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The politics of vaccine hesitancy in Europe

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Background: Vaccine hesitancy threatens public health. Some evidence suggests that vaccine hesitancy in Europe may be linked with the success of populist parties, but more systematic analysis is needed. **Methods:** We examine the prevalence of individual-level vaccine hesitancy across the European Union (EU) and its association with political orientations. We also analyze whether success of populist parties is linked with vaccine hesitancy and uptake. We draw on individual-level Eurobarometer data from 2019, with a total of 27 524 respondents across the EU. We also rely on national and regional-level populist party vote shares. Finally, for a time-series analysis, we rely on aggregated populist party support as measured in the European Social Survey waves 1–9 (2002–18), and national immunization coverage rates from the WHO from 2002 to 2018. **Results:** While vaccine hesitancy is confined to a minority of the population, this group is large enough to risk herd immunity. Political orientations on a left-right dimension are not strongly linked to vaccine hesitancy. Instead, vaccine hesitancy is associated with anti-elite world views and culturally closed rather than cosmopolitan positions. **Conclusions:** Vaccine hesitancy is not only present in all EU member states but also maps on broader dimensions of cultural conflict. Hesitancy is rooted in a broader worldview, rather than misperceptions about health risks. Pro-vaccine interventions need to consider the underlying worldview, rather than simply targeting misperceptions.

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Introduction

Significant portions of the population express doubts about the safety, efficacy and importance of vaccines.[1,2] Pushback against COVID-19 vaccines has only magnified this issue and could further erode confidence in standard childhood vaccines.[3] In Europe, the spread of vaccine hesitancy has coincided with a period of success for populist politicians, suggesting a causal link from populist success to vaccine hesitancy. For example, Kennedy finds a country-level correlation between vaccine hesitancy and the vote share of populist parties in 14 European states based on data from 2014 to 2015.[4] Using more comprehensive data from 28 European countries from 2019, we do not observe a correlation between populist party strength and vaccine hesitancy. Further, a time-series analysis of populist party support and immunization rates casts further doubt on parties themselves as direct drivers of hesitancy. We extend and refine this line of analysis to examine the connection between populism and vaccine hesitancy using nationally representative samples from 28 European countries ($N = 27\,524$). While the aggregate-level analyses do not show a relationship between populist party support and vaccine hesitancy, we do find that individual-level measures tapping anti-elite sentiment (including an item that asks about sympathy for populist parties) predict vaccine hesitancy. We argue that this broader 'anti-elite' worldview represents a more general loss of institutional trust and is causally prior to both populist party support and vaccine hesitancy.

Anti-establishment/anti-elite sentiments

Vaccine policy, production and provision are largely the domain of experts. The success of public immunization programs is reliant on continued public confidence in both vaccines and the experts who provide them.[5] Vaccine hesitancy is correlated with distrust in medical professionals,[6,7] the pharmaceutical system[8] and policymakers.[9]

Trust in public health institutions has eroded and they have had their credibility called into question.[10,11]

Evaluating 'arguments from authority' in the absence of technical knowledge relies on trust.[10] When this trust is lost, individuals are more likely to reject the scientific basis of vaccines and turn to alternative sources for information.[2] Increased distrust in elites appears to be a broad feature of contemporary European politics as populist parties have risen to prominence by mobilizing 'the people' against 'the elite'.[12,13] Populist discourses have smeared the 'corrupted elites' in healthcare; painted doctors, healthcare bureaucrats and pharmaceutical companies as self-interested and untrustworthy; and openly allied with 'anti-vax' movements.[14] Overall, then, the rise of anti-elite sentiment has coincided with broader anti-science and anti-intellectual movements.[15,16]

Using aggregate-level 2014–15 data, Kennedy explores the link between populism and vaccine hesitancy by finding significant correlations between the populist vote share in 14 Western European countries and the percentage of individuals reporting vaccine-hesitant attitudes,[4] with correlations ranging from $r = 0.50$ to $r = 0.79$ across three attitudinal items. Although these effect sizes are large, the uncertainty around them is considerable given the small sample size [by our calculation, for $r=0.50$, $N = 14$, 95% confidence intervals (CIs) would be (-0.042 to 0.81), and for $r = 0.79$, 95% CIs would be (0.45–0.93)]. These results do not hold with more recent 2019 data from a broader set of European countries allowing for more precise CIs. We reconcile these seemingly conflicting results by grounding vaccine hesitancy in a wider 'anti-elite' frame that recognizes contemporary distrust in the prevailing European establishment and resentment towards the status quo,[17] which allows social identity processes to motivate the rejection of scientific advice.[18] In this interpretation, European increases in vaccine-hesitant attitudes are part of a process of experts losing their privileged authority over knowledge, as expertise itself becomes a culturally contested topic

within the populist 'cultural backlash' against the liberal, cosmopolitan project of elites.[15,16,19] In this interpretation, populist party success is more a concurrent marker of this broader process, and less a proximate cause of vaccine hesitancy.

