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Coronavirus Conspiracy Theories in Southeast Europe: (Non-)Believers, Social Network Bubbles, and the Discourse of Blame

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ABSTRACT

Using survey and social network evidence from Southeast Europe, we advance the understanding of conspiracy theories and politics related to the coronavirus pandemic in three ways: (1) we show that beliefs in coronavirus conspiracy theories are related to ideological support for a nationalist vision of society and socialist vision of the economy; (2) we also show that both conspiracy believers and nonbelievers are living in bubbles of the like-minded; and (3) we use the tools of natural language processing to elucidate the unambiguous differences in the discourse related to the coronavirus used by conspiracy believers and nonbelievers.

The coronavirus pandemic has exposed a number of medical, economic, social, and political weaknesses of contemporary societies. What is particularly striking is that it has exposed the vulnerabilities of twenty-first- century humankind when it comes to making reasoned decisions based on facts and observable data, rather than on instincts, prejudice, wishful thinking, or conspiracy theories. One the one hand, all of us have seen the footage of patients who had to endure their pain separated from their loved ones, the images of mass graves being filled with victims of the pandemic in cities from Italy to Brazil, and testimonials from doctors, epidemiologists, and scientists explaining the origins and the spread of the virus. On the other hand, however, we have also seen footage of arsonists setting hundreds of 5 G masts on fire in the belief it was this telecommunications equipment, rather than the novel coronavirus, that was the cause of the deadly pandemic. We have seen protesters against coronavirus measures storming government buildings from Berlin, Germany to Lansing, Michigan, often carrying signs claiming the coronavirus was either a hoax or a conspiracy by globalists, billionaires, the vaccination lobby, or the Chinese Communist Party. The contrast between these two sets of images has been stark. But what can we say about the determinants of people's beliefs in conspiracy theories related to the coronavirus pandemic? Should we think of these beliefs as expressions of people's frustration with their social status independently of the pandemic, as much of research on conspiracy beliefs in general has shown (e.g. Uenal 2016; Uscinski and Parent 2014)? Or are these beliefs rooted in fears prompted by the pandemic's economic consequences (Douglas, Sutton, and Cichocka 2017)? Are coronavirus conspiracy beliefs somehow related to people's political ideologies (Gramacho et al. 2021; Miller, Saunders, and Farhart 2015; Oliver and Wood 2014; Pasek et al. 2015), media consumption (Southwell, Thorson, and Sheble 2018; Stecula and Pickup 2021a), or social networks (Ahadzadeh, Ong, and Wu 2021; Hartman et al. 2021; Jang, Lee, and Shin 2019; Jensen et al. 2021; Stecula and Pickup 2021b)? And what can we say about the manifestations of conspiracy beliefs in how people explain and describe the coronavirus reality around them?

We answer these questions by analyzing the results of a representative survey of more than seven thousand respondents conducted during the first wave of the coronavirus pandemic in April and May 2020 in Bosnia-Herzegovina, Croatia, and Serbia. We conducted the survey in these three countries because they encapsulate a wide variety of potential conspiracy belief drivers while at the same time representing the region of post-Communist Europe in its complexity. Although based on data from a region with its own idiosyncrasies, we believe our study should be seen as globally relevant, as the questions it grapples with remain significant regardless of the geographic or social context. Our research design, where participants were gathered using the social network platform Facebook and were encouraged to leave expansive comments in addition to discrete answers to detailed survey questions, sets our study apart from similar efforts and makes our contribution particularly valuable. It allows us to identify not only the individual determinants of conspiracy beliefs, but also how those beliefs influence people's social network connections as well as their discursive expression about the coronavirus crisis.[1]

The results of our analysis convincingly connect respondents' propensity to subscribe to coronavirus conspiracy theories to their lower educational and income status, (social) media consumption, and perception of the dire economic consequences of the pandemic. More importantly, our analysis also shows respondents' conspiracist beliefs to be positively related to their ideological support for a nationalist (as opposed

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to cosmopolitan) vision of society and a socialist (as opposed to liberal) vision of the economy. We consider this finding a particularly instructive sign for the nature of political competition in the region and the world in general if the crisis continues and deepens. The data we collect on the Facebook friendship connections among survey respondents furthermore allows us to show that respondents' conspiracy beliefs significantly determine their social network connections. Both conspiracy believers and nonbelievers are more likely to inhabit bubbles of the like-minded, even when controlling for a host of factors commonly believed to determine people's social network connections. This finding is also an instructive sign highlighting the divisive and corrosive effect the pandemic has had on our societies, as well as the challenges we face to heal those divisions once the pandemic ends. Finally, the tools of natural language processing help us elucidate the unambiguous differences in the discourse of blame and responsibility related to the coronavirus used by conspiracy believers and nonbelievers. The former try to find meaning and order by blaming usually distant and hidden actors, while the latter focus on personal responsibility and problems in their immediate environment.

We organize our argumentation as follows. First, we review the literature on conspiracy beliefs with special focus on more contemporary studies and in particular the rapidly evolving body of work dealing with conspiracy theories related to the coronavirus pandemic. We then present the main features of our survey design and execution. The three subsequent sections deal in turn with the methodological aspects and the main findings related to the three main contributions of our study: (1) identifying the determinants of conspiracy beliefs, (2) establishing the relationship between conspiracy beliefs and social network connections, and (3) exposing the discursive manifestations of conspiracy beliefs. The final section summarizes our findings and discusses their main implications.

Contemporary Advances in the Study of Conspiracy Beliefs

Over the past decade, there has been an explosion of research into the psychological and sociopolitical determinants of conspiracy beliefs and their consequences.[2] Psychological research focused on personality traits in explaining either specific conspiracy beliefs or general conspiracist worldviews has yielded often conflicting results (Goreis and Voracek 2019), although we can generally say that people who are afraid (Grzesiak-Feldman 2013), who desire to have control over their environment (Van Prooijen 2017), and who exhibit narcissistic character traits (Cichocka, Marchlewska, and Golec de Zavala 2016) are more likely to believe in conspiracies. Literature on the sociopolitical determinants of conspiracy beliefs, on the other hand, has yielded a string of more robust findings. Arguably the most consistent findings have been those concerning individuals' social status. People who are unemployed or with lower income (Uenal 2016; Uscinski and Parent 2014), people with lower levels of education (Freeman and Bentall 2017; Mancosu, Vassallo, and Vezzoni 2017; Oliver and Wood 2014), as well as members of ethnic and racial minorities (Crocker et al. 1999; Wilson and Rose 2013) have been found to be more likely to harbor conspiracy beliefs. Related to the findings on unemployment and income, conspiracy beliefs have also been found to be more prevalent among people who believe the economy is in decline (Parsons et al. 1999), likely due to heightened economic security fears. And related to the findings on the education level, the influence of individuals' level of knowledge of and interest in specific topic areas on related conspiracy beliefs has been found to be context dependent. In the United States, knowledge seems to lower the propensity to believe in "birther" and "truther" conspiracy theories (Enders, Smallpage, and Lupton 2018), whereas in Egypt and Saudi Arabia knowledge seems to be associated with higher propensity to believe in anti-Western and anti-Jewish conspiracy theories (Nyhan and Zeitzoff 2018).

