principles on the one hand, and trust in the scientific institutions on the other hand. Younger male participants with a liberal political orientation achieve higher results on scales referring to trust in science (according to 20). People who trust science as an approach and who trust scientists in general and medical scientists in particular, should be more open to vaccination.

Conspiracy theories represent an attempt to explain the causes of important social and political events by attributing them to secret agreements among a small number of very powerful individuals or organisations (21). They often involve ideas about various secret organisations and societies trying to control people by using illicit means, such as implanting microchips or spraying chemicals from airplanes. Conspiracy mentality is a set of basic convictions that underlies the beliefs in specific conspiracy theories. This type of mentality reflects stable individual differences between people in the attribution of significant events to sinister causes or secret conspiracies (22). Research has shown that individuals with more developed conspiracy mentalities also truly believe in several specific conspiracy theories (23, 24).

Believing in conspiracy theories can have numerous negative consequences for individuals and for the society as a whole (25). People who believe in conspiracy theories are less likely to be included in socially useful activities such as those aiming at preventing climate change (26) or at adhering to the measures prescribed in order to control the pandemic (27, 28). Numerous conspiracy theories associated with vaccination existed even before the COVID-19 pandemic. Probably the most widespread idea is that the side effects of vaccination are much greater than those reported in the official medical literature (29). The conspiracy theories mostly associated with vaccination against COVID-19 are those relating to the use of

U današnjem modernom svijetu ljudima je na raspolaganju širok spektar izvora informacija. Još uvijek se koriste tradicionalni izvori poput novina, televizije i radija, ali su dostupni i moderni izvori kao što su internetski portali i društvene mreže. Važno je naglasiti da odluka o cijepljenju ovisi o informiranosti, kako o samom cjepljivom tako i procesu cijepljenja (8). No, problem s korištenjem neuređenih izvora informacija, poput društvenih mreža, leži u tome što su one često leglo dezinformacija i lažnih vijesti (33). Posebno je opasno kada osoba posjećuje samo stranice koje podržavaju njihov svjetonazor. U takvim slučajevima postoji opasnost da se osoba zatvori u vlastiti "balon" informacija koje samo potvrđuju već postojeće stavove i vrijednosti. Umjesto da proširuju svoje znanje putem različitih izvora, ljudi mogu zaglaviti sve dublje u ideološkoj rupi, vjerujući da su informirani, dok zapravo gube objektivnost i perspektivu (34).

Cilj ovog istraživanja je proučiti doprinos kognitivnih čimbenika poput korištenja različitih izvora informiranja i *online* platformi te svjetonazora (povjerenja u znanost, mentaliteta teorija zavjera i vjerovanja u teorije zavjere o pandemiji) u predviđanju vjerojatnosti oklijevanja s cijepljenjem. Želimo vidjeti mogu li izvori informiranja, a onda i povjerenje u znanost i vjerovanje u teorije zavjera, predviđati ishod nakon statističke kontrole nekih demografskih varijabli. U analizu su uključeni i ranije poznati čimbenici odluke o cijepljenju poput političke orijentacije ili važnosti vjere (kao operacionalizacije religioznosti).

## METODA

### Sudionici

Istraživanje je provedeno *online*, a sudjelovalo je ukupno 398 sudionika koji su vrbovani preko različitih studentskih mailing-lista kao i putem društvenih mreža. Prosječna dob sudionika bila je 26,5 godina (SD = 11,1). U tablici 1 prikazane su neke demografske odrednice uzorka. Kao što se može vidjeti, većina sudionika su žene

vaccine for the purpose of injecting people with microchips used for monitoring and control. In general, believing in these conspiracy theories, as well as the theories relating to COVID-19, has proved to be associated with vaccine hesitancy (30, 31). On the other hand, some findings indicate that vaccination intentions were anticipated in specific vaccine-related conspiracy theories, and not in general conspiracy theories relating to the pandemic (32).

In the modern world that we live in today, people have a wide spectrum of information sources at their disposal. Traditional sources of information such as newspapers, television and radio are still being used, but modern sources such as internet portals and social networks are available as well. It is important to note that a decision to get vaccinated depends on the individual's level of information, as well as the vaccine itself and the vaccination process (8). However, the problem with using unregulated sources of information such as social networks lies in the fact that they are often a hotbed of misinformation and fake news (33). A particularly troubling situation arises when an individual only visits the websites that support their worldview. In such cases, there is a risk of being enclosed in one's own "balloon" of information that only confirm the already existing attitudes and values. Instead of expanding their knowledge by looking into various sources, people may get stuck deeper and deeper in their ideological holes believing that they are informed, while they are actually losing objectivity and perspective (34).

The objective of this study was to examine the contribution of cognitive factors, such as the use of various sources of information and *online* platforms, and worldviews (trust in science, conspiracy mentality and believing in conspiracy theories associated with the pandemic) for the purpose of predicting the likelihood of vaccine hesitancy. Our aim was to establish whether the sources of information, and then the trust in science and belief in conspiracy theories, can predict the outcome after a statistical control of some demographic variables. Previously known

koje studiraju ili su zaposlene i žive u mjestu s preko 500,000 ljudi. Podatci za ovo istraživanje prikupljeni su u svibnju 2021., nakon što je u Hrvatskoj počela kampanja cijepljenja, ali svi koji se žele cijepiti još nisu stigli na red.