H1: An anti-elite worldview is associated with greater vaccine hesitancy.

Political orientations

Studies examining how political ideology affects vaccine attitudes typically use a single left-right dimension or liberal-conservativism scale.[7] Drawing primarily on data from the United States, hesitancy appears greater among more conservative voters.[20] However, in the USA, there is a strong overlap between two distinct political dimensions of conflict—an economic dimension and a more cultural dimension. In Europe, these are distinct dimensions of political conflict and party competition.[21]

Baumgaertner and colleagues propose mechanisms that link political preferences with vaccine attitudes.[7] Parties could cue their voters. Conservatives might view vaccines as unwarranted government intervention. Conservative voters might exhibit greater hesitancy irrespective of party positions because conservativism can be related to greater risk aversion.[9] Finally, conservatism is also associated with moral purity,[22] and vaccines may be perceived as violating a body's purity.[23]

Do these insights apply to Europe? While European conservatives oppose 'big government' like their US counterparts, they also accept greater government (or welfare state) involvement in citizens' lives, particularly as universal healthcare coverage is present in nearly all European countries. Moreover, European party competition is fundamentally different from the two-party system found in the USA because there are two separate dimensions of political conflict—one mostly economic and another mostly cultural—that have fused in the American context. This second dimension, also called the 'gal-tan' dimension in work on European party competition, is associated with right-wing populist parties. It is steeped in issues of national culture, environmental politics, immigration and European integration.[21,24] Those on the far-right of this spectrum, labelled the traditional-authoritarian-nationalism ('tan') pole by Hooghe and colleagues,[21] express a profound sense of threat to their way of life and traditions from immigration, multiculturalism, supranational bodies and cosmopolitan elites. This supposed cosmopolitan elite may include experts who can be seen as working on behalf of entrenched elected officials, and in opposition to the masses, which can result in the rejection of scientific expertise.[20]

Tan's opposite, green-alternative-libertarian ('gal'), represents a pro-social, altruistic ideology that encourages behaviour promoting the collective safety of the community and embraces universal values. Vaccination, which protects vulnerable members of the public through herd immunity, could be one such pro-social behaviour. While cultural conservatives can exhibit collectivist sentiment, it typically does not extend beyond a circumscribed in-group identity. Cultural conservatives are less concerned for the welfare of the vulnerable[25,26] and generally less accepting of threat under uncertainty.[27]

H2: Culturally closed attitudes are associated with greater vaccine hesitancy.

Strength of populist parties

Levels of vaccine hesitancy also differ between countries. We replicate Kennedy's aggregate-level analysis from 2014 to 15 using data from 2019 for 28 European countries and extend the analysis to the individual level. Following Kennedy,[4] we expect a positive relationship between populist party strength and vaccine hesitancy.

H3: Higher vote shares of populist parties are related to greater vaccine hesitancy.

The connection between populist parties and vaccine hesitancy could operate by tightening the connection between misperceptions and behavioural intentions. In other words, people may hold misperceptions about vaccines (e.g. about how they work), but in the absence of coherent belief systems about vaccines, these misperceptions may not translate into hesitancy. However, populist leaders who push back against 'experts' and the 'establishment' may mobilize concerns about vaccine safety[28] or the authority of scientific expert knowledge more generally.[19] For party supporters, such messaging may convert stray misperceptions into active avoidance of vaccines. Once that happens, we would expect misperceptions to have a greater effect on vaccine hesitancy.

H4: Populist parties strengthen the relationship between vaccine misperceptions and vaccine hesitancy.

Methods

Sample

We use individual-level data from Eurobarometer 91.2. The survey was conducted face to face with probability samples from each EU member state in March 2019 ($N = 27\,524$). We additionally rely on national- and regional-level populist party vote shares from the 2019 European Parliament (EP) elections. We code populist parties based on the PopuList project.[29] Our time-series analysis relies on aggregated populist party support as measured in ESS waves 1–9, which took place every 2 years from 2002 to 2018, and national immunization coverage rates from the WHO from 2002 to 2018.