Conspiracy theories, obviously, do not arise out of thin air, nor do they spread indiscriminately through the population. They are products of social activity and are often propagated through different (social) media channels. Researchers have consistently shown the importance of media consumption for individuals' conspiracy beliefs. In the United States, consumers of traditional media (TV news and daily newspapers) are less prone to believe conspiracy theories about 9/11 than the consumers of less mainstream media sources are (Stempel, Hargrove, and Stempel 2007). This finding has been confirmed in a recent multinational study concerning beliefs in conspiracy theories related to the coronavirus pandemic: exposure to traditional media is associated with lower propensity to believe in coronavirus misinformation (De Coninck et al. 2021), whereas exposure to social media is associated with higher propensity to subscribe to conspiracy theories related to the pandemic (Ahadzadeh, Ong, and Wu 2021; Hartman et al. 2021; Jensen et al. 2021; Stecula and Pickup 2021b). Conspiracy beliefs can be strengthened by exposure to media sources peddling conspiracy theories (Douglas et al. 2019). For example, exposure to Fox News is a good predictor of belief in anti-Democrat conspiracy theories (Hollander 2018) and consumption of conservative media is a good predictor of belief in conspiracy theories related to the coronavirus in the United States (Stecula and Pickup 2021a). Encouragingly, however, individuals with higher levels of news media literacy are less likely to subscribe to conspiracy theories (Craft, Ashley, and Maksl 2017), suggesting that negative media effects on conspiracy beliefs can be combated or even reversed by improving public education about the media.

This finding is particularly important in light of a fast-evolving media landscape due to the proliferation of real and fake news sources that are finding new audiences through social media. The impact of social media on the proliferation of conspiracy theories and subsequent political polarization (as well as possible distortion of electoral and referendum results in the United States and the United Kingdom) has been an increasing source of public and academic concern (Southwell, Thorson, and Sheble 2018). Although the actual effects of social media exposure on conspiracy beliefs are difficult to quantify and need further study, there is growing social network analysis evidence that people belong to (online) communities of politically like-minded individuals (Barberá 2015; Boutyline and Willer 2017; Halberstam and Knight 2016; McPherson, Smith-Lovin, and Cook 2001). This may also hold for conspiracy believers (and, consequently, nonbelievers).

Ultimately, conspiracy beliefs are political in nature. Their political character is obvious from the classical definition of conspiracy beliefs as "unsubstantiated accusatory beliefs positing small groups working in secret, for their own benefit, and against the common good" (Edelson et al. 2017, 933). The evidence accumulated in a host of different social contexts—from the United States (Miller, Saunders, and Farhart 2015; Pasek et al. 2015) to Pakistan (Siddiqui 2018) and Brazil (Gramacho et al. 2021)—convincingly connects beliefs in overtly political conspiracies with partisanship. Partisanship is seen as a form of "motivated reasoning"—a psychological mechanism for processing information and integrating it into an already existing worldview that is crucial in people's interaction with political phenomena (Enders, Smallpage, and Lupton 2018). In other words, partisanship is a good predictor of conspiracy beliefs about election fraud (Edelson et al. 2017) or about President Barack Obama's birthplace (Enders, Smallpage, and Lupton 2018) because such beliefs fit into and validate believers' preexisting political worldviews.

The evidence on the relationship between political ideology and predilection toward conspiratorial thinking (i.e. a general disposition toward holding various conspiracy beliefs) is more mixed, however. Oliver and Wood (2014) use four large studies and national samples of US adults in the period 2006–2011 to demonstrate that conspiratorial thinking is not related to individuals' political ideology. Van der Linden et al. (2020), however, also use four large studies and national samples of US adults, this time in the period 2016–2018, to demonstrate that conservatives are not only more likely to support specific conspiracy theories, but are also more likely to hold general conspiratorial worldviews. Similarly, Cichocka, Marchlewska, Golec de Zavala, and Olechowski (2016) find a close connection between nationalism and conspiracy beliefs about the Russians in Poland. To complicate matters further, there is also convincing evidence that conspiracy beliefs in the United States and Western Europe (Krouwel et al. 2017; Van Prooijen, Krouwel, and Pollet 2015) are more prevalent on both the far-left and far-right extremes of the political spectrum, though somewhat more on the right. Likewise, there is evidence that conspiracy thinking is stronger among those classifying themselves outside of the traditional left–right spectrum or considering themselves as independents (Uscinski and Parent 2014). Recent evidence suggests that the key may be in an orthogonal "anti-establishment" dimension of political opinion that is associated with both right-wing and left-wing populism as well as with higher propensity to harbor conspiracist beliefs (Uscinski et al. 2021).

What seems clear is that the relationship between political ideology and predilection toward holding conspiracy beliefs is sensitive to temporal and geographic context as well as modeling strategy. Once again, we believe that holding conspiracy beliefs is inherently political. Identifying its association with political ideology, however, requires contextual acuity. Based on our previous work (Glaurdić, Lesschaeve, and Mochtak 2021), we see the political landscape in Southeast Europe as dominated by two dividing lines (Redžić and Everett 2020). The first of those dividing lines is between nationalism and cosmopolitanism and is rooted in the trauma of the nationalist wars of the 1990s, which accompanied the dissolution of Yugoslavia. These nation-building conflicts revolved around the issues of national identity and ethnic cooperation and coexistence (Ramet 2006). The second line is more concerned with economics and is between socialism and liberalism. It is rooted in what was for many people an equally traumatic experience of transition from a socialist, planned economy to a deeply flawed version of a market-oriented economy. This entailed a withdrawal of the government from significant sectors of the economy and a phasing out of many social services. Virtually all conspiracy theories that have a high level of social acceptance in Southeast Europe are rooted in either the nationalist or the socialist narrative of the contemporary history of the region (Blanuša 2011). In that sense, Southeast Europe fits rather well with the pattern observed throughout post-socialist Eastern Europe. Conspiracy theories rooted in nationalist and socialist narratives in the region have been grafted onto the older conspiracy theories rooted in anti-Semitism to explain everything from the economic transition to globalization and integration in the European Union, particularly during the most recent period of democratic backsliding (Astapova et al. 2021). We find this dominance of nationalist and socialist narratives in conspiracy theories in Southeast Europe unsurprising for two reasons.

The first reason stems from one characteristic the ideological worldviews of nationalism and socialism share. Despite many and obvious differences between these ideologies, they both see the world in terms of a conflict between out- and in-groups (Clarke 1991; Papini 1973; also see Vincent 2013; Brown 2013). Both nationalism and socialism "socialize" people to the idea that there is a potentially threatening outgroup, making them susceptible to conspiracy beliefs that are, in essence, us-versus-them depictions of the world. The second reason why we find it unsurprising to find nationalist and socialist conspiracy theories with a broad appeal in this region has to do with these two ideologies in their regional context, in particular with the way people have rationalized the recent past and their own roles in it. It is much easier to believe that, for example, Yugoslav socialism or the nationalist schemes of one's own national leaders failed due to concerted efforts by Western powers, than it is to believe that one had individual or collective responsibility. All of this suggests to us that the nationalist (as opposed to cosmopolitan) and socialist (as opposed to liberal) ideological camps would be more disposed to subscribe to coronavirus conspiracy theories because of their general, as well as contextually specific, conspiratorial worldviews.

Determining whether individuals hold conspiracist views is obviously important in and of itself. A growing body of research is shedding light on the everyday manifestations of conspiracy beliefs through the study of discourse. Scholars have used a variety of methodological approaches—from ethnographic interviews (e.g. Abalakina-Paap et al. 1999) to quantitative analysis of tweets using expert coding and various natural language processing (NLP) tools (e.g. Faasse, Chatman, and Martin 2016; Gerts et al. 2021; Wood 2018). While there is consensus that conspiracy believers and nonbelievers use different language and rhetorical strategies when discussing conspiracy theories, findings are highly context- and topic-specific. What stands out

to us as the task for future scholarship is identifying how the narratives of blame and responsibility are constructed and how they reverberate across different communities.

