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Ideological Extremism or Far-Right Attitudes? The Role of Ideology for COVID-19 Scepticism

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ABSTRACT

COVID-19 sceptics view the virus as harmless (i.e., not worse than a casual flu). While political orientation appears to play a crucial role in developing these sceptical positions, previous research showed inconsistent findings on the relationship between COVID-19 related beliefs and ideological orientation: Whereas various studies find close ties between far-right attitudes and COVID-19 related beliefs, other research suggests that sceptical views are linked to extremism on both ends of the ideological spectrum. We contribute to this debate by investigating the underlying ideological foundations of COVID-19 scepticism on a more fine-grained conceptualisation and measurement of ideological orientation and by focusing on a case with a prevalence of support for parties at both ideological fringes. Using data from a representative survey conducted in the East German region of Thuringia in autumn 2020, we show a strong significant link between far-right political attitudes and COVID-19 scepticism, as well as a weaker link between extremism on both sides of the ideological spectrum and scepticism.

KEYWORDS


COVID-19; Covid-19 scepticism; science scepticism; far-right

Introduction

The COVID-19 pandemic is accompanied by a spread of disinformation, leading the World Health Organization (WHO) director to conclude ‘we’re not just fighting an epidemic, we’re fighting an infodemic’ (WHO, 2020). Among the false information about the coronavirus, claims that negate or trivialise the threat posed by the virus have been prominent (Krings et al., 2021). Frequent claims are that the virus is not worse than a casual flu or that it is a hoax (Latkin et al., 2021a; Pennycook et al., 2022). Attitudes that deny or downplay the seriousness of the illness have been conceptualised as COVID-19 scepticism (Latkin et al., 2021a). Understanding the explanatory factors of these sceptic attitudes is of high relevance: COVID-19 sceptics endanger the successful containment of the virus since they are less likely to adopt preventive behaviour and more likely to oppose political measures to mitigate the pandemic (Latkin et al., 2021a; Reiser et al., 2021a; Rothmund et al., 2020)

COVID-19 sceptics also pose a serious challenge to representative democracy, despite the fact that in most countries a broad majority has supported the governments and

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lockdown measures (e.g., Bol et al., 2021; Dietz et al., 2021): There are indications that sceptic attitudes are linked to low trust in political institutions (e.g., Reinemann et al., 2020) and pandemic-related conspiracy beliefs (e.g., Bruder & Kunert, 2022; Rothmund et al., 2020; Uscinski et al., 2020). COVID-19 sceptics are also more likely to participate in anti-lockdown protests which took place worldwide (Carnegie Endowment, 2021), and it has been suggested that these anti-lockdown protests can provide fertile ground for radicalisation (Grande et al., 2021).

In particular, existing studies point to an important role of ideology in developing sceptical positions. However, previous research showed inconsistent findings on the relationship between COVID-19 related beliefs and political orientations: On the one hand, research indicates close ties between far-right ideology and COVID-19 beliefs (see Eberl et al., 2021; Grande et al., 2021; Richter et al., 2021). Such a link is plausible from a theoretical viewpoint since beliefs typically associated with the broader spectrum of far-right attitudes, e.g., Social Darwinism, anti-Semitism, and conspiracy beliefs, gained prominence during the pandemic (Amadeu Antonio Stiftung, 2021; Frenken et al., 2022; Löhr, 2020; Reiser et al., 2021b). On the other hand, it has been shown that sceptical views are not only linked to far-right attitudes but to ideological extremism on both ends of the ideological spectrum (e.g., Imhoff et al., 2022; Van der Linden et al., 2020 for conspiracy theories; Debus & Tosun, 2021 for vaccine scepticism). One possible explanation for this are high levels of mistrust in political institutions on both ends of the ideological spectrum. In line with this, research has also revealed that protests against COVID-19 mitigation measures have attracted participants from both the far-left and the far-right (Nachtwey et al., 2020; Salheiser & Richter, 2021).

In light of these diverging results, this article wants to contribute to further improve our understanding of how political ideology is related to COVID-19 scepticism. Due to the increasing ideological polarisation and the rise of populism in Europe and its impact on representative democracy (e.g., Bobba & Hubé, 2021; Huber & Schimpf, 2017; McCoy et al., 2018), understanding the ideological foundations of COVID-19 scepticism more closely is of high importance. Moreover, it is assumed that COVID-related scepticism is fuelled by similar factors than other forms of science scepticism (e.g., Dryhurst et al., 2020; Rutjens & van der Lee, 2020). Since science scepticism is on the rise and poses a challenge to democracy (e.g., Rutjens, Heine, et al., 2018), it is crucial to scrutinise the role of political orientations for sceptical beliefs.

In order to add knowledge to this emerging debate, the article wants to move beyond the existing research: While there are several empirical studies analysing the role of political orientations on COVID-19 related beliefs, most studies adopt a rather simple operationalisation of political ideology by using a left-right or conservatism-liberalism self-placement-scale (e.g., Grande et al., 2021; Latkin et al., 2021a; Scheitle & Corcoran, 2021). By introducing a more fine-grained conceptualisation and measurement of ideological orientation and by distinguishing more precisely between different aspects of ideology – far-right attitudes, ideological extremism, and party identification –, we want to disentangle the different facets of political orientation.