Measures

Individual-level outcome measure

Vaccine hesitancy. Our primary individual-level outcome measure is vaccine hesitancy using a battery of five questions included in a Eurobarometer survey from 2019. Respondents were asked about their agreement with statements such as the following: 'Not getting vaccinated can lead to serious health issues' and 'vaccines are important to protect not only yourself but also others'. Response options for each item are totally agree, tend to agree, tend to disagree, and totally disagree. We follow the literature[2,30] to create an additive index with a good scale reliability (Cronbach's α is 0.84) (figure 1).

National-level outcome measures

Vaccine uptake. For our time-series analysis, we obtained national immunization coverage data from the WHO for two vaccinations for the years 2002–18: DTP3 (diphtheria, tetanus and pertussis) and MCV1 (measles-containing vaccine). Vaccine coverage rates are calculated by the WHO by dividing the number of vaccine doses that were administered in a district by the target population of the district (i.e. the number of children in case of MCV1 and DTP3). Our quantity of interest is the departure from the mean value of vaccine uptake for a given country. We use MCV1 and DTP3 because they are widely used in vaccine hesitancy studies and they are also among the vaccines for which the WHO possesses the most complete data.

Individual-level independent variables

Anti-establishment worldviews. The Eurobarometer does not include a question item whose wording resembles one of the standard measures used in the literature to measure anti-establishment positions exactly. It does however include an item that focuses on a traditional political elite and measures whether respondents welcome protest against these elites. This gets right to the fundamental antagonism
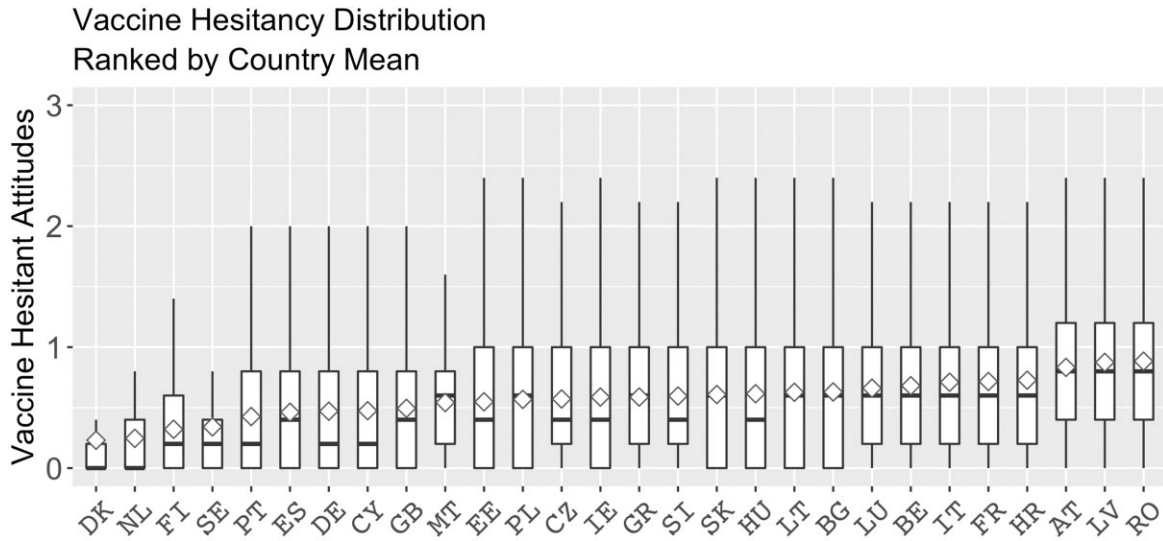
Vaccine Hesitancy Distribution
Ranked by Country Mean