Considering the state of the scholarship on (the politics of) conspiracy theories presented here, however briefly, our principal empirical expectations regarding coronavirus conspiracy beliefs are as follows. First, we expect to find coronavirus conspiracy beliefs more likely among individuals of lower social status and education. We also expect coronavirus conspiracy beliefs to be more likely among consumers of social media, as opposed to consumers of mainstream media. Furthermore, we expect coronavirus conspiracy beliefs to be more prevalent among individuals harboring fears about the pandemic's impact on the economic situation. We also expect coronavirus conspiracy beliefs to be less prevalent among individuals knowledgeable about the pandemic and about politics in general. In light of the nature of the principal dividing lines in political ideology in Southeast Europe, we expect coronavirus conspiracy beliefs to be more prevalent among those espousing nationalist political views as well as among those supporting socialist economic policies. Aside from the sociodemographic and political determinants of coronavirus conspiracy beliefs, we also expect these beliefs to structure people's social connections. In other words, we expect to find evidence of social connections being determined by agreement on coronavirus conspiracy beliefs. And finally, we are keen to shed light on the differences we expect to find in the discourse used by coronavirus conspiracy believers and nonbelievers when they discuss the pandemic.

Survey Design and Social Network Data

We study people's beliefs in coronavirus conspiracies by relying on a representative survey of citizens of Bosnia-Herzegovina, Croatia, and Serbia conducted between April 27 and May 16, 2020. Figure 1 shows the evolution of the coronavirus crisis in the three countries between the first reported case on February 26 and the end of our survey period on May 16, 2020. As the coronavirus response *Stringency Index* (Roser et al. 2020) figures demonstrate, the governments of the region reacted quickly and resolutely with restrictive measures, resulting in a comparatively mild first wave of cases during March and April. All three countries, and in particular Bosnia-Herzegovina and Croatia, had much lower case and fatality numbers than their West European neighbors. The sharp economic downturn, however, brought the relaxation of measures in May and June and an accompanying stronger second wave in the summer, with a further explosion of cases in October and November, as well as strong and highly lethal further waves.

Survey participants were gathered via an online panel platform that used Facebook as a login tool for respondents.[3] Using Facebook enabled us to target ads aimed at specific demographic groups and subpopulations, increasing the effectiveness of the quota sampling process.[4] This approach has been found to be capable of producing samples similar to national probability samples (Zhang et al. 2020)—something we were also able to achieve. This is clearly visible in our detailed network analysis, which follows a power law distribution.[5] Our efforts resulted in a sample of 7,105 respondents: 2,219 from

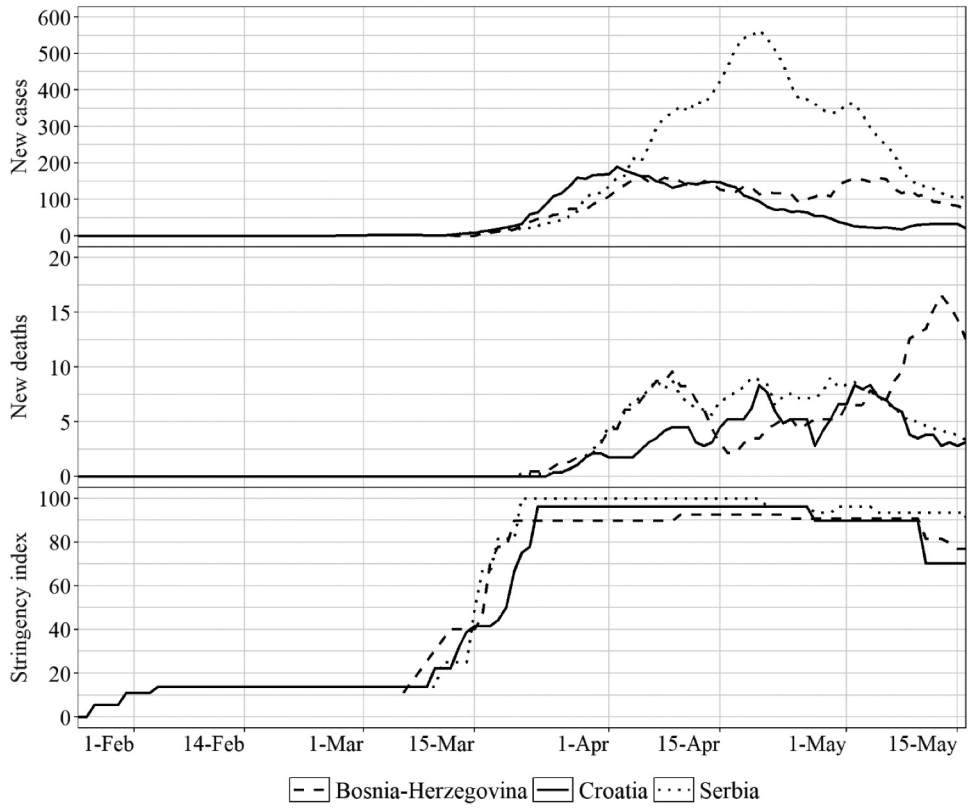

Figure 1. Daily spread of Coronavirus cases and policy responses in Bosnia-Herzegovina, Croatia, and Serbia.

Bosnia-Herzegovina, 2,282 from Croatia, and 2,604 from Serbia.[6] To remove any remaining differences between the composition of the samples and the populations, we apply survey weights (Ansolabehere and Rivers 2013) in all analyses, making our approach directly comparable to conventional survey research.[7]

Recruiting survey participants using our methodology allowed us to collect not only fully anonymized survey responses, but also information on whether respondents were Facebook friends or not. In other words, we did not have access to respondents' full social networks, but only to information regarding whether they were connected to any of the other participants in the survey. Collection of this anonymized data took place only upon users' personal approval. It satisfied Facebook terms and conditions as well as pertinent legislation in the three countries and the European Union.[8] We graphically represent the network structure of our survey respondents whose nodes are colored differently depending on their country of origin in the online appendix Figure A1. Researchers interested in explaining the formation of social ties have in the past largely relied on three approaches: (1) asking survey respondents to identify their friends and the friends' characteristics (e.g. Bond and Sweitzer 2022)—a cognitively demanding and biased procedure; (2) only collecting network data and deriving people's characteristics from limited and deeply flawed proxies (e.g. Boutyline and Willer 2017); and (3) using survey and network data of completely separate samples (e.g. Bridgman et al. 2021). Our research design is clearly superior as it allows us to collect reliable network and survey data from the same sample of respondents.

Since our goal was also to explore the prevailing discourse concerning the pandemic, our survey collected both discrete answers and textual data focused on assigning blame for the coronavirus crisis. Specifically, we asked respondents who they believed was responsible for the outbreak of the pandemic and then we encouraged them to elaborate their answers in their own words. Our unique survey design thus enables us to complete the three tasks we set out in the introductory section: identify the determinants of conspiracy beliefs, establish the relationship between conspiracy beliefs and social network connections, and expose the discursive manifestations of conspiracy beliefs.

Determinants of Coronavirus Conspiracy Beliefs in Southeast Europe

We measure people's belief in coronavirus conspiracies using responses on a five-point Likert scale to four conspiracy statements: (1) There is already a cure/vaccine for coronavirus but the pharmaceutical industry does not want to release it yet; (2) Coronavirus is a bioweapon engineered by the Chinese government to wage war on America and the West; (3) Coronavirus is a bioweapon engineered by the CIA to wage war on China; and (4) Coronavirus is a hoax—there is no such thing as a global pandemic. These four conspiracy statements were chosen because they were the most prominent in the region's public discourse at the time. We follow the lead of a number of other studies examining people's conspiracy beliefs (e.g. Miller, Saunders and Farhart 2015; Jolley, Douglas, and Sutton 2018; Stoica and Umbreş 2021) and combine respondents' answers into a composite variable, hereafter referred to as *Coronavirus conspiracy beliefs*, by adding them up (i.e. the values of *Coronavirus conspiracy beliefs* go from 0 for respondents who strongly disagree to 16 for those who strongly agree with all four statements).[9] Figure 2 shows the proportion of respondents who believe in each of the four conspiracy theories, with the conspiracy theories regarding the vaccination and the very existence of the coronavirus having the highest level of support. Taken together, 53.6 percent of respondents from Bosnia-Herzegovina, 47.3 percent of respondents from Croatia, and 49.9 percent of respondents from Serbia believe at least one of the four conspiracy theories. Interestingly, these figures are similar to those observed in the United States (Stecula and Pickup 2021a).