## Instrumenti

### Sociodemografska obilježja

Osim demografskih varijabli spomenutih ranije i prikazanih u tablici 1, još su prikupljeni podatci o političkoj orijentaciji (na ljestvici od 1 – ekstremno lijevo do 7 – ekstremno desno) i važnosti vjere u životu sudionika (na ljestvici od 1 – nimalo važno do 7 – vrlo važno). Informacije o cijepljenju prikupljene su uz pomoć dva pitanja. Prvo smo sudionike pitali jesu li se do sada cijepili, a ako nisu imaju li namjeru (sigurno da, ne znam, sigurno ne).

### Broj online platformi i izvori informiranja

Sudionike smo pitali da označe koje od različitih društvenih mreža i kanala komunikacije koriste (*Facebook, Twitter, YouTube, Instagram,*

factors influencing vaccination decisions, such as political orientation or the importance of religion (as the operationalisation of religiousness), were also included in the analysis.

## METHOD

### Participants

The study was conducted online, with a total of 398 participants who were recruited through various student mailing lists and social networks. The average age of participants was 26.5 years (SD = 11.1). Table 1 shows some demographic characteristics of the sample. As can be seen, the majority of participants were women studying or working and living in a city of over 500 000 inhabitants. The data for this study were collected in May 2021, after the start of the vaccination campaign in Croatia, but before all of the people wanting to get vaccinated had the opportunity to do so.

## Instruments

### Sociodemographic characteristics

In addition to the demographic variables mentioned above and shown in Table 1, data on political orientation (on a scale from 1 - far left to 7 - far right) and the importance of religion in the participants' lives (on a scale from 1 - no importance to 7 - very important) were collected as well. Information on vaccination was collected by asking the participants two questions. The participants were first asked whether they had been vaccinated thus far, and if they hadn't, whether they had such intentions (definitely yes, I do not know, definitely no).

### The number of online platforms and sources of information

We asked the participants to indicate which of the different social networks and communication channels they used (*Facebook, Twitter, YouTube,*

**TABLICA 1.** Raspodjela sudionika prema rodu, radnom statusu i veličini mjesta u kojem žive

**TABLE 1.** Distribution of participants according to gender, employment status and size of place of residence

Rod / Gender	Frekvencija / Count	%
Muško / Male	143	36.0%
Žensko / Female	254	64.0%
<b>Radni status / Employment status</b>		
Student / Student	288	72.4%
Nezaposlen-a / Unemployed	11	2.8%
Zaposlen-a / Employed	94	23.6%
Umirovljenik-ca / Retired	5	1.3%
<b>Veličinamjesta / Size of place of residence</b>		
< 1000	21	5.3%
1000 - 10 000	80	20.1%
10 000 - 100 000	86	21.6%
100 000 - 500 000	30	7.5%
> 500 000	181	45.5%

Reddit, TikTok, Snapchat, Whatsapp, Viber, Signal, Telegram). Od sudionika smo tražili da označe samo one platforme koje aktivno koriste (kojima su pristupili barem jednom u zadnjih tjedan dana). U ovom nas istraživanju nije zanimala svaka platforma pojedinačno, već koliko različitih platformi sudionik koristi kao mjera širine izloženosti različitim utjecajima. Nadalje, pitali smo ih da procijene na ljestvici od 5 stupnjeva (1 - nikad, 5 - svakodnevno) koje izvore koriste za informiranje (TV, internetske portale, društvene mreže, radio, tiskani materijal i/ili druge ljude).

### Povjerenje u znanost

Povjerenje u znanost odmjerenjeno je kratkom ljestvicom koja je konstruirana za potrebe ovog istraživanja. Instrument se sastoji od 5 tvrdnji za koje sudionici daju odgovore na ljestvici od 7 stupnjeva (1 – uopće se ne slažem, 7 – u potpunosti se slažem). Čestice su konstruirane tako da viši rezultat ukazuje na veće povjerenje u znanost. Primjeri čestica su „Ako želimo riješiti probleme modernog društva trebali bismo više slušati znanstvenike.“ ili „Nikada se ne bih podvrgnuo/la medicinskom postupku koji nema znanstveno utemeljenje.“ Jednodimenzionalni mjerni model dobro odgovara podacima ( $\chi^2=17,9$ ;  $df=5$ ;  $CFI=0.98$ ;  $SRMR=0,025$ ;  $RMSEA=0,08$ ). Pouzdanost je procijenjena McDonaldovim (35) *omega total* koeficijentom ( $\omega_t=0,8$ ) i Cronbachovim koeficijentom ( $\alpha = 0,78$ ) te je na zadovoljavajućoj razini za ljestvicu ove dužine.

### Mentalitet teorija zavjera

Upitnik za mjerenje mentaliteta teorija zavjera (CMQ; 22) sastoji se od 5 tvrdnji, a zadatak sudionika je odrediti svoje slaganje sa svakom tvrdnjom na ljestvici od 11 stupnjeva. Ljestvica je izražena kao postotno slaganje sa svakom tvrdnjom – od 0 % do 100 % sigurnosti. Primjeri tvrdnji su „Smatram da postoje tajne organizacije koje imaju velik utjecaj na političke

Instagram, Reddit, TikTok, Snapchat, WhatsApp, Viber, Signal, Telegram). We asked the participants to indicate only those platforms that they actively used (which they had accessed at least once in the previous week). In the course of this study we were not interested in individual platforms, but rather in the number of different platforms a participant used as a measure of the breadth of exposure to different influences. Furthermore, we asked them to evaluate on a 5-point scale (1 - never, 5 - every day) which sources they used to obtain information (television, internet portals, social networks, radio, printed material and/or other people).