We study the ideological foundations of COVID-19 scepticism at the example of the East German region of Thuringia, a stronghold of both the populist radical right AfD and the Left party (Olson, 2018; Weisskircher, 2020). Moreover, the number of citizens holding far-right views is comparatively high (Reiser et al., 2021a). This prevalence of

support for parties at the ideological fringes in Thuringia offers an ideal opportunity to study the ideological foundations (far-right attitudes vs extremism on both ends of the ideological spectrum) of COVID-19 scepticism. Based on multivariate analyses, we find strong and robust support for a link between far-right attitudes and COVID-19 scepticism, as well as weaker support for a link between extremism on both ends of the ideological spectrum and COVID-19 sceptic beliefs.

Review of the Literature, Theory, and Hypotheses

There has been a growing interest and relevance to study the phenomenon of COVID-19 scepticism during the pandemic. According to a definition by Latkin et al. (2021a, p. 1), COVID-19 scepticism ‘can be conceptualized as the denial of the seriousness of the illness and the perception that the pandemic is overblown or a hoax’. However, there are indications of different types of COVID-19 scepticism. Using the conceptual work on climate change sceptics (Rahmstorf, 2004), one can distinguish between trend, attribution, and impact sceptics. With regard to the coronavirus, trend sceptics deny that there is a pandemic at all and see it as a hoax and as manufactured (see, e.g., Pennycook et al., 2022; Stanley et al., 2020). Attribution sceptics acknowledge the threat posed by the coronavirus but deny its natural origins and claim, for instance, that the virus was purposefully manufactured (e.g., Banai et al., 2022; Schaeffer, 2020). Impact sceptics see the virus as harmless, and typical beliefs include that the virus is seen as not worse than a casual flu (see, e.g., Banai et al., 2022; Latkin et al., 2021a; Pennycook et al., 2022). This paper focuses exclusively on the latter type since existing research points to different consequences and predictors for these types of scepticism, and thus, they should be clearly separated (e.g., Imhoff & Lamberty, 2020). We also focus on impact scepticism since the claim that COVID-19 is not worse than a casual flu is a more widespread belief than trend or attribution sceptic beliefs (see Latkin et al., 2021a; Pennycook et al., 2022).

While there has been intensive research on the role of health behaviour and social distancing (e.g., Allcott et al., 2020; Gollwitzer et al., 2020; Plohl & Musil, 2021) and on the predictors of pandemic-related conspiracy beliefs (Bruder & Kunert, 2022; Eberl et al., 2021; Uscinski et al., 2020), less is known about COVID-19 sceptic attitudes (for exceptions see Lange & Monscheuer, 2021; Latkin et al., 2021a; Rothmund et al., 2020). The existing studies show that people with a low risk perception are more likely to agree with COVID-19 sceptic statements (Latkin et al., 2021a). Furthermore, COVID-19 sceptics are less likely to trust COVID-19 experts, the WHO (Rutjens, van der Linden, et al., 2021), scientists (Rothmund et al., 2020), traditional media, and the government (Reinemann et al., 2020). Conspiracy beliefs which have been identified as a crucial predictor of various forms of science scepticism (e.g., Lewandowsky et al., 2013; Rutjens & van der Lee, 2020) are also linked to COVID-19 scepticism (Rothmund et al., 2020).

The Role of Political Ideology for COVID-19 Scepticism

Research points to a crucial role of ideology in developing COVID-19 related sceptical beliefs. However, the existing studies show inconsistent findings on the relationship between COVID-19 related beliefs and political orientation:

One strand of studies finds close ties between right-wing attitudes and COVID-19 related beliefs (see Eberl et al., 2021; Grande et al., 2021; Richter et al., 2021): Recent scholarship on the US indicates close ties between conservative political ideology and COVID-19 scepticism (Latkin et al., 2021a; Motta et al., 2020). In contrast, in Europe COVID-19 denial does not appear to be linked to mainstream right-wing attitudes. Instead, COVID-19 scepticism has been associated with populist radical right or far-right parties such as the Alternative for Germany (AfD) and the Austrian Freedom Party (FPÖ) (Eberl et al., 2021; Reinemann et al., 2020; Richter et al., 2021). Reports highlighting the participation of right-wing extremist individuals at the Anti-Corona rallies in Germany also point towards a link between COVID-19 scepticism and far-right attitudes (e.g., Grande et al., 2021). Such a link also seems plausible from a theoretical perspective since views typically associated with the broader spectrum of far-right attitudes, e.g., Social Darwinism and anti-Semitism, gained prominence during the pandemic. Social Darwinism applies the Darwinian concepts of natural selection (a.k.a. ‘survival of the fittest’) to human societies. Its links with far-right thought date back to the National Socialists’ concept of ‘racial hygiene’ (e.g., Haas, 2008). The belief that there exists ‘less worthy’ or ‘unworthy’ life remains a central component of modern far-right ideology (Pfitzenmaier, 2019). Social Darwinist thoughts had a resurgence during the COVID-19 pandemic. Narratives and examples have been, e.g., cost-benefit calculations that were made in order to weigh the economic consequences of the protective measures against the protection of risk groups. Some also argued that the protection of the elderly was overrated, as these elderly people would die only a little earlier from the coronavirus than they would anyway (Löhr, 2020).

Also, anti-Semitism, another central component of Neo-Nazi ideology, may make far-right individuals prone to endorse COVID-19 sceptical positions. Studies have shown a link between anti-Semitism and conspiracy belief (e.g., Reiser et al., 2021b, p. 102), and several conspiracy theories insinuate or claim that the coronavirus is harmless or a hoax (see, e.g., Pennycook et al., 2022). Moreover, reports about anti-Semitic incidents during the various anti-COVID protests are abundant (Amadeu Antonio Stiftung, 2021). With regard to political ideology, we thus hypothesise:

- H1: The more individuals share far-right attitudes, the more likely they are to endorse COVID-19 scepticism.