We test our propositions outlined in the section on the literature on conspiracy beliefs by building four ordinary least-squares (OLS) models focusing in turn on respondents' (1) socio-demographics, (2) media consumption, (3) views of the coronavirus crisis, and (4) political views. Our models account for respondents' standard socio-demographic characteristics: gender, age, education, income (deciles), employment status, and health condition. We model media consumption as a string of binary variables taking the value of 1 for respondents who get their news often or daily from (1) newspapers, (2) television, (3) news websites, (4) radio, and (5) social media. Respondents' views on the coronavirus crisis are captured by

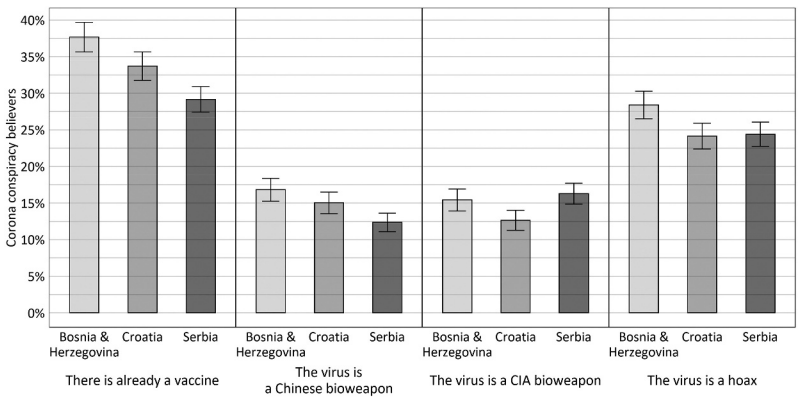

Figure 2. Prevalence of Coronavirus conspiracy beliefs.

two variables. First, guided by past research, which posited that people's attitudes toward conspiracy theories might be affected by their perception of economic threat (Parsons et al. 1999), we asked respondents whether they believed the economic situation had gotten worse due to the virus. And second, to test the proposition that knowledge of a topic makes people less susceptible to conspiracy theories about that topic, we include the variable *Coronavirus ignorance*. We asked respondents to state how many official cases there were in their country up until the day they were filling out the survey. At the time when our survey was conducted, this figure dominated local press coverage and was the only easily quantifiable figure (in addition to the number of deaths) in broad use across the region. *Coronavirus ignorance* represents the ln-transformed absolute difference between this figure and the actual official number of cases in the respondent's country. The fourth set of explanatory variables comprises people's political views, which we capture with four variables looking at respondents' stance on the cosmopolitanism–nationalism and liberalism–socialism dimensions, their support for the party/parties in power, and their interest in politics in general. The variables *Nationalism* and *Socialism* were thus obtained by averaging responses on a Likert-scale to a set of five policy statements for each dimension (see Table A1 in the online appendix).[10] Lastly, because our sample spans multiple countries, we include country dummies in all models. Also, because the Corona crisis was rapidly evolving, with new developments happening every day that might affect responses, all models include day dummies. We realize the limitations of our approach when it comes to causal inference, but the fast pace in the evolution of the crisis, its relative suddenness, and its very nature disabled us from utilizing a different research design. Descriptives of all variables are presented in Table A2 and their correlation matrix in Table A3 in the online appendix.

Table 1 shows the results of our analysis, with the models progressively expanding to include new batteries of variables. Model 1 with the socio-demographic baseline shows that beliefs in coronavirus conspiracies are likelier among women, respondents with lower education, and respondents with lower incomes. These findings confirm our expectations outlined above and are in line with other preliminary findings regarding coronavirus conspiracy beliefs (e.g. Sallam et al. 2020) as well as a string of past studies showing that conspiracy theories are more prevalent among people with lower social status (Mancosu, Vassallo, and Vezzoni 2017; Oliver and Wood 2014; Uscinski and Parent 2014). Here we should note that we examined the possibility of a non-linear relation between income and conspiracy beliefs in two ways. First, by including an $Income^2$ term in the model, and second, by including all but the first income decile as a dummy variable in the model. Both approaches did not change the result of the analyses, with nothing pointing to a non-linear relation between income and beliefs in coronavirus conspiracies.

The media consumption battery of variables introduced in Model 2 shows that respondents frequently getting their news from television were less likely to believe in conspiracy theories, whereas respondents frequently getting their news from the social media were more likely to believe in conspiracy theories. Television stations in the region have been

Table 1. Determinants of Coronavirus Conspiracy Beliefs

	Model 1			Model 2			Model 3			Model 4		
	B	S.E.	β	B	S.E.	β	B	S.E.	β	B	S.E.	β
Gender	0.23	0.10**	0.03	0.24	0.10**	0.04	0.24	0.10**	0.04	0.19	0.09**	0.03
Age	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00*	0.02
Lower education (ref.)												
Middle education	−0.34	0.11***	−0.05	−0.36	0.11***	−0.05	−0.30	0.11***	−0.04	−0.13	0.11	−0.02
Higher education	−0.87	0.12***	−0.09	−0.88	0.12***	−0.09	−0.78	0.12***	−0.08	−0.49	0.12***	−0.05
Income	−0.08	0.02***	−0.07	−0.09	0.02***	−0.07	−0.08	0.02***	−0.07	−0.05	0.02***	−0.04
Full-time employed (ref.)												
Part-time employed	−0.31	0.17*	−0.02	−0.31	0.17*	−0.02	−0.38	0.17**	−0.03	−0.37	0.17**	−0.03
Unemployed	−0.03	0.13	0.00	−0.02	0.13	0.00	−0.09	0.13	−0.01	−0.09	0.12	−0.01
Self-employed	0.03	0.37	−0.01	0.06	0.37	−0.01	−0.04	0.40	−0.01	−0.04	0.38	−0.02
Retired	−0.15	0.18	−0.01	−0.14	0.18	−0.01	−0.10	0.18	−0.01	−0.17	0.17	−0.01
Stay-at-home spouse	−0.12	0.18	−0.01	−0.10	0.18	−0.01	−0.11	0.18	−0.01	−0.14	0.18	−0.01
Pupil, student	−0.42	0.40	−0.01	−0.43	0.39	−0.01	−0.49	0.41	−0.01	−0.28	0.45	−0.01
Sick, disabled	−0.54	1.10	0.00	−0.50	1.13	0.00	−0.62	1.15	0.00	−0.58	1.19	0.00
Newspapers				0.12	0.14	0.01	0.11	0.14	0.01	0.05	0.14	0.00
Television				−0.41	0.10***	−0.06	−0.38	0.10***	−0.06	−0.45	0.10***	−0.07
Websites				0.02	0.13	0.00	0.05	0.13	0.01	0.12	0.12	0.01
Radio				0.10	0.11	0.01	0.10	0.11	0.01	0.08	0.11	0.01
Social media				0.33	0.15**	0.03	0.30	0.15**	0.03	0.31	0.14**	0.03
Economic situation got worse							0.61	0.10***	0.09	0.55	0.10***	0.08
Coronavirus ignorance							0.18	0.02***	0.12	0.17	0.02***	0.11
Nationalism										0.87	0.07***	0.19
Socialism										0.62	0.09***	0.10
Political interest										−0.06	0.02***	−0.06
Voted for government party										−0.03	0.13	0.00
Constant	7.15	0.30***		6.96	0.32***		5.46	0.36***		0.91	0.49*	
n		7105			7105			7105			7105	
Time controls		Yes			Yes			Yes			Yes	
Country controls		Yes			Yes			Yes			Yes	
Adjusted R^2		2.46%			2.87%			4.77%			9.59%	