### Trust in science

Trust in science was measured using a short scale which was constructed for the purposes of this study. The instrument consisted of five statements for which the participants provided answers on a 7-point scale (1 - completely disagree, 7 - completely agree). The items were constructed in such manner that a higher score indicated higher trust in science. Item examples were the following: “If we want to solve the problems existing in the modern society, we should listen to scientists more” or “I would never undergo a medical procedure that has no scientific basis”. The one-dimensional model matched well with the data ( $\chi^2=17.9$ ;  $df=5$ ;  $CFI=0.98$ ;  $SRMR=0.025$ ;  $RMSEA=0.08$ ). Reliability was assessed by McDonald's (35) *omega total* coefficient ( $\omega_t = 0.8$ ) and Cronbach's coefficient  $\alpha$  ( $\alpha = 0.78$ ) and was at a satisfactory level for a scale of this length.

### Conspiracy mentality

The Conspiracy Mentality Questionnaire (CMQ; 22) consisted of five statements, and the participant's task was to determine their level of agreement with each statement, using an 11-point scale. The scale was expressed as a percentage of agreement with each statement - from 0% to 100% certainty. Some examples included the following: “I believe that there are secret organisations that have great influence on political decisions” or “I believe that government officials



odluke.“ ili „Smatram da vladini zaposlenici pomno nadziru sve građane.“. Viši rezultat na ovoj ljestvici ukazuje na izraženiji mentalitet za vjerovanje u teorije zavjera. Pouzdanost ove ljestvice pokazala se zadovoljavajućom ( $\omega_t=0,83$ ;  $\alpha = 0,82$ ).

### Vjerovanje u teorije zavjere o pandemiji COVID-19

Vjerovanje u specifične teorije zavjere povezane s COVID-19 pandemijom odmjereno je instrumentom preuzetim iz istraživanja Banai i sur. (27). Sudionici procjenjuju svoje slaganje s devet tvrdnji na ljestvici od 5 stupnjeva (0 – uopće se ne slažem, 5 – u potpunosti se slažem). Primjeri tvrdnji su „Širenje koronavirusa je povezano s 5G tehnologijom.“ ili „Podatci Svjetske zdravstvene organizacije o broju oboljelih i umrlih od koronavirusa su lažni.“. Viši rezultat na ovoj ljestvici ukazuje na veće vjerovanje u teorije zavjere o pandemiji, a ljestvica također pokazuje dobru pouzdanost ( $\omega_t=0,9$ ;  $\alpha = 0,89$ ).

### Obrada podataka

Kako bismo odgovorili na postavljeni problem proveli smo hijerarhijsku logističku regresijsku analizu. Kao kriterij je korištena varijabla oklijevanja s cijepljenjem u kojoj su kao oni koji oklijevaju označeni ispitanici koji se još nisu cijepili, a izjavili su ili da se sigurno neće cijepiti ili da nisu sigurni hoće li se cijepiti. Drugu skupinu su činili oni koji su se već cijepili i oni koji su izjavili da će se sigurno cijepiti čim im se pruži prilika. Prediktore smo unosili u analizu u blokovima u svrhu kontrole utjecaja ranijih prediktora.

## REZULTATI

Kako bi se ispitao doprinos pojedinih prediktorskih varijabli u predviđanju vjerojatnosti oklijevanja s cijepljenjem izračunate su hijerar-

closely monitor all citizens“. A higher score on this scale indicated a more pronounced conspiracy mentality. The reliability of this scale proved to be satisfactory ( $\omega_t = 0.83$ ;  $\alpha = 0.2$ ).

### Belief in conspiracy theories associated with the COVID-19 pandemic

Belief in specific conspiracy theories associated with the COVID-19 pandemic was measured by an instrument taken from a study conducted by Banai et al. (27). The participants rated their agreement with nine statements on a 5-point scale (0 - completely disagree, 5 - completely agree). Some statement examples were the following: “The spread of coronavirus is connected with the 5G technology” or “The data provided by the World Health Organization regarding the number of cases and deaths caused by the coronavirus are false”. A higher score on this scale indicated a greater belief in conspiracy theories relating to the pandemic, while the scale showed good reliability as well ( $\omega_t = 0.9$ ;  $\alpha = 0.89$ ).

### Data processing

In order to address the problem at hand, we conducted a hierarchical logistic regression analysis. As the criterion, we used a vaccine hesitancy variable in which respondents who had not yet been vaccinated and who stated either that they would certainly not be vaccinated or that they were not sure whether they would be vaccinated were designated as hesitant. The second group consisted of those who had already been vaccinated and those who declared that they would certainly get vaccinated as soon as they had the opportunity. We input the predictors into the analysis in blocks, in order to control the impact of earlier predictors.

## RESULTS

In order to analyse the contribution of individual predictor variables when predicting the likelihood of vaccine hesitancy, hierarchical logistic regression analyses were calculated in which sociode-

hijske logističke regresijske analize u kojima su kao prediktori redom uvedene sociodemografske varijable (dob, rod, politička orijentacija i važnost vjere), varijable informiranosti (izvori informiranosti i broj korištenih platformi), svjetonazor (povjerenje u znanost i mentalitet vjerovanja u teorije zavjere) te u zadnjem koraku vjerovanje u specifične teorije zavjere povezane sa COVID-19 pandemijom. U tablici 2 prikazana je deskriptivna statistika za kontinuirane varijable koje nisu opisane ranije.