Figure 1 Boxplot showing the distribution of vaccine hesitancy across the countries in the sample. The boxes refer to the interquartile range, the horizontal line in the boxes refer to the median of each country, and the whiskers outside of the boxes end at the 25th percentile minus 1.5 times of the interquartile range or, respectively, the 75th percentile plus 1.5 times of the interquartile range. Grey diamonds indicate country means
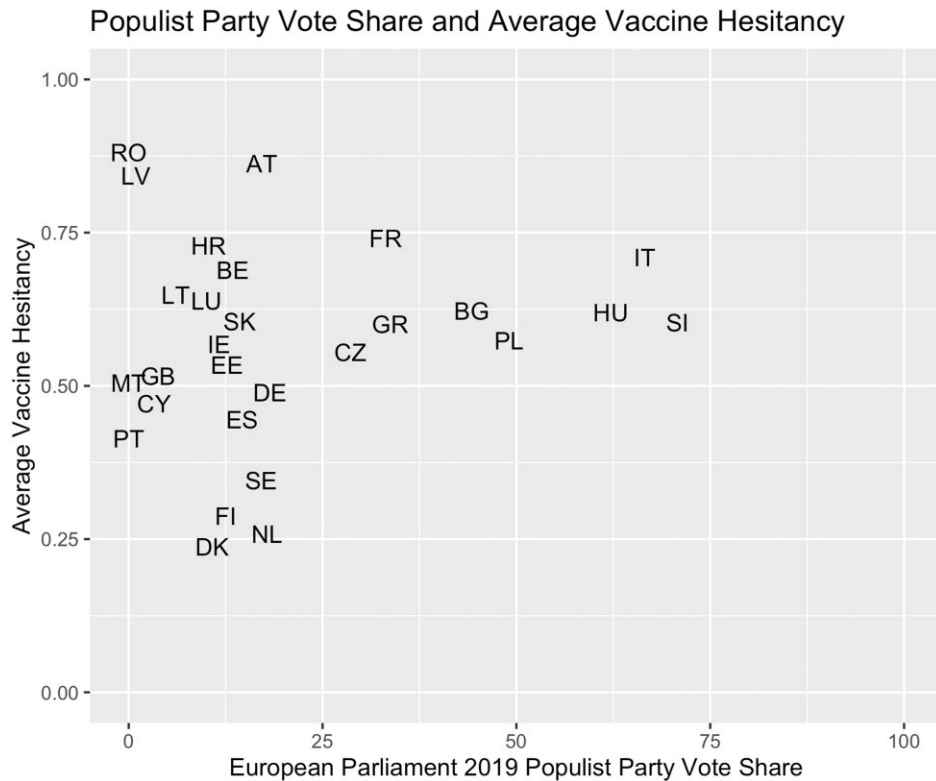
Populist Party Vote Share and Average Vaccine Hesitancy

Figure 2 Figure shows a country's (weighted) mean vaccine hesitancy score (based on Eurobarometer data from 2019) plotted against the vote share of populist parties at the EP elections 2019 in the respective country

that related (and finer-grained) standard measures are about. As has recently been pointed out,[31] these measures are usually closely connected and hence we believe that our measure is capturing anti-establishment views well. Specifically, respondents are asked whether they agree or disagree that 'the rise of political parties protesting against the traditional political elites in various European countries is a matter of concern'. We code disagreement with this statement as anti-elite sentiment. The reference category in our models is respondents who do not share this anti-elite sentiment. We test for robustness using distrust in the media and perceptions of who

is trustworthy for vaccine information (e.g. expert sources vs. friends and family) as alternative measures of anti-elite sentiment.

Political orientations. We differentiate between citizens' economic preferences using a left-right ideology scale. The left-right scale is a 10-point self-placement scale (plus 'don't know' category), which we break into dummy variables to account for potentially non-linear effects (and to retain respondents who do not provide information on their left-right self-placement). We measure orientations on the cultural dimension with a question that asks whether globalization

Table 1 The correlates of vaccine hesitancy (multilevel regression results)