Note: OLS regression; *p < 0.10; **p < 0.05; ***p < 0.01

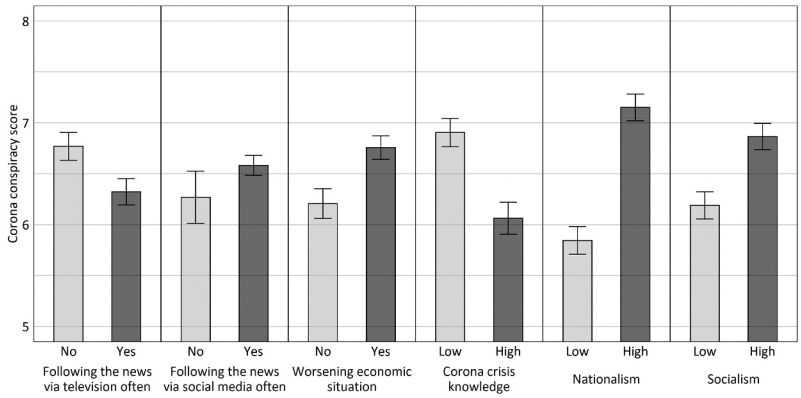

Figure 3. Marginal effects of principal explanatory variables on Coronavirus conspiracy beliefs.

notoriously biased and susceptible to pressure by political power holders (Peruško, Vozab, and Čuvalo 2020), but during the early stages of the coronavirus pandemic they performed their essential function rather well. The frequent consumers of news distributed on social media being more likely to believe in conspiracy theories, on the other hand, is in line with our expectations and with a growing body of work showing that social networks can be a fertile breeding ground for conspiracy theories (Jang, Lee, and Shin 2019; Jensen et al. 2021; Stecula and Pickup 2021b). It also closely mirrors other early findings suggesting that those who rely on social media for news are more likely to believe in coronavirus conspiracies than the users of traditional news sources (De Coninck et al. 2021).

In Model 3, we introduced two variables capturing respondents' knowledge of and views about the coronavirus crisis: *Economic crisis got worse* and *Coronavirus ignorance*. Both variables were highly statistically significant and in the expected direction. Respondents who believed that the economic situation was getting worse were more likely to believe in conspiracy theories, and those who were knowledgeable about the crisis (i.e. the value of *Coronavirus ignorance* was lower) were less likely to believe in them. One standard deviation decrease in *Coronavirus ignorance* (equal to 2.25) lowered the *Coronavirus conspiracy beliefs* by 0.41.

Finally, in Model 4 we introduced four variables capturing respondents' political views. There is a long line of research showing that (political) conspiracy beliefs can be guided by so-called "motivated reasoning" of partisanship (Edelson et al. 2017; Enders, Smallpage, and Lupton 2018; Miller, Saunders, and Farhart 2015). None of the four coronavirus conspiracy theories, however, was directly related to the parties in power or any other domestic players in the three countries. This guided us to be agnostic regarding whether voters of the ruling parties were more or less likely to believe in them. The lack of statistical significance for the variable *Voted for government party* in Model 4 suggests we were correct to be ambivalent on this issue. The three remaining political variables, however, are highly statistically significant and substantively important. We posited that political interest, as a proxy for political knowledge, should lower the propensity for conspiracy beliefs. Model 4 results show our expectation was correct, although the effect is substantively small: an increase in one standard deviation in political interest (3.25) leads to a decrease in *Coronavirus conspiracy beliefs* (SD = 3.41) of only 0.13.

The results for the variables *Nationalism* and *Socialism*, however, are substantively much larger. As discussed above, we believe the cosmopolitanism–nationalism and liberalism–socialism dimensions perfectly encapsulate the essence of ideological cleavages in Southeast Europe, with people on the right edge of the cosmopolitanism–nationalism spectrum and left edge of the socialism–liberalism spectrum being most likely to harbor conspiracist grievances against enemies real and imagined, foreign and domestic. This led us to expect the variables *Nationalism* and *Socialism* to have a positive effect on *Coronavirus conspiracy beliefs*. Results presented in Model 4 show that expectation to have been correct. Both *Nationalism* and *Socialism* are highly statistically significant and in the expected direction. Respondents holding a nationalist, as opposed to cosmopolitan, worldview and respondents holding socialist, as opposed to liberal, economic views, are more likely to believe in coronavirus conspiracy theories. In our view, this finding is a particularly poignant and instructive sign regarding politics and policymaking in the near future in the region, especially if the crisis continues and deepens. We present the marginal effects of these two variables, as well as the principal explanatory variables introduced in Models 2 and 3, graphically in Figure 3.

Coronavirus Conspiracy Beliefs and Social Network Bubbles

Conspiracy theories do not arise or spread in a vacuum. They are products of social interactions and highly dependent on the connections among people who do and do not believe in them. We do not know, however, whether conspiracy beliefs are a significant factor in structuring people's interpersonal connections, particularly on social media where many contemporary conspiracy theories have found fertile ground. In other words, are there tendencies to disproportionally connect to people who share similar views on conspiracy theories? The data we collected allow us to answer those questions.

To test whether conspiracy beliefs are an important factor in structuring people's social media connections, we ask what factors affect the odds of two people from our sample being Facebook friends. These odds are estimated via an exponential random graph (ERG) model. While one might be tempted to use a logistic model, given the nature of the dependent variable (the presence of a Facebook friendship (1), or its absence (0)), such a model requires social ties to be independent. This assumption is untenable, as some individuals might be more popular and accumulate more friendships over time, or two people could be friends because of a mutual friend. An ERG model can be considered a logistic regression in which terms are added that account for the interdependence between the observations or the endogenous aspects of the network (Cranmer et al. 2017; Morris, Handcock, and Hunter 2008). The discovery of the endogenous terms is a trial-and-error approach whereby terms are added and removed based on their contribution to the overall model fit and the avoidance of model degeneracy[11] (see Goodreau 2007). This process resulted in an ERG model with a term for node popularity.[12]

Our principal explanatory variable measures the distance of coronavirus conspiracy beliefs between two respondents, for which we use the earlier explained *Coronavirus conspiracy belief* variable. Specifically, we take the absolute difference between the scores of two respondents. This results in a variable that takes on low values when two respondents have similar stances toward coronavirus conspiracy theories and high values when their views differ. We progressively expand our binomial regression model to include batteries of other congruence variables, capturing in turn sociodemographics, whether two respondents are of the same gender, age distance, education (distance between education levels), income (distance between income deciles); whether they come from the same country and area (with the same zip code); political ideology (the distance between respondents in terms of views on cosmopolitanism–nationalism and liberalism–socialism); and social media use (whether respondents both use social media as a news source often). Our design and the quality of the data we collect thus allows us to make far more robust conclusions than other attempts at the study of the networks of spread of coronavirus conspiracy theories where most personal and contextual characteristics of the individuals in question are unknown (e.g. Ahmed et al. 2020; Jarynowski, Wójta-Kempa, and Belik 2020). For the interpretation of the model, it is important to note that for distance measures (conspiracy beliefs, political ideologies, education level, age, and income), *negative* coefficients point to a tendency of the respondents to connect to people similar to them, while for the other measures *positive* coefficients indicate the same.