However, a second strand of studies suggests that COVID-19 sceptical views may also be linked to ideological extremism on both ends of the political spectrum. The first protests against the lockdown measures (so-called ‘hygiene demonstrations’) that were held in Berlin in March 2020 were organised by a left-wing capitalism-critical collective and attracted participants from both extremes of the ideological spectrum (Salheiser & Richter, 2021).

Also, several studies focusing on conspiracy theories show a curvilinear association between political orientation and COVID-19 related beliefs (e.g., Imhoff et al., 2022; Van der Linden et al., 2020). This has been explained by the fact that people who have more ideologically extreme orientations are more likely to distrust political institutions, are less tolerant of different ideas and have relatively simplistic perceptions of the social world (e.g., Imhoff et al., 2022; Van Prooijen & Krouwel, 2019). Moreover, COVID-19

sceptical attitudes and scepticism towards vaccines are closely correlated (Scheitle & Corcoran, 2021), and some studies point to a link between vaccine hesitancy and extremism on both ends of the ideological spectrum (Debus & Tosun, 2021; but see Baumgaertner et al., 2018; Engin & Vezzoni, 2020). It is suggested that people with far-left attitudes might have negative views on vaccines because they distrust pharmaceutical companies, whereas people with far-right attitudes are vaccine sceptics because they view scientists as part of a corrupt elite (Debus & Tosun, 2021; Kossowska et al., 2021). We thus propose a second hypothesis that is not necessarily mutually exclusive to hypothesis 1:

- H2: The more individuals locate themselves on the fringes of the political spectrum (i.e., share far-right *or* far-left attitudes), the more likely they are to endorse COVID-19 scepticism.

Research Design and Methodology

We empirically analyse the ideological foundations of COVID-19 scepticism based on a representative survey of citizens in the Eastern German state of Thuringia. Thuringia presents an interesting case to investigate the ideological foundations of COVID-sceptical attitudes: On the one side, the radical right-wing populist party AfD is very successful in Thuringia (Weisskircher, 2020). At the 2019 regional elections, the AfD won the second-highest number of votes in Thuringia (23 per cent), and at the 2021 federal election, the party even attracted the highest number of votes in Thuringia (24 per cent). In addition, the regional party branch is known for its extremist leader Björn Höcke and has been classified as right-wing extremist by the Thuringian Office for the Protection of the Constitution (Heinze & Weisskircher, 2021). Also, the number of citizens holding far-right views is comparatively high (Decker et al., 2020; Reiser et al., 2021a). On the other side, Thuringia is also a stronghold of the Left Party. The party won the most votes at the last regional election (31 per cent), and its party leader Bodo Ramelow currently is the leader of a minority government at the regional level (Olson, 2018). Thus, at the last regional elections in 2019, AfD and Left Party combined won more than 54 per cent of the votes. Due to the prevalence of support for parties at the ideological fringes, the regional focus on Thuringia allows studying whether COVID-19 scepticism is associated with far-right attitudes or with extremism on both ends of the ideological spectrum.

Despite an overall broad acceptance of the lockdown measures to mitigate the pandemic, there have been numerous protests in Thuringia directed against these measures (Reiser et al., 2021a). The participants of these protests have been heterogeneous: Next to groups severely affected by the measures, they have been organised by the anti-lockdown group ‘Querdenken’ (‘Lateral Thinking’) and partly organised or infiltrated by right-wing extremists (De Weck, 2020; Grande et al., 2021; Richter et al., 2021).

Design of the Survey

The analysis is based on a representative survey (Schmitt et al., 2021) conducted between 3. September and 5. October 2020 via telephone interviews (CATI). The sample consists of 1,110 citizens of the East German state of Thuringia who were at least 18 years and

eligible to vote at federal elections. The sampling frame was obtained via RDD (random-digit dialing), and in multi-member households, the last birthday method was applied (Reiser et al., 2021a). The survey data was weighted by age, gender, education, and household size (for information on the sample, see table S.8 in the supplementary material).

Operationalisation and Measurement

Dependent Variable

COVID-19 scepticism is measured based on the item ‘The virus is actually not worse than the flu’ – an item which has been used in other studies to measure COVID-19 scepticism (e.g., Latkin et al., 2021a). Participants indicated on a four-point-scale whether they ‘fully agree’, ‘mostly agree’, ‘mostly disagree’, or ‘fully disagree’ with the statement. Respondents who chose to answer the ‘Don’t know’ category (N = 9) were excluded from the analysis. For the logistic regression analysis, responses were recoded into a dummy variable (‘mostly disagree’/‘fully disagree’ = 0; ‘mostly agree’/‘fully agree’ = 1).

Explanatory Variables

Most empirical studies analysing the association between COVID-19 related beliefs and political ideology rely on a rather simple operationalisation of political ideology. In particular, a left-right or conservatism-liberalism self-placement-scale is used (e.g., Grande et al., 2021; Latkin et al., 2021a; Scheitle & Corcoran, 2021). It has been argued at the outset that this study wants to introduce a more fine-grained conceptualisation and measurement of ideological orientation. Furthermore, it wants to distinguish more precisely between different facets of ideology by disentangling far-right attitudes, ideological extremism, and party identification.