Kao pomoć pri interpretaciji i alat za bolji uvid u podatke prvo su izračunate bivarijatne korelacije između svih korištenih prediktor-skih varijabli i oklijevanja s cijepljenjem (tablica 3). Kako je ishod dihotomna varijabla, korišten je *point*-biserijalni koeficijent korelacije, a za povezanost s rodom koeficijent *phi*. Možemo vidjeti kako su na bivarijatnoj razini s oklijevanjem povezani dob, politička orijentacija, važnost vjere, korištenje TV-a kao izvora informacija te tri svjetonazorske varijable (povjerenje u znanost, mentalitet zavjera i vjerovanje u teorije zavjere vezane uz COVID-19). Nadalje, možemo primijetiti relativno visoke korelacije između tri svjetona-

mographic variables (age, gender, political orientation and importance of religion), information variables (sources of information and number of platforms used), worldview (trust in science and conspiracy mentality) and, in the final step, belief in specific conspiracy theories associated with the COVID-19 pandemic, were each introduced as predictors. Table 2 shows the descriptive statistics for continuous variables which were not described earlier.

As an aid to interpretation and a tool for better insight into the data, bivariate correlations between all used predictor variables and vaccine hesitancy were calculated first (Table 3). Since the outcome is a dichotomous variable, the point-biserial correlation coefficient was used, while the phi coefficient was used for gender correlation. We can see how age, political orientation, importance of religion, use of television as a source of information and three worldview variables (trust in science, conspiracy mentality and belief in conspiracy theories associated with COVID-19) correlate with hesitance at the bivariate level. Furthermore, relatively high correlations are observed between the three worldview variables, therefore those individuals displaying a higher conspiracy mentality will also believe

**TABLICA 2.** Deskriptivna statistika za kontinuirane varijable korištene kao prediktori u ovom istraživanju  
**TABLE 2.** Descriptive statistics for continuous variables used as predictors in this study

	N	Aritmetička sredina / Arithmetic mean	Median	SD	Minimum	Maximum
Politička orijentacija / Political orientation	394	2,858	3	1,566	1	7
Važnost vjere / Importance of religion	397	3,783	4	2,257	1	7
Broj platformi / Number of platforms	398	3,445	3	1,341	0	7
Informacije od ljudi / Information from people	397	3,617	4	,966	1	5
Informacije s radija / Information from the radio	397	2,335	2	1,177	1	5
Informacije iz tiska / Information from newspapers	397	1,544	1	,763	1	5
Informacije s društvenih mreža / Information from social networks	398	3,952	4	1,252	1	5
Informacije s portala / Information from portals	398	3,829	4	1,123	1	5
Informacije s TV-a / Information from television	398	2,771	3	1,225	1	5
Povjerenje u znanost / Trust in science	393	29,786	30	7,237	6	42
Mentalitet zavjera / Conspiracy mentality	396	32,177	32	10,308	3	50
Zavjere o Covid-19 / Covid-19 conspiracies	397	19,408	18	7,991	9	45

**TABLICA 3.** Korelacijska matrica korištenih prediktorskih varijabli i kriterija  
**TABLE 3.** Correlation matrix of the predictor variables and criteria used

Varijabla / Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Dob / Age	—														
2 Rod - ženski / Gender - Female	-,094	—													
3 Politička orijentacija / Political orientation	,046	-,159**	—												
4 Važnost vjere / Importance of religion	,046	,154**	,529**	—											
5 Broj platformi / Number of platforms	-,231**	,096	-,076	,06	—										
6 Informacije od ljudi / Information from people	-,157**	,175**	,042	,071	,042	—									
7 Informacije s radija / Information from the radio	,267**	,132**	,024	,178**	,039	,218**	—								
8 Informacije iz tiska / Information from newspapers	,110*	-,083	,023	,069	,126*	,058	,216**	—							
9 Informacije s društvenih mreža / Information from social networks	-,284**	,201**	,052	,105*	,377**	,199**	0,07	,140**	—						
10 Informacije s portala / Information from portals	,196**	0,02	-,006	,014	,102*	-,018	,124*	,235**	,329**	—					
11 Informacije s TV-a / Information from television	,309**	-,039	,047	,110*	,001	,022	,319**	,387**	,047	,378**	—				
12 Povjerenje u znanost / Trust in science	,094	-,026	-,311**	-,410**	,081	-,058	-,014	,035	-,057	,115*	,119*	—			
13 Mentalitet zavjera / Conspiracy mentality	-,047	,123*	,307**	,360**	,152**	,072	-,035	,011	,123*	,002	-,024	-,301**	—		
14 Zavjere o Covid-19 / Covid-19 conspiracies	,032	,084	,358**	,419**	,026	,022	-,03	,051	,049	-,037	-,014	-,433**	,634**	—	
15 Oklijevanje s cijepljenjem / Vaccine hesitancy	-,127*	-,024	,332**	,345**	-,008	-,006	-,048	,043	,092	-,065	-,111*	-,335**	,330**	,542**	—

Napomena: \* p<,05; \*\* p<,01 / Note: \* p<,05; \*\* p<,01

zorske varijable, dakle oni koji pokazuju viši mentalitet zavjera će i vjerovati u više teorija zavjere vezano uz COVID-19, dok su obje ove varijable negativno povezane s povjerenjem u znanost.