As is visible from Table 2, which presents the results of our analysis, *Congruence of conspiracy beliefs* is a statistically significant determinant of respondents' social network connection and is robust to the inclusion of all other variables. People of similar views regarding coronavirus conspiracy theories are more likely to be friends (or, conversely, friends are more likely to have similar views of coronavirus conspiracy theories). Our finding adds credence to the views of those who suggest that conspiracy theories do not spread indiscriminately through social media, but rather stay confined to communities of people already prone to believe them (DeWitt, Atkinson, and Wegner 2018; Metaxas and Finn 2017). In other words, the data suggest that beliefs in conspiracy theories play a significant role in shaping people's social ties. This effect is all the more remarkable when compared to other variables capturing people's world and policy views such as *Nationalism* and *Socialism* (see below). Figure 4, using data from the full Model 4, shows this relationship graphically: similarity in coronavirus conspiracy beliefs increases the probability of a Facebook connection. Our findings regarding other explanatory variables are also noteworthy. As could be expected, two respondents are more likely to be connected if they are of the same gender; if they are of similar age, education, or income; if they come from the same country and zip code; and if they use social media as a news source. They are also more likely to be friends if they share similar political views on nationalism versus cosmopolitanism—clear evidence that political bubbles of the like-minded are a fact of people's online lives in Southeast Europe, just as they are in the United States (Barberá 2015; Boutyline and Willer 2017; Halberstam and Knight 2016). However, views on economic policy (socialism vs. liberalism) do not affect the formation of friendship ties. Regardless, it is

Table 2. Determinants of a Social Network Connection

	Model 1			Model 2			Model 3			Model 4		
	B	S.E.	β	B	S.E.	β	B	S.E.	β	B	S.E.	β
Congruence of conspiracy beliefs	−0.03	0.01**	−2.76	−0.02	0.01*	−2.56	−0.02	0.01*	−2.25	−0.02	0.01*	−2.23
Gender				0.24	0.06***	4.15	0.23	0.06***	4.01	0.22	0.06***	3.85
Age				−0.06	0.00***	−16.99	−0.06	0.00***	−16.48	−0.06	0.00***	−18.24
Education				−0.28	0.04***	−7.26	−0.27	0.04***	−6.77	−0.27	0.04***	−6.34
Income				−0.06	0.01***	−5.08	−0.06	0.01***	−4.39	−0.06	0.01***	−4.54
Country				2.39	0.09***	26.42	2.38	0.09***	25.30	2.38	0.09***	25.39
Zip code				2.12	0.06***	37.28	2.13	0.06***	33.41	2.09	0.07***	29.35
Nationalism							−0.13	0.05**	−2.79	−0.14	0.04***	−3.22
Socialism							−0.06	0.06	−0.99	−0.06	0.06	−1.11
Social media as news source										0.34	0.07***	4.66
Alternating K-stars	1.93	0.08***	25.38	1.78	0.07***	23.97	1.77	0.08***	22.96	1.77	0.08***	22.40
Constant	−11.09	0.07***		−11.67	0.13***		−11.55	0.13***		−11.79	0.15***	
N (respondents)		7105			7105			7105			7105	
Δ AIC		−6			−2907			−2943			−2919	

Note: ERG model; *p < 0.05; **p < 0.01; ***p < 0.001; Δ AIC compares the model to one with only the endogenous terms

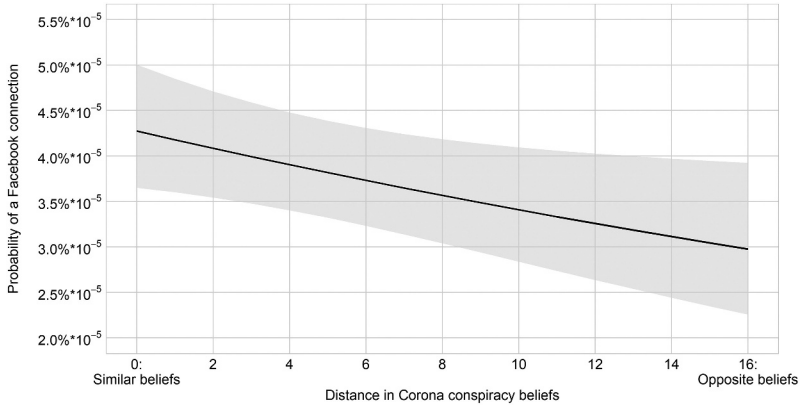

Figure 4. Similarity in Coronavirus conspiracy beliefs and being connected on Facebook.
Notes: Gray area represents the 95% confidence interval; when calculating the marginal effects, all other variables are kept at their mean.

clear that we seek online what we seek in real life: people like us. This includes people who hold the same beliefs about conspiracies.

Assigning Blame: Conspiracy (Non-)Believers' Coronavirus Discourse

After shedding light on the prevailing personal characteristics of believers in coronavirus conspiracies and demonstrating that their beliefs have an important influence on their social networks, we turn toward the most obvious expression of people's conspiracy beliefs: their discourse. To explore the prevailing discourse concerning the pandemic, our survey collected discrete answers and textual data focused on assigning blame for the coronavirus crisis. We first asked respondents who they believed was responsible for the outbreak of the pandemic and then we encouraged them to elaborate their answer in their own words. As we are interested in comparing the prevailing patterns in discourse of those who believe in conspiracy theories and those who do not, we split the sample in two halves, based on self-reported beliefs in conspiracy theories. One half of the sample consists of respondents who agree or strongly agree with at least one of the four conspiracy theories ("believers"), and the other half consists of all others ("nonbelievers"). Figure 5 compares the prevalence of different answers of conspiracy believers and nonbelievers to the question of who was to blame for the pandemic. The contrast is immediately apparent. Respondents who do not believe in conspiracy theories were far more likely to assign blame to individuals who do not follow epidemiological measures or to globalization. Believers in conspiracy theories, on the other hand, were far more likely to blame international actors like China or the World Health Organization (WHO).

Respondents were given the opportunity to explain their answers at more length. We collected textual responses written in Bosnian-Croatian-Serbian (BCS) from 5,530 participants. Although relatively small, we believe this is a consistent corpus summarizing the prevailing discourse regarding the coronavirus crisis. We cleaned and processed the corpus using software tools for Bosnian/Croatian/Serbian (Ljubešić, Erjavec, and Fišer 2016; Straka, Hajič, and Straková 2015). The post-processed corpus contains 4,924 texts with 8,584 unique words and 53,863 tokens. We finally split the corpus into two halves between the believers and the nonbelievers. Each sub-corpus was analyzed separately in order to identify prevailing patterns in conspiracist/non-conspiracist discourse. Due to the size of the overall corpus, its monothematic nature, and the characteristics of the analyzed languages, we explore discourse with models based on word colocations. More specifically, we build two models based on pairwise correlations computed among words

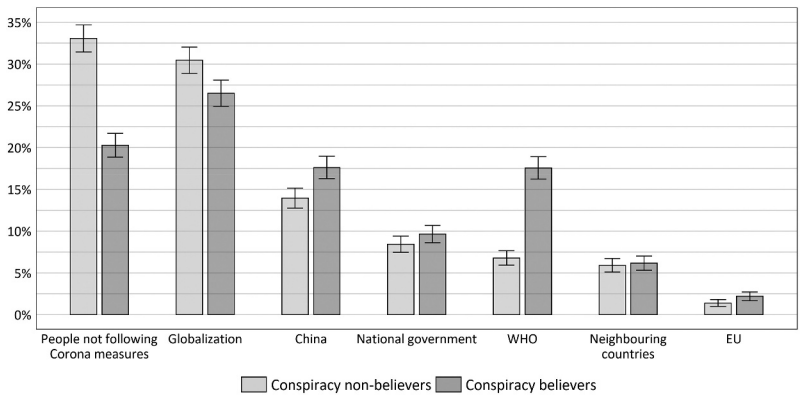

Figure 5. Coronavirus culprits in the eyes of Coronavirus conspiracy (non-)believers.