In order to measure *far-right attitudes*, we rely on an operationalisation widely used in other studies in the German context (e.g., Decker et al., 2020; Heitmeyer, 1987; Zick & Küpper, 2021). The operationalisation is based on the definition of far-right attitudes as a multidimensional pattern of attitudes which are based on an ideology of inequality in the social and political sphere (Heitmeyer, 1987; see also Salomo, 2019, p. 107). Far-right attitudes are captured based on ten single items which comprise anti-Semitism, racism, Social Darwinism, support for a right-wing dictatorship, and downplaying Nazi-crimes (see Table A1 in the appendix for the exact wording of the items). The items are combined into a mean scale (Cronbach’s $\alpha = 0.81$). A factor analysis reveals that these items load on two factors corresponding to an ethnocentrism and a Neo-Nazi ideology dimension (see also Best & Vogel, 2022).

As a second measurement of ideology, we capture participant’s *extremity of ideology*. Inspired by the study of Debus and Tosun (2021) on vaccine scepticism, we calculated the squared distance from the mean of the left-right scale ranging from 1 (‘very far-left’) to 7 (‘very far-right’). To assess the robustness of our findings, we computed additional models using dummies for locating oneself on the very far-right or very far-left end of the ideological spectrum, the absolute distance from the mean of the left-right self-placement scale, and general political ideology (not extremism) that was operationalised as self-placement on the left-right scale and is included as a continuous variable in the analysis. We present the models using these alternative operationalisations in the supplementary materials (table S.3).

Third, as an alternative measurement to capture far-left and far-right beliefs, we use *party identification*. To assess party identification, we asked: ‘Generally speaking, do you tend towards a particular party? If yes, towards which one?’. Having no party identification was used as a reference category. This allows to analyse whether supporters of the far-left (Left party) and far-right (AfD) are more likely to hold COVID-19 sceptic beliefs.

In the multivariate analyses, we further included *control variables* for age, gender, education, and political interest (see table S.7 in the supplementary material for the exact operationalisation). Furthermore, we asked participants whether their health had been affected by the coronavirus, or whether they had close friends, family, or relatives that had been affected, and whether they belonged to a risk group. We also included two controls for *risk perception* whereby the first one refers to the perceived risk for the participant’s *own health* due to the coronavirus. The second risk perception related control measures the participant’s *risk perception for their individual economic situation* by the COVID-19 crisis.¹ Moreover, an item measuring *conspiracy belief* related to the COVID-19 pandemic from Rees et al. (2020) was included.

We measured *trust* in two institutions that are crucial for the mitigation of the pandemic, as well as the spread of information on the coronavirus and recommended health behaviours: the federal government and the Robert Koch Institute (RKI). The RKI is the federal agency and research institute that monitors public health and is responsible for the control and prevention of diseases in Germany. Thus, it is one of the main sources of information for the government and the public during the COVID-19 pandemic. For the analysis, responses were recoded into three groups: those with ‘high trust’ (‘trust it fully’, ‘trust it largely’), with ‘partial trust’ (‘partially trust it’) and ‘no/low trust’ (‘rather not trust it’, ‘not trust it at all’).²

See table S.7 in the supplementary material for the exact question wordings and table S.8 for the descriptive statistics of the socio-demographic control variables. To test our hypotheses, we present logistic regression analysis.

Results

Descriptive Results

The descriptive analysis reveals that 35 per cent of the respondents share the view that ‘the virus is not worse than the flu’. While thus the majority of the respondents does not have COVID-19 sceptical views, the share of sceptical views is significantly higher than the results for the US (20 per cent), UK (17 per cent), and Canada (12 per cent) based on a similar measurement (‘the seasonal flu is just as dangerous as the coronavirus’) (Pennycook et al., 2022; see also Latkin et al., 2021a).

Our data show that the group of COVID-19 sceptics is politically heterogeneous. Respondents with COVID-19 sceptical views can be found across the whole ideological spectrum. However, sceptical views are more widespread on the very far-left (45 per cent) than the far-left, left or middle of the ideological spectrum. Though, in particular, sceptical views are more prevalent on the right side than on the left side, and the middle of the ideological spectrum: 74 per cent of those locating themselves on the very far-right also have COVID-19 sceptic attitudes (see Figure 1).

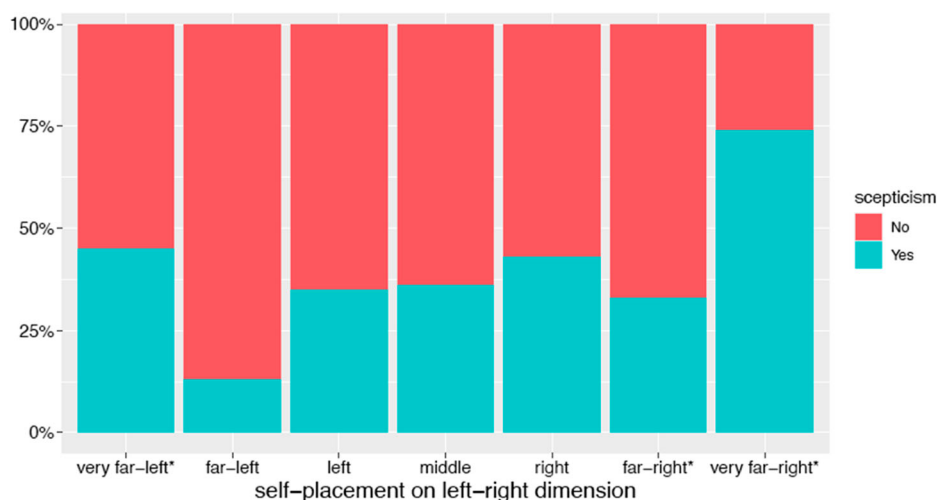


Figure 1. Distribution of COVID-19 sceptics along the left-right dimension.