Rezultati hijerarhijske logističke regresije prikazani su u tablici 4, gdje se mogu vidjeti ne-standardizirani koeficijenti za sve prediktore u sva četiri koraka. Prikazani su i omjeri izgleda (engl. *odds ratio*) za svaku varijablu, koji govore o razlici u vjerojatnosti oklijevanja s cijepljenjem za porast od jedne jedinice u nekom prediktoru. Za svaki korak (model) prikazani su i podatci omnibust testa ( $\chi^2$ , df i p – ekvivalent F testu kod OLS regresijske analize) kao i pseudo  $R^2$  (Cox i Snell verzija – ekvivalent  $R^2$  kod OLS regresije).

U prvom su koraku u analizu unesene demografske varijable. Dob, politička orijentacija i važnost vjere pokazali su se kao značajni prediktori oklijevanja s cijepljenjem. Stariji ispi-

in several conspiracy theories associated with COVID-19, while both of these variables have a negative correlation with the trust in science.

The results of hierarchical logistic regression analysis are shown in Table 4, where non-standardised coefficients for all predictors in all four steps are presented. The odds ratios for each variable are also presented, indicating the difference in the likelihood of vaccine hesitancy for a one-unit increase in a predictor. The omnibus test ( $\chi^2$ , df and p – equivalent to F-test in OLS regression analysis) and the pseudo  $R^2$  (Cox and Snell version – equivalent to  $R^2$  in OLS regression) data are also shown for each step (model).

The demographic variables were analysed in the first step. Age, political orientation and importance of religion proved to be significant predictors in vaccine hesitancy. Older respondents were less likely to hesitate when it comes to vaccination – it is visible that the likelihood of vaccine hesitancy reduces by approximately 4% with each year of age. Furthermore, the likelihood

**TABLICA 4.** Rezultati provedene hijerarhijske logističke regresijske analize nakon svakog od 4 koraka  
**TABLE 4.** Results of conducted hierarchical logistic regression analysis after each of the four steps

Model	Prediktor / Predictor	b	Omjerizgleda / Odds ratio
1	Dob / Age	-,042**	,959
	Rod - ženski / Gender - female	-,404	,668
	Politička orijentacija / Political orientation	,34**	1,405
	Važnost vjere / Importance of religion	,306**	1,358
$\chi^2 = 75,719$ ; df = 4; p < ,001; R <sup>2</sup> (CS) = 0,198			
2	Dob / Age	-,035*	,965
	Rod - ženski / Gender - female	-,442	,642
	Politička orijentacija / Political orientation	,361**	1,435
	Važnost vjere / Importance of religion	,353**	1,424
	Broj platformi / Number of platforms	-,253*	,777
	Informacije od ljudi / Information from people	-,299*	,741
	Informacije s radija / Information from the radio	,031	1,032
	Informacije iz tiska / Information from newspapers	,357	1,430
	Informacije s društvenih mreža / Information from social networks	,222	1,249
	Informacije s portala / Information from portals	-,088	,916
	Informacije s TV-a / Information from television	-,461**	,631
	$\chi^2 = 99,315$ ; df = 11; p < ,001; R <sup>2</sup> (CS) = 0,251		
3	Dob / Age	-,04*	,961
	Rod - ženski / Gender - female	-,583	,558
	Politička orijentacija / Political orientation	,274*	1,315
	Važnost vjere / Importance of religion	,256**	1,292
	Broj platformi / Number of platforms	-,292*	,747
	Informacije od ljudi / Information from people	-,321*	,725
	Informacije s radija / Information from the radio	,08	1,083
	Informacije iz tiska / Information from newspapers	,347	1,415
	Informacij s društvenih mreža / Information from social networks	,171	1,186
	Informacije s portala / Information from portals	-,049	,952
	Informacije s TV-a / Information from television	-,403**	,668
	Povjerenje u znanost / Trust in science	-,049*	,952
	Mentalitet zavjera / Conspiracy mentality	,051**	1,053
	$\chi^2 = 119,208$ ; df = 13; p < ,001; R <sup>2</sup> (CS) = 0,293		
4	Dob / Age	-,058**	,944
	Rod - ženski / Gender - female	-,933*	,393
	Politička orijentacija / Political orientation	,229	1,258
	Važnost vjere / Importance of religion	,253**	1,288
	Broj platformi / Number of platforms	-,328*	,721
	Informacije od ljudi / Information from people	-,278	,757
	Informacije s radija / Information from the radio	,19	1,209
	Informacije iz tiska / Information from newspapers	,283	1,327
	Informacije s društvenih mreža / Information from social networks	,23	1,259
	Informacije s portala / Information from portals	-,029	,971
	Informacije s TV-a / Information from television	-,442**	,643
	Povjerenje u znanost / Trust in science	,006	1,006
	Mentalitet zavjera / Conspiracy mentality	-,01	,990
	Zavjere o Covid-19 / Covid-19 conspiracies	,191**	1,210
	$\chi^2 = 174,352$ ; df = 14; p < ,001; R <sup>2</sup> (CS) = 0,398		

Napomena: \* p<,05; \*\* p<,01 // Note: \* p<,05; \*\* p<,01

tanci manje su skloni oklijevati s cijepljenjem – možemo vidjeti da se za svaku godinu života vjerojatnost oklijevanja s cijepljenjem smanjuje za oko 4 %. Nadalje, za svaki bod više prema desno na ljestvici političke orijentacije kao i bod više na ljestvici važnosti vjere vjerojatnost oklijevanja s cijepljenjem se povećava za oko 40 %. Omnibus test pokazuje da već i prvi korak statistički značajno razlikuje ove dvije skupine sudionika.