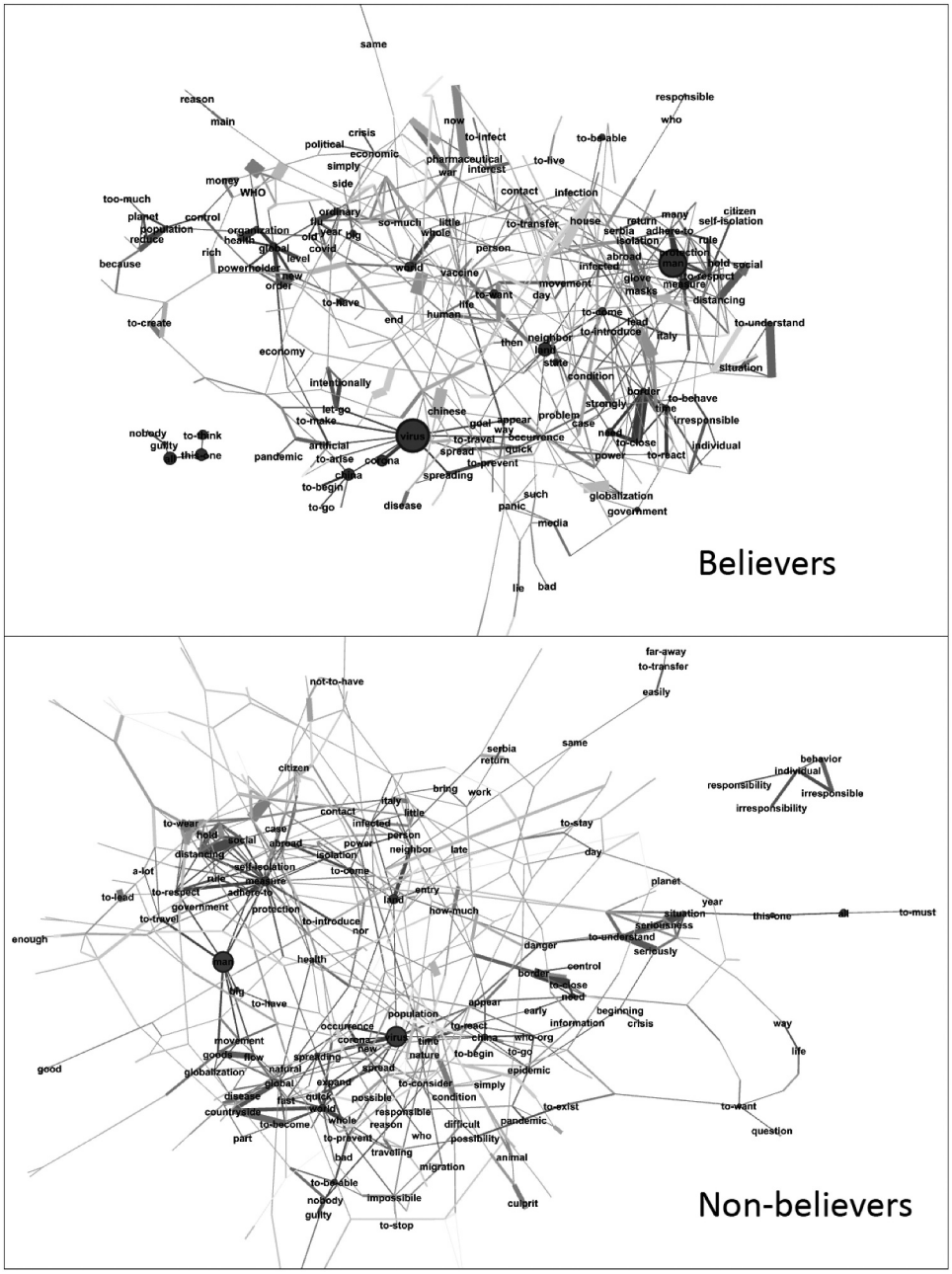

Figure 6. Discourse of blame among Coronavirus conspiracy (non-)believers.

(using phi coefficients), which indicate how often they appear in a sentence together relative to how often they appear separately. In order to do that, we use the part-of-speech tags with detected sentence borders to split the answers into sentences as a natural unit for words' co-occurrences. The analysis returns a list of dyads of co-occurring words with phi coefficients indicating how empirically consistent they are. As listing tens of thousands of word dyads would be highly impractical, we apply a network approach in order to capture the complexity of discourse on a macro level (visualizing pairs of words with phi coefficient ≥ 0.1). We present our findings graphically in Figure 6, where the size of the nodes refers to words' document frequency, color hue visualizes words' absolute rank in an ordered frequency list, and edge thickness depicts consistency of how words co-occur together (phi coefficient). Both graphs show labels for words that are among the first 150 most frequent words in the respective sub-corpus.

As we can see, the difference in discourse of blame among users who believe in conspiracy theories and those who do not is stark. Conspiracy believers particularly comment on three major subjects: (1) complaints regarding epidemiological measures (cluster around the word "man"); (2) the supposedly artificial origin of the pandemic in China (cluster around the word "virus"); and (3) various global conspiracies (cluster around the word "WHO"). These two latter clusters are particularly notable. A sizable group of respondents not only sees the virus as Chinese in origin, but also believes it to be man-made [artificial, to make] as well as intentionally distributed [intentionally, let go, goal,

spread]. As a 29-year-old conspiracy believer from Croatia put it, "China is to blame because the virus 'escaped' from their lab, whether accidentally or deliberately. I think it spread accidentally, but that it was manufactured and not transferred from an animal. And when everything happened, they did not institute measures in a timely way. [. . .] It's all planned." Final comment: "I am no conspiracy theorist." The cluster around the acronym WHO, on the other hand, reveals that people believing in conspiracy theories talk about topics such as population reduction [planet, population, reduce], financial and political interests [money, rich, control, powerholder], international system of power [global, world, order], or even biological warfare at the hands of the pharmaceutical industry [war, pharmaceutical, interest], with the WHO being an important part of the conspiracy. In the words of one characteristic conspiracy believer, a 57-year-old respondent from Serbia: "The WHO is financed by various global billionaires. Many of them are also in the pharmaceutical business. It seems the WHO is extending the duration of the pandemic to justify the sale of vaccines."

The graph built from answers given by those who do not believe in conspiracy theories is clearly very different. The structure can be summarized into two larger and several smaller clusters, none of which refer to any obvious discourse of blame, although the question explicitly asked respondents to identify "culprits" for the pandemic. The cluster around the word "measure" in the upper left corner combines the narratives of responsibility [hold, to protect, to wear, to adhere] and protection [self-isolation, protection, isolation]. Unlike conspiracy believers whose discourse on epidemiological measures is filled with questioning and dismissal, the nonbelievers mainly lament people's lack of responsibility and appeal for discipline. In the words of a 50-year-old conspiracy nonbeliever from Serbia, "Travel to risk areas results in personal responsibility of the person in question to protect himself and not endanger others." The second cluster around the word "virus" summarizes the discourse of rather technical or even "blameless" causes and circumstances of the pandemic, such as migration and globalization [movement, goods, flow, global, traveling, migration]. As a 23-year-old conspiracy nonbeliever from Bosnia-Herzegovina characteristically put it, "Even before the first case of infection in BIH, government institutions prepared for a possible state of emergency and started implementing measures in a timely fashion. In spite of the existence of these measures, people did not follow them, which contributed to the rise in the number of infections. Globalization certainly contributed to the pandemic, but I am not looking for culprits in other countries." In many ways, this answer epitomizes the differences between the discourses used in the two sub-corpora: one trying to find meaning and order by blaming usually distant and hidden actors, and the other focusing on personal responsibility and problems in the immediate environment.