Notes: *) The numbers on the very far-right and very far-left margins of the left-right self-placement scale need to be interpreted with caution as the number of cases is very small.

This overlap between far-right and COVID-19 sceptic attitudes is also evident when using the more fine-grained measurement of far-right attitudes (based on the ten items, see [Table A1](#) in the appendix): Of the respondents with far-right attitudes, almost two thirds are COVID-19 sceptics (compared to 27 per cent of those not having far-right attitudes). Of the COVID-19 sceptics, about a third have far-right attitudes (compared to nine per cent of the non-sceptics).

Regarding party identification, we find the highest share of COVID-19 sceptics among the supporters of the populist radical right AfD (67 per cent), followed by respondents who identify with other small parties (50 per cent) and with the Liberal party (41 per cent). The supporters of the Green party are the least sceptic (5 per cent). The supporters of the Left party are located in the middle (one third are COVID-19 sceptics) (see [Figure 2](#)).

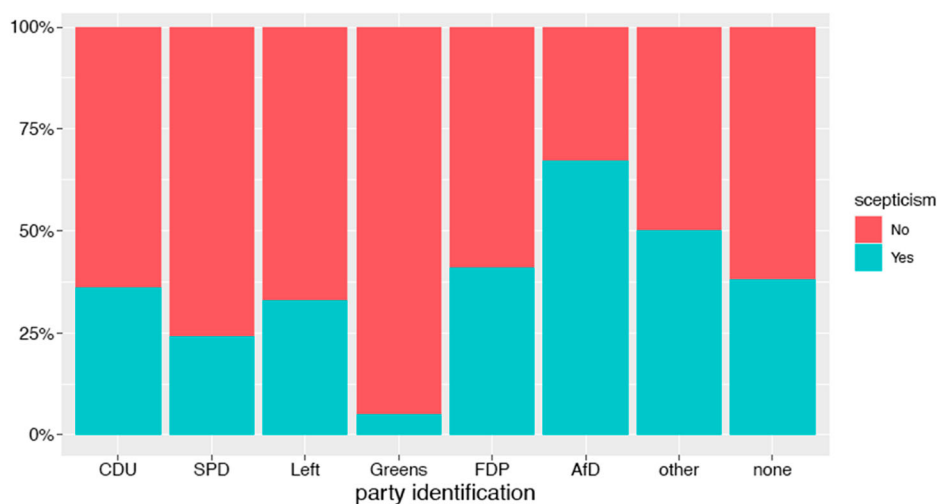


Figure 2. Distribution of COVID-19 sceptics according to party identification.

Results of the Logistic Regression Analysis

To evaluate our theoretical expectations about the role of ideology for COVID-19 scepticism, Table 1 presents the results of the logistic regression models. Our multivariate analysis reveals that *far-right attitudes* are a strong predictor of COVID-19 sceptic attitudes (see models 1 and 4 in Table 1).³ To get a substantive understanding of the significant effects, Figure 3 presents the predicted probabilities. It shows that individuals who have far-right attitudes are more likely to share COVID-19 sceptic attitudes. This is in line with the relationship between far-right attitudes and scepticism proposed in hypothesis 1.