U drugom su koraku unesene varijable povezane s informiranjem. Nakon kontrole varijabli iz prvog koraka, kao značajni prediktori su se pokazali broj platformi, dobivanje informacija od drugih ljudi i dobivanje informacija s TV-a. Sudionici koji koriste više platformi te oni koji informacije dobivaju od drugih ljudi i s TV-a skloniji su cijepljenju.

U trećem su koraku dodane varijable koje se odnose na svjetonazor: povjerenje u znanost i mentalitet zavjera. Kao što možemo vidjeti, obje varijable značajno doprinose objašnjenju kriterija nakon kontrole svih varijabli iz prva dva koraka. S cijepljenjem će oklijevati oni koji su skloniji mentalitetu zavjera kao i oni koji pokazuju manje povjerenje u znanost.

U četvrtom je koraku unesena varijabla vjerovanja u konkretne teorije zavjere povezane s pandemijom COVID-19. Ova varijabla značajno doprinosi objašnjenju varijance kriterija čak i uz kontrolu svih ranije unesenih varijabli. Za svaki bod više na ovoj ljestvici vjerojatnost oklijevanja s cijepljenjem raste za 20 %. Zanimljivo je spomenuti da su oba prediktora iz prethodnog koraka prestala biti značajni prediktori nakon što je unesena ova varijabla. Drugim riječima, povjerenje u znanost i mentalitet zavjera objašnjavaju isti dio varijance kriterija kao i vjerovanje u teorije zavjere o pandemiji COVID-19. Ukupno je ovim testom prediktora objašnjeno oko 40 % varijance kriterija, a model točno klasificira 82 % sudionika u ove dvije skupine.

of vaccine hesitancy increases by approximately 40% with each point to the right on the political orientation scale, as well as with each additional point on the scale referring to the importance of religion. The omnibus test results indicate that there are statistically significant differences between these two groups of participants already in the first step.

The variables associated with the provision of information were entered in the second step. After having controlled the first-step variables, the number of platforms, obtaining information from other people and obtaining information from television proved to be significant predictors as well. The participants who used several platforms and those who obtained information from other people and from television were more likely to get vaccinated.

Variables referring to the worldview, such as trust in science and conspiracy mentality, were added in the third step. As can be seen, both variables contributed significantly to the explanation of the criteria after controlling all the variables from the first two steps. Individuals prone to conspiracy mentality, as well as those expressing lower trust in science, proved to be hesitant to get vaccinated.

The variable referring to belief in specific conspiracy theories associated with the COVID-19 pandemic was entered in the fourth step. This variable contributes significantly to the explanation of the criteria variance even after controlling all of the previously entered variables. The likelihood of vaccine hesitancy increased by 20% with each additional point on this scale. Interestingly, both predictors referred to in the previous step ceased to be significant predictors after this variable was entered. In other words, trust in science and conspiracy mentality provide an explanation for the same part of the criteria variance as does belief in conspiracy theories associated with the COVID-19 pandemic. Approximately 40% of the criteria variance was explained by means of this predictor test, while the model provides an accurate classification of 82% of the participants in these two groups.

Okljevanje s cijepljenjem je kompleksan fenomen koji je posljedica mnogih osobinskih i situacijskih čimbenika. U ovom nas je istraživanju zanimala mogućnost predviđanja tog ishoda na temelju sociodemografskih i kognitivnih odnosno svjetonazorskih varijabli. Uzimajući u obzir bivarijatne korelacije prediktora s kriterijem (tablica 3), kao i pojedinačne samostalne doprinose nakon kontrole ostalih prediktora (tablica 4) niz se konstrukata pokazao kao koristan u predviđanju oklijevanja s cijepljenjem.

Dob se pokazala kao značajan prediktor oklijevanja s cijepljenjem u očekivanom smjeru – stariji sudionici skloniji su se cijepiti. Iako je naš uzorak relativno homogen po dobi, dovoljno je varijabiliteta da se ovaj efekt opazi. Ovaj je nalaz u skladu s ranijim istraživanjima koja su pokazala da mlađi imaju manje povjerenja prema cijepljenju te više oklijevaju s cijepljenjem (36-38), čak i na školskom uzorku suženog dobnog raspona (39). Za pregled odnosa dobi i oklijevanja s cijepljenjem upućujem na rad Hudsona i Montelparea (40). Jedan od mehanizama koji bi mogao objasniti ovaj efekt povezan je s većom izloženošću mladih dezinformacijama na društvenim mrežama (40).

Desna politička orijentacija i veća važnost vjere pokazali su se povezanim s oklijevanjem s cijepljenjem. Ove varijable su i međusobno blisko povezane i definiraju svjetonazor koji se često dovodi u vezu s oklijevanjem s cijepljenjem (41-43). Rezultati opaženi na našem uzorku tako su dodatna potpora trendu opaženom u velikom broju istraživanja preko različitih kultura (38). Važno je napomenuti da u nekim istraživanjima nije opažen takav učinak (44,45). Desna politička uvjerenja često su povezana s populističkim političkim diskursom koji gradi svoj zamah na nepovjerenju prema institucijama (46). Kako upravo vlade i nevladine udruge pozivaju ljude na cijepljenje, opažena povezanost između ovih varijabli ne čudi.