Conclusions

Coronavirus has wreaked havoc on the world. By the end of 2021, preliminary excess mortality figures suggest that likely more than ten million people have died because of the virus. Economic activity decreased significantly. Whole industries teetered on the verge of collapse. The global recession has the potential of turning into a depression with exploding inflation that could have devastating social and political consequences. Combating the spread of the virus, as well as successfully addressing the consequences of the pandemic, is not possible in polities whose citizens subscribe to conspiracy theories. As a long line of studies—including preliminary research on the coronavirus—have shown, conspiracy believers do not engage in socially safe and responsible behavior during public health crises (Douglas et al. 2019; Imhoff and Lamberty 2020; Plohl and Musil 2020). The comprehensive analysis presented in this article advances our understanding of popular views of the coronavirus crisis, their potential channels of spreading, and their discursive manifestations.

Using an innovatively designed and executed survey, we improve our grasp of coronavirus conspiracy beliefs in three countries of Southeast Europe whose societies are particularly vulnerable to the detrimental effects of both the virus and conspiracy theories. We demonstrate that conspiracy beliefs are more prevalent among people with lower education and income—that is, those with lower social status. We also demonstrate the significance of media consumption, with respondents getting their news from television being less and those getting their news from social media being more likely to subscribe to conspiracy beliefs. Our analysis also shows the importance of people's perceptions of coronavirus's impact on the economic situation, with those who see the economy suffering being more susceptible to coronavirus conspiracy theories. What is particularly important, we show the clear connection between respondents' ideological commitments and conspiracy beliefs. In the context of contemporary Southeast Europe, we find respondents subscribing to nationalist (as opposed to cosmopolitan) and socialist (as opposed to liberal) ideologies more likely to subscribe to coronavirus conspiracy beliefs. We find this result of our research in particular to be an instructive sign for the near political future in the region and Europe in general, if the crisis continues and deepens.

The nature of our research design allowed us, however, to move beyond the study of determinants of conspiracy beliefs and to show that people's conspiracy views significantly determine their social connections and the nature of their discourse related to the coronavirus crisis. Even when controlling for virtually all criteria commonly believed to affect people's social connections, we show that people are more likely to be connected to those who share their coronavirus conspiracy views, implying that both conspiracy believers and nonbelievers often inhabit bubbles of the like-minded. This is an important lesson not only for the study of conspiracy beliefs in general, but also for the study of political communication and public health policy in times of crisis. Moreover, on the discursive level, we show conspiracy believers and nonbelievers to be starkly different. Believers are keen to blame actors who are often hidden and distant, and nonbelievers are focused on finding immediate solutions through personal responsibility and addressing problems in the immediate environment. In our view, if the world is to come out of the coronavirus crisis safely, the challenge for all societies facing the pandemic will be to keep political, economic, and public health decision-making resistant to the conspiracist discourse of blame and driven by a focus on solutions and personal responsibility.

Notes

1. The technical aspects of the survey were implemented by the company Oraclum Intelligence Systems Ltd. (oraclum.co.uk) and hosted on the dedicated platform survey.oraclum.co.uk. What is crucial to note here is that all personal information was anonymized first by Facebook, and then further encrypted by Oraclum. That means that no one from Oraclum nor from our research team could identify individual respondents. The anonymized survey responses were stored on the secure servers of Oraclum (i.e. Facebook did not have access to that data) for the duration of the survey and subsequently deleted after they were turned over to our team. Full details regarding survey design, content, security, approvals by various relevant bodies, as well as the full survey questionnaire and privacy policy and consent form users had to agree to in order to participate in the survey are provided in the online appendix at elwar.uni.lu/publications.
2. For a comprehensive introduction to the various strands of research on conspiracy theories, see (Butter and Knight 2020).
3. According to www.internetworldstats.com, Facebook offers access to about half of the adult population of the three countries in question.
4. To this end, we identified 238 strata in Bosnia-Herzegovina, 294 in Croatia, and 400 in Serbia according to several demographic characteristics (gender, age, level of education, and region/county) using the data from the most recent censuses in the three countries made publicly available by the three national bureaus of statistics.
5. Our user network's degree distribution deviates from a typical Facebook network (Ugander et al. 2011) because users were pooled into the survey randomly. This becomes obvious while observing the clustering coefficient. Random networks have a property that the local clustering coefficient of a node is independent of the node's degree (e.g. Barabási 2016). Real social networks do not behave like this. Instead, their local clustering coefficient is dependent on the node's degree, with typically larger degree nodes having a smaller clustering coefficient than smaller degree nodes. Indeed, our network shows a clear tendency to stay almost constant (variability increases for higher degrees due to a smaller number of nodes with such high degrees), until the degree reaches about 60, when it finally starts to drop (where 1–4 nodes exist for a given degree). Essentially, our network has a tendency to be random as its clustering coefficient oscillates around a constant value. Detailed results on the power law distributions available upon request from the authors.
6. The total sample consisted of 9,108 respondents: 2,865 from Bosnia-Herzegovina, 2,956 from Croatia, and 3,287 Serbian respondents. Of those, 2,003 respondents had to be dropped due to missing information or because they filled out the survey too fast. Following standard practice for online surveys (eg. Šrol, Mikušková, and Čavojová 2021), we instituted 18 time checks throughout the survey, indicating how fast respondents had answered all the questions on a page. Per time check, respondents were given a "speeding ticket" when they belonged to the top 5 percent of the fastest respondents. Respondents who accumulated more than five speeding tickets were excluded from analysis. It is important to note that only 3.7% of respondents were excluded due to speeding and the vast majority of those who were dropped were respondents who failed to fill out the whole survey anyway.
7. Considering the extensive size of the pool of Facebook members in the region, as well as our quota sampling process and the application of survey weights, we find the prospects of the moderating effects of Facebook membership on the findings we present in this section limited at best. Such an effect would imply that the mere act of joining Facebook somehow invalidated or even overturned the direction of the impact of the different variables we test on conspiracy beliefs. We cannot conceive of a mechanism that would potentially explain such a dynamic and we therefore find it unlikely.
8. Here it is important to note that survey participants were asked to give direct consent to sharing their connections to other survey respondents in addition to separately giving direct consent to participating in the survey and having their answers analyzed for scientific purposes. The consent form and the survey privacy policy users had to agree to are also provided in the online appendix available at elwar.uni.lu/publications.
9. Because some of the conspiracy theories could be considered logically oppositional (but not necessarily in the eyes of those believing them), we tested whether there was an empirical basis for combining these conspiracy theories together. Factor analysis revealed only one factor driving the scores and the Cronbach's alpha indicated that the four items constitute a sufficiently reliable scale (> 0.7).
10. Factor analysis revealed both sets of items to be unidimensional. However, only *Nationalism* reached conventional levels of reliability (alpha > 0.7). Nevertheless, we believe the items in the *Socialism* index adequately capture people's views on the role of the government in the economy, and the higher degree of variability of the responses does not detract from this. In addition, when we reran the analyses with the reduced version of *Socialism*, which led to an improved scale, the results arrived at were substantively the same and statistically even slightly stronger.
11. Model degeneracy refers to a situation where a model's specifications fit the data so poorly that an effective estimation of the model becomes very difficult or even impossible. However, this is also an advantage, as poorly specified models cannot be fit (Cranmer et al. 2017).
12. Specifically, the models include an alternating k-star statistic, as proposed by Snijders et al. (2006).

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