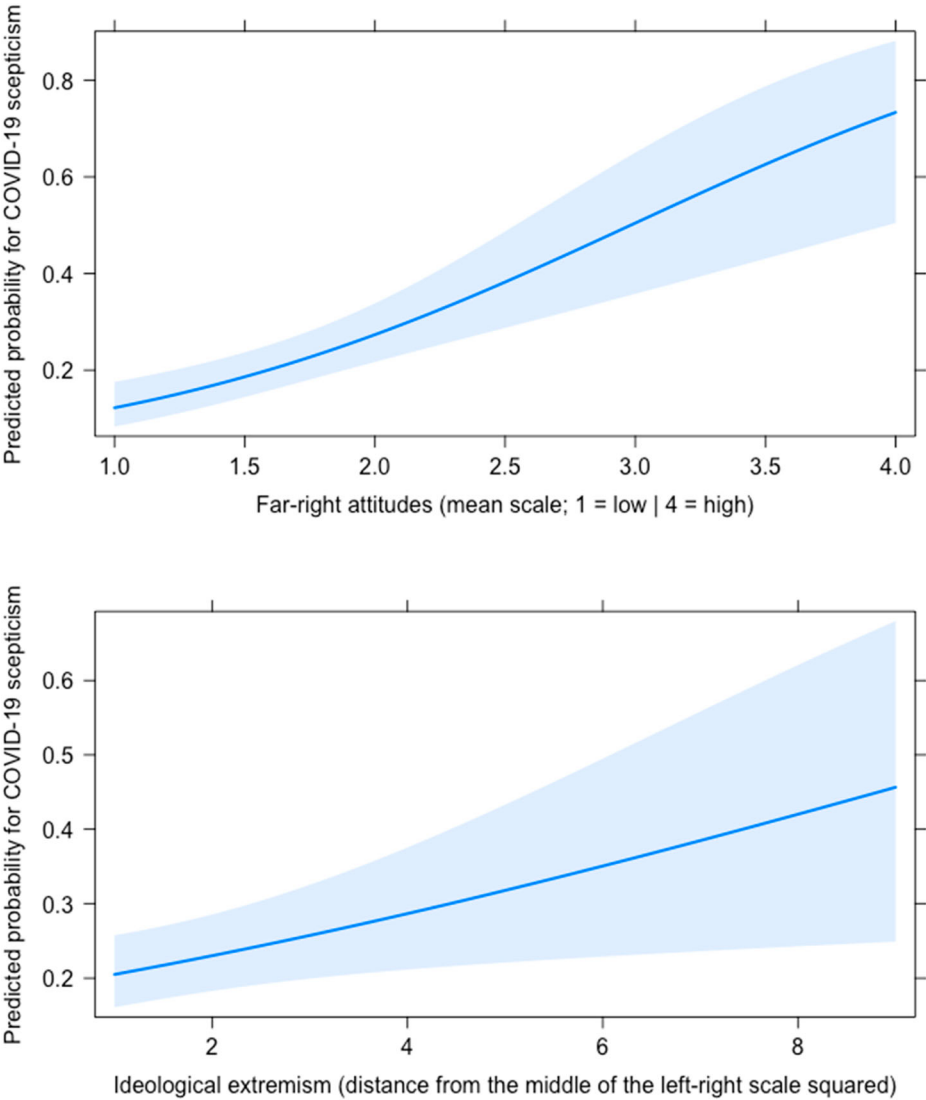


Figure 3. Predicted probabilities for COVID-19 scepticism.

Table 1. Logistic regression models (odds ratios, 95% confidence intervals).

Dependent variable: dummy COVID-19 scepticism ('the virus is actually not worse than the flu')				
	Model (1) Far-right ideology	Model (2) Ideological extremism	Model (3) PartyID	Model (4) Full model
Far-right attitudes	2.780*** [1.936; 4.027]			2.703*** [1.781; 4.150]
Ideological extremism		1.123* [1.010; 1.245]		1.159* [1.027; 1.306]
AfD			1.487 [0.597; 3.831]	0.634 [0.232; 1.746]
CDU			1.593 [0.926; 2.734]	1.640 [0.867; 3.095]
FDP			1.324 [0.315; 5.227]	1.460 [0.332; 6.246]
Greens			0.235* [0.045; 0.763]	0.467 [0.086; 1.605]
Left			0.742 [0.426; 1.273]	0.518 [0.259; 1.004]
SPD			0.717 [0.261; 1.729]	0.957 [0.332; 2.440]
Other			3.326** [1.398; 7.934]	2.707* [0.999; 7.327]
Age	0.997 [0.985; 1.008]	1.010 [0.999; 1.021]	1.008 [0.997; 1.020]	1.003 [0.990; 1.017]
Gender (female)	1.018 [0.701; 1.479]	0.767 [0.527; 1.113]	1.053 [0.726; 1.528]	0.957 [0.621; 1.473]
Education (A-levels or higher)	0.949 [0.600; 1.492]	0.818 [0.520; 1.275]	0.894 [0.570; 1.395]	1.203 [0.730; 1.977]
Political interest	0.782** [0.648; 0.941]	0.572*** [0.467; 0.695]	0.700*** [0.582; 0.839]	0.656*** [0.523; 0.818]
Affectedness by COVID-19 (no)	1.358 [0.729; 2.619]	1.490 [0.817; 2.801]	1.892 [1.003; 3.719]	1.299 [0.664; 2.637]
Affectedness by COVID-19 (no, but risk group)	0.795 [0.358; 1.784]	0.772 [0.351; 1.707]	0.958 [0.434; 2.147]	0.654 [0.266; 1.612]
Risk perception (health) (high risk)	0.546** [0.344; 0.854]	0.583* [0.365; 0.917]	0.492** [0.313; 0.762]	0.471** [0.277; 0.784]
Risk perception (pers. econ. situation) (high risk)	0.803 [0.478; 1.330]	0.963 [0.581; 1.582]	0.764 [0.459; 1.258]	0.932 [0.528; 1.626]
Conspiracy belief	2.166*** [1.429; 3.287]	2.163*** [1.440; 3.254]	2.531*** [1.696; 3.790]	1.531 [0.952; 2.455]
Trust federal government (low)	1.764* [1.026; 3.014]	2.951*** [1.769; 4.928]	2.936*** [1.735; 4.983]	2.526** [1.360; 4.694]
Trust federal government (medium)	1.436 [0.906; 2.269]	1.970*** [1.260; 3.087]	1.953** [1.260; 3.032]	1.558 [0.915; 2.646]
Trust Robert Koch Institute (low)	7.825*** [3.853; 16.837]	9.962*** [4.721; 22.634]	6.187*** [2.923; 13.792]	10.215*** [4.392; 25.372]
Trust Robert Koch Institute (medium)	2.302*** [1.478; 3.588]	2.920*** [1.860; 4.601]	2.045** [1.300; 3.224]	3.223*** [1.923; 5.440]
Intercept	0.073*** [0.022; 0.239]	0.465 [0.167; 1.262]	0.253** [0.088; 0.708]	0.076*** [0.020; 0.277]
Observations	819	808	783	719
Log Likelihood	-326.104	-325.443	-342.578	-261.476
AIC	682.208	680.886	727.157	568.953
Nagelkerke Pseudo-R2	0.353	0.330	0.325	0.407

With regard to hypothesis 2, suggesting that *extremism* on both sides of the ideological spectrum is associated with COVID-19 scepticism, the results of the analyses are inconclusive and are dependent on the concrete operationalisation: On the one side, when

measured as squared distance from the mean of the left-right self-placement scale, extremism is significantly associated (see model 2 and 4 in Table 1). When using dummies for far-right and far-left positions, the significant results are also confirmed. However, computing additional models to assess the robustness of this finding do not confirm the significance of the relationship.⁴ Using *party identification* as an alternative measurement for far-right (AfD) and far-left (Left party) ideology also does not support H2. Both supporters of the AfD and of the Left party are not significantly more likely to endorse COVID-19 sceptic views than people not having a party identification (see model 3 and 4 in Table 1).