Vaccine hesitancy is a complex phenomenon that is the result of many personal and situational factors. In this study, we were interested in the possibility of predicting these outcomes based on the sociodemographic and cognitive, i.e. worldview-related variables. Taking into consideration the bivariate correlations of the predictors with the criterion (Table 3) and the individual contributions after the control of other predictors (Table 4), a series of constructs proved to be useful in predicting vaccine hesitancy.

Age proved to be a significant predictor of vaccination hesitancy in the expected direction - older participants are more likely to get vaccinated. Although our sample is relatively homogeneous in terms of age, there is enough variability for this effect to be observed. These findings are consistent with previous studies which found that the younger population has less trust in vaccination and is more likely to hesitate when it comes to vaccination (36 - 38), even in a school sample of a narrow age range (39). For the purposes of examining the correlation between age and vaccine hesitancy, I refer to the work of Hudson and Montelpare (40). One of the mechanisms that might explain this effect is associated with the higher exposure of young people to misinformation that can be found on social networks (40).

A right-wing political orientation and higher importance of religion proved to be linked to vaccine hesitancy. These variables are closely interlinked and define a worldview that is often associated with vaccine hesitancy (41 - 43). The results obtained from our sample provide an additional support to the trend observed in a large number of studies across different cultures (38). It is important to note that in some studies no such effects were observed (44, 45). Right-wing political orientation is often associated with populist political discourse that builds its momentum on distrust towards institutions (46). Since the governments and non-governmental organisations are the ones encouraging people to get vaccinated, it is no surprise that a connection between these variables was observed.

Ranija su istraživanja u vezu dovela korištenje društvenih mreža kao izvora informacija i oklijevanje s cijepljenjem (47). Na našem uzorku ovaj obrazac nije opažen, već se pokazalo da su se skloniji cijepiti oni koji više koriste druge ljude kao izvor informiranja, kao i TV. Nadalje, veći broj korištenih platformi (društvenih mreža i aplikacija za komunikaciju) povezan je s manjim oklijevanjem s cijepljenjem. Pojedine platforme komunikacije imaju svoje norme i obrasce ponašanja koje su definirale i krug korisnika platforme. Dakle, za pretpostaviti je da je iz perspektive informacijske vrijednosti korisnije imati po jedan kontakt na dvije različite platforme nego dva na istoj. Također, korisnici većeg broja platformi imaju manju vjerojatnost da će upasti u informacijsku „slijepu ulicu“, odnosno da će im se servirati samo jedna strana neke kontroverzne teme.

Ljudi su skloni različitim kognitivnim pristranostima, a jedna od najraširenijih je sklonost potvrdi (eng. *confirmation bias*). Ovaj se fenomen odnosi na traženje i interpretaciju informacija koje su u skladu s ranijim uvjerenjima ili očekivanjima (48). Za pretpostaviti je da će se ova pristranost teže manifestirati kod ljudi koji primaju informacije s TV-a i od drugih ljudi u odnosu na izvore informacija gdje ljudi imaju veću kontrolu nad time čemu će biti izloženi (poput društvenih mreža). Nadalje, istraživanja pokazuju da pojedinci koji su skloni oklijevati s cijepljenjem iznimno teško mijenjaju stavove unatoč tome što su argumenti za cijepljenje norma na brojnim *online* izvorima (49).

Povjerenje u znanost se pokazalo korisnim prediktorom oklijevanja s cijepljenjem – ljudi koji više vjeruju u znanost i znanstvenicima skloniji su se cijepiti. Taj je nalaz u skladu s ranijim istraživanjima koja su pokazala da je ovaj ishod povezan s povjerenjem prema stručnjacima (30) i može se objasniti pozitivnom vezom između povjerenja prema znanosti i povjerenja prema cjepivu (50). Drugim riječima, ljudi koji vjeruju u znanstvene principe imat će i više

Earlier studies indicated that there was a correlation between the use of social networks as sources of information and vaccine hesitancy (47). This pattern was not observed in our sample, but it turned out that those who were more likely to get vaccinated were those who used other people and television as sources of information. Furthermore, a larger number of platforms used (social networks and communication applications) is associated with less hesitancy to get vaccinated. Certain communication platforms have their own standards and behaviour patterns which have also defined the range of platform users. Presumably then, from the information value perspective, it is more useful to have one contact on two different platforms than two contacts on one platform. Moreover, those using a larger number of platforms are less likely to encounter an informational “dead end”, i.e. to only be exposed to one side of a controversial topic.

People are prone to a variety of cognitive biases, one of the most prevalent being the confirmation bias. This phenomenon refers to people looking for, or interpreting, information that is consistent with their existing beliefs or expectations (48). It is to be presumed that this bias would be less pronounced in people who obtain information from television and from other people compared to sources of information where people have more control over what they will be exposed to (such as social networks). Furthermore, research has shown that individuals who tend to hesitate to get vaccinated have a hard time changing their attitudes despite the fact that pro-vaccination arguments represent the norm in numerous online sources (49).

Trust in science has proved to be a useful predictor when it comes to vaccine hesitancy - people who have a greater trust in science and scientists are more likely to get vaccinated. These findings are consistent with previous studies that have shown that this outcome is associated with trust in experts (30) and can be explained by a positive link between trust in science and trust in the vaccine (50). In other words, people who believe in scientific principles will have more trust in vacci-

povjerenje prema cijepljenju kao znanstveno utemeljenoj metodi, što će rezultirati i manjim oklijevanjem.