Looking briefly at the control variables, the analyses show no significant effect of the socio-demographic variables (age, gender, education level) (see model 4 in Table 1). Thus, in contrast to other studies (e.g., Latkin et al., 2021a; Rothmund et al., 2020), younger people are not more likely to share COVID-19 sceptic attitudes. Furthermore, the affectedness by the virus does not significantly influence the likelihood to endorse COVID-19 scepticism. Risk perception with regard to one's own health has a significant effect on COVID-19 sceptic attitudes. Those respondents who perceive the pandemic as a threat to their own health are less likely to share COVID-19 sceptic attitudes. Economic risk perception is not a significant predictor. In line with other studies (e.g., Rothmund et al., 2020), pandemic-related *conspiracy belief* is significantly associated with COVID-19 scepticism in models 1–3. It is, however, not significant in the full model (model 4 in Table 1).

Low trust in the federal government as well as showing a low and medium level of trust towards public health experts is significantly correlated with COVID-19 scepticism (model 4 in Table 1), confirming the results of other studies highlighting the important role of trust (e.g., Reinemann et al., 2020; Rothmund et al., 2020). Finally, self-reported political interest impedes scepticism.

Conclusion

During the COVID-19 pandemic, many societies have additionally been challenged by COVID-19 sceptics who downplay or deny the seriousness of the illness. It is crucial to understand the explanatory factors for COVID-19 sceptical attitudes: They endanger the successful containment of the pandemic since they result in lower acceptance and willingness to adhere to the mitigation measures (Plohl & Musil, 2021). Furthermore, as different forms of science scepticism have increased during the last years and challenge societies and democracies, it is important to understand the factors fuelling COVID-related scepticism as one specific form of science scepticism (e.g., Dryhurst et al., 2020; Rutjens & van der Lee, 2020). Using a representative sample of citizens from the East German region of Thuringia, our analysis shows that in the autumn of 2020, about a third of the respondents shared COVID-19 sceptic attitudes. The share is significantly higher than the results for the US (20 per cent), UK (17 per cent), and Canada (12 per cent) based on a similar measurement ('the seasonal flu is just as dangerous as the coronavirus') (Pennycook et al., 2022; see also Latkin et al., 2021a). Further studies are needed to examine why Thuringians show this comparably high level of sceptical attitudes. One possible explanation might be that in contrast to other regions and European countries (e.g., Italy, Spain), Thuringia was hardly

hit by the pandemic in the first wave. Since only 12 per cent of the respondents reported that they have been affected by the virus either directly or indirectly (i.e., family and friends) (see Reiser et al., 2021a; see also figure S.1 and table S.8 in the supplementary material), a part of the respondents might have had wrong perceptions about the seriousness of the virus. This might explain the higher share of respondents who denied or downplayed the virus.

Another explanation for the high level of sceptical attitudes in Thuringia is the high level of far-right attitudes in the population and the prevalence of support for parties at the ideological fringes. Accordingly, the ideological foundations of COVID-19 scepticism have been the core focus of this article.

Our study confirms hypothesis 1 by showing a robust and strong significant effect of far-right attitudes on COVID-19 sceptical beliefs. This reinforces findings that point to differences regarding ideology between the US and Europe: While there is a relationship between mainstream right-wing views (political conservatism) and COVID-19 scepticism in the US, in Europe, scepticism is associated with far-right views (see also Latkin et al., 2021a; Rothmund et al., 2020; Rutjens, van der Linden, et al., 2021). By that, COVID-19 scepticism seems to mirror climate change scepticism (Jylhä et al., 2020; Krange et al., 2019; Kulin et al., 2021).

Our study moreover confirms hypothesis 2, although the effect of extremism on both ends of the ideological spectrum on COVID-19 scepticism is weaker and less robust. This association speaks to findings by Debus and Tosun (2021) or Imhoff et al. (2022) who show a link between ideological extremism and conspiracy belief or vaccine hesitancy respectively. Even after controlling for political trust, those individuals on the ideological fringes are more prone to endorse COVID-19 scepticism, suggesting that low trust cannot be the only explanation for extremists' high levels of scepticism. More recent evidence, however, indicates that during the course of the pandemic, Anti-COVID protesters in Germany shifted to the right (Grande et al., 2021). Thus, the link between very far-left attitudes and COVID-19 scepticism may be confined to the early phase of the pandemic.

We did not find a significant effect of party identification. Neither the supporters of the Left party nor the supporters of the AfD are significantly more likely to endorse COVID-19 sceptic attitudes. This seems puzzling since party identification provides a powerful cue (Campbell et al., 1960), and citizens are likely to trust their preferred party the most with regard to positions and policies (e.g., for attitudes towards compulsory vaccinations, Juen et al., 2021). Although the AfD had initially taken the threat posed by the virus seriously and had agreed more-or-less with the mitigation measures adopted by the mainstream parties (Jungkunz, 2021), in late April 2020, a 180-degree turn towards COVID-19 scepticism took place (Lehmann & Zehnter, 2022). Therefore, the missing significant effect is surprising. In contrast, the result seems plausible for the Left party: Although it increasingly criticised the mitigation measures of the government, the clear majority of the party leaders did not articulate COVID-19 sceptical positions. Moreover, COVID-19 scepticism as well as support for Left party and – even more – for the AfD can be explained by one important common underlying factor: a very low trust in political institutions.

Although not the focus of the present analysis, our study is consistent with previous scholarship showing that low trust in the government and public health authorities is

significantly linked with COVID-19 scepticism (Pennycook et al., 2022; Rothmund et al., 2020). In contrast to previous research, our full model does not confirm the link between COVID-19 scepticism and COVID-related conspiracy theories. This is surprising, since conspiracy beliefs have been identified as a significant predictor of various forms of science scepticism (e.g., Hornsey et al., 2018; Lewandowsky et al., 2013; Rothmund et al., 2020; Rutjens & van der Lee, 2020). A possible explanation for this is that the effect can be explained by the other variables in the model, given the overlap between conspiracy belief and extremism on both ends of the ideological spectrum (e.g., Imhoff et al., 2022), as well as far-right attitudes (e.g., Van der Linden et al., 2020), and trust (e.g., Bruder & Kunert, 2022). This finding should be scrutinised in further investigations.

It is interesting to note that in contrast to the result of Dryhurst et al. (2020, p. 998), the affectedness by the virus – either personally or in the family – does not significantly influence the likelihood to endorse COVID-19 scepticism. Risk perception with regard to one's own health is a significant predictor of COVID-19 sceptic attitudes: Respondents who perceive the pandemic as a threat to their own health are less likely to share COVID-19 sceptic attitudes. This effect might, however, be bidirectional (Latkin et al., 2021a). Economic risk perception is not significantly associated with COVID-19 scepticism. Overall, this study confirms important factors explaining COVID-19 scepticism.

The strong impact of political ideology points to deeper roots of sceptic attitudes. It has been shown that right-wing ideology predicts other forms of science scepticism, such as climate change denial (e.g., Jylhä et al., 2020; Krange et al., 2019), whereas the evidence for a link between ideology and vaccine hesitancy produces mixed results (Baumgaertner et al., 2018; Debus & Tosun, 2021; Engin & Vezzoni, 2020). Science scepticism is heterogeneous and not all science scepticism appears to be fed by right-wing political ideology (Rutjens, Sengupta, et al., 2021a). More research is needed to investigate the similarities and differences between COVID-19 scepticism and other forms of science scepticism (see Latkin et al., 2021b; Scheitle & Corcoran, 2021 for first attempts).

In particular, further research should investigate the potential causal mechanisms between right-wing ideology, ideological extremism, and scepticism more closely (see Kossowska et al., 2021 for a first attempt) in order to understand *how* ideology influences different forms of science scepticism. This would allow developing counter-strategies against COVID-19 scepticism and other forms of science scepticism. This is of high relevance since sceptics might limit progress in the mitigation of societal problems, e.g., on the route to carbon neutrality or achieving herd immunity to contain the COVID-19 pandemic. The strong link between ideology and scepticism that can also be observed also for other types of science scepticism (e.g., Scheitle & Corcoran, 2021) implies that providing information will most likely not change these peoples' beliefs. Since science sceptics are often also characterised by high mistrust in political institutions and scientists (see, e.g., Debus & Tosun, 2021; Engin & Vezzoni, 2020; Kossowska et al., 2021), information provided by these actors will most likely not change sceptics' beliefs. This poses a challenge for representative democracy and its institutions.

Notes

1. Explorative models including economic affectedness instead of economic risk perception showed similar findings (see table S.5 in the supplementary material).
2. We also tested a model based on an alternative operationalisation (five-point scale instead of a dummy variable) of threat to own health, threat to personal economic situation, and the two trust measurements. None of these alternative specifications changed our general conclusion that far-right attitudes, extremism, as well as trust in the government and public health authorities are central predictors of COVID-19 scepticism (see table S.4 in the supplementary material).
3. In a model containing two separate scales for the measurement of far-right attitudes (Neo-Nazi ideology and ethnocentrism), both dimensions are significant and are positively associated with COVID-19 skepticism (see table S.6 in the supplementary materials).
4. As a robustness check, we also computed a COVID-19 scepticism index consisting of three items. Next to the item mentioned beforehand the two additional items are 'The danger posed by the coronavirus is greatly exaggerated by the media' and 'I trust my feelings about dealing with Corona more than so-called experts' (see Rees et al., 2020). An OLS regression model using this additive index as dependent variable provided similar results to our full logistic regression model presented in the text. Likewise, a logistic regression model using a dummy variable computed of the three items where an individual was coded as COVID-19 sceptic (= 1), when (s)he responded 'fully agree' or 'mostly agree' on all three items generated similar results. However, extremism (measured as either squared distance from the mean of the left-right self-placement scale or with dummy variables for a position on the left or right fringe of the distribution) was *not* significant in any of these models; see supplementary material tables S.1 and S.2.

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Appendix

Table A1. Coding of far-right attitudes in the study.

Dimension	Operationalisation/survey items (English translation)
Ethnocentrism	Foreigners only come to Germany to abuse the welfare state. Germany is dominated by foreigners to a dangerous degree. Other countries don't match Germany's achievements. What we need in our country is to forcefully and aggressively assert German interests toward foreign countries.
Neo-Nazi ideology	National Socialism had its positive aspects. For the national interest, a dictatorship is under certain conditions the best form of government. The Jews are just peculiar and don't really fit in with us. There is worthy and unworthy life. As in nature, in society the fittest should win. Foreigners ought to marry only among themselves.

Notes: Far-right attitudes were computed as a mean scale, comprised of the following items (that were each rated on a four-point scale ranging from 'fully agree' to 'fully disagree')