Vjeronanje u teorije zavjere povezano je s odbacivanjem znanosti i znanstvenog načina razmišljanja (51). Ovo potvrđuje i umjerena negativna korelacija između povjerenja prema znanosti i mentaliteta zavjera opažena i u ovom istraživanju. Posjedovanje mentaliteta zavjera pokazalo se kao značajan prediktor oklijevanja s cijepljenjem, ljudi koji su skloni vjerovati teorijama zavjera općenito, manje su skloni cijepiti se. Istraživanja pokazuju kako je vjeronanje u teorije zavjera povezano s negativnim stavom prema cijepljenju (52,53). Ta veza može biti moderirana subjektivnim normama bliskih pojedinaca, odnosno pozitivni stavovi prema cijepljenju prijatelja ili članova obitelji mogu reducirati ovu povezanost (42).

Važni događaji s globalnim utjecajem poput globalne pandemije jako su dobar kandidat za nastanak i širenje brojnih teorija zavjera. Ovo je definitivno slučaj s pandemijom COVID-19 oko koje su nastale brojne teorije zavjera, poput one da je pandemija namjerno iscenirana ili da se cijepljenje koristi za ubrizgavanje čipova za kontrolu populacije. Naši rezultati pokazuju vrlo jasnu vezu između vjeronanja u ovakve teorije zavjera i oklijevanja s cijepljenjem. Ovaj je nalaz u skladu s ranijim istraživanjima (30, 31). Zanimljivo je da su uvođenjem ovog prediktora u analizu na značajnosti izgubili i povjerenje u znanost i mentalitet teorija zavjera. Jedno od objašnjenja ovog efekta je da je vjeronanje u specifične teorije zavjera medijator veze između ova dva konstrukta i opaženog ishoda. Dakle, iako ljudi koji ne vjeruju u znanost i pokazuju viši mentalitet zavjera pokazuju veće oklijevanje s cijepljenjem, ova se veza može objasniti vjeronanjem u specifične teorije zavjere povezane s pandemijom COVID-19.

Zaključno, naši rezultati sugeriraju kako je oklijevanje s cijepljenjem kompleksan fenomen s puno korelata. Ako želimo potaknuti ljude na

nation as a scientifically based method, which will result in less hesitation.

Believing in conspiracy theories is associated with the rejection of science and the scientific way of thinking (51). This is also confirmed by the moderate negative correlation between trust in science and conspiracy mentality, which was observed in this study as well. Having a conspiracy mentality has proved to be a significant predictor of vaccine hesitancy, and people who tend to believe in conspiracy theories are generally less likely to get vaccinated. Studies have shown that there is a correlation between believing in conspiracy theories and a negative attitude towards vaccination (52, 53). This link can be moderated by subjective norms of close individuals, i.e. positive attitudes towards vaccination displayed by friends or family members can reduce this correlation (42).

Major events that have a global impact, such as a global pandemic, are very good candidates for the creation and spread of numerous conspiracy theories. This has definitely been the case with the COVID-19 pandemic, in relation to which numerous conspiracy theories have been formed, such as the theory that the pandemic was deliberately staged or that vaccination was being used for the purpose of injecting population control chips. Our results indicate that there is a very clear connection between belief in such conspiracy theories and hesitancy to get vaccinated. These findings are consistent with the previously conducted studies (30, 31). Interestingly, both trust in science and conspiracy mentality lost their relevance after this predictor was introduced into the analysis. One of the possible explanations for this effect is that belief in specific conspiracy theories serves as a mediator in the link between these two constructs and the resulting outcome. Therefore, although individuals who do not trust science and display a higher conspiracy mentality are more hesitant to get vaccinated, this link can be explained by belief in specific conspiracy theories associated with the COVID-19 pandemic.

In conclusion, our results indicate that vaccine hesitancy is a complex phenomenon with many



cijepljenje potrebno je djelovati na razvoj kritičkog razmišljanja. Kritička analiza informacija iz više izvora kao i povjerenje u znanost mogu se učiti i vježbati. Ovi su elementi jedan od potencijalno vrlo važnih smjerova kako obrazovanja djece u okviru školskog sustava tako i edukacije odraslih izvan sustava. Važno je upozoriti i na neke nedostatke ovog istraživanja. Prigodan uzorak u velikoj mjeri onemogućuje generalizaciju naših nalaza. Krajnji uzorak sudionika nije reprezentativan za sve mlade u Hrvatskoj jer je u njemu veći udio sudionika iz velikih mjesta kao i visokoobrazovanih sudionika. Nadalje, nacrt istraživanja onemogućuje bilo kako uzročno-posljedično zaključivanje već samo opis povezanosti između različitih konstrukata.

correlates. If we want to encourage people to get vaccinated, we need to work on developing critical thinking. Critical analysis of multiple-source information and trust in science can be taught and trained. These elements represent potentially very important directions both in the education of children within the school system and in the education of adults outside the system. It is important to point out some of the shortcomings of this study as well. A convenient sample largely precludes the generalisation of our findings. The final sample of participants is not representative of all young people in Croatia because it includes a larger share of female participants from large cities, as well as highly educated participants. Furthermore, the study design precludes any causal inference, but only allows for a description of the connection between the different constructs.

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