	Model 1	Model 2	Model 3	Model 4
Anti-elite worldview	0.103***	0.081***	0.095***	0.095***
	(0.008)	(0.008)	(0.008)	(0.008)
Culturally closed (identity threatened by globalization)	0.082***	0.065***	0.066***	0.065***
	(0.008)	(0.008)	(0.008)	(0.008)
Far-left	0.019	0.009	0.022	0.022
	(0.014)	(0.014)	(0.014)	(0.014)
Left	–0.026*	–0.023*	–0.019	–0.020
	(0.011)	(0.010)	(0.011)	(0.011)
Right	0.002	–0.008	0.002	0.002
	(0.011)	(0.011)	(0.011)	(0.011)
Far-right	–0.018	–0.030*	–0.022	–0.023
	(0.015)	(0.015)	(0.015)	(0.015)
Low education	0.036**	0.032**	0.041***	0.041***
	(0.012)	(0.012)	(0.012)	(0.012)
High education	–0.059***	–0.061***	–0.052***	–0.052***
	(0.009)	(0.009)	(0.009)	(0.009)
Social class	–0.064***	–0.058***	–0.043*	–0.043*
	(0.017)	(0.017)	(0.017)	(0.017)
15–24	0.027	0.006	0.025	0.025
	(0.015)	(0.015)	(0.015)	(0.015)
25–39	0.072***	0.058***	0.070***	0.070***
	(0.011)	(0.011)	(0.011)	(0.011)
40–54	0.046***	0.039***	0.046***	0.046***
	(0.010)	(0.009)	(0.010)	(0.010)
Female	–0.033***	–0.032***	–0.037***	–0.037***
	(0.007)	(0.007)	(0.007)	(0.007)
Rural	0.044***	0.047***	0.039***	0.039***
	(0.010)	(0.009)	(0.010)	(0.010)
Small town	0.042***	0.042***	0.040***	0.040***
	(0.009)	(0.009)	(0.009)	(0.009)
Child <10 in household	–0.055***	–0.053***	–0.057***	–0.058***
	(0.011)	(0.011)	(0.011)	(0.011)
Distrust of media	–	0.068***	0.072***	0.072***
	–	(0.007)	(0.008)	(0.008)
Most trusted source for vaccine info: online	–	0.407***	–	–
	–	(0.021)	–	–
Most trusted source for vaccine info: Family and Friends	–	0.318***	–	–
	–	(0.018)	–	–
Vax misperception	–	–	0.193***	0.166***
	–	–	(0.008)	(0.011)
Populist country vote share	–	–	0.006	0.002
	–	–	(0.015)	(0.015)
Misperception × pop vote share	–	–	–	0.013**
	–	–	–	(0.004)
(Intercept)	0.509***	0.458***	0.375***	0.386***
	(0.032)	(0.030)	(0.045)	(0.045)
Log likelihood	–19118.175	–17099.690	–18165.780	–18168.264
Num. obs.	23 104	21 836	22 347	22 347
Num. groups: country	28	28	28	28

Reference categories: no anti-elite worldview, culturally open (=not threatened by globalization), ideology: centre, education: medium, age: older than 55, male, area of residence: large town, no child in HH, most trusted for vaccine information: professionals. Dummy variables for respondents who replied 'Don't know' not displayed (see Supplementary appendix), but included when a 'Don't know' response was given by >5% of respondents.
***: $P < 0.001$;
**: $P < 0.01$;
*: $P < 0.05$.

threatens their country's identity. Although globalization can be seen as an economic process, the fact that this question refers to a country's identity makes this a reasonable measure for someone's cultural position.[32]

Vaccine misperception. Hypothesis 4 posits an interaction between vaccine misperceptions and political context. We operationalize vaccine misperceptions with a question that asks respondents whether they believe that vaccines can cause the disease against which they protect.

We account for the following confounding factors: education, gender, age, social class, location, and whether one or more children under ten are living in the household of the respondent.[26]

National-level independent variables

Vote shares of populist parties. We follow Kennedy and measure vote shares of populist parties from EP elections that took place roughly at the same time as our survey.[4] As Kennedy notes, there is no 'commonly agreed definition or list of populist parties'[4] (p. 514). We code populist parties based on PopuList, a widely used classification scheme.[29]

Populist party support. The independent variable for our aggregate-level time series comes from the European Social Survey (ESS) waves 1–9, which took place every two years from 2002 to 2018. Specifically, we compute the weighted percentage of respondents in a country who 'feel close to' a populist party. We look both at populist parties generally and far-right populist parties specifically.

Statistical analysis

We replicate Kennedy's aggregate-level analysis, but we use data from 2019 and a larger set of countries. Next, we examine the relationship with individual-level data. We use a multilevel regression model to account for the nested structure of the data.[33] We rescaled all variables (except for populist party vote share) to a range of zero to one to ease interpretation. We show the effects of a 2 SD change[34] in Supplementary appendix table S2. We use a linear link function for models in table 1. Results for models with group mean centred predictors are in the Supplementary appendix table S3.[35] We also conduct a robustness test with a negative binomial link function (Supplementary appendix table S7). The results reinforce our findings.

Results

Kennedy[4] uses data from 2014 to present a strong correlation between populist party vote share and vaccine hesitancy in Western Europe. Using more recent data from 2019, we do not observe this relationship between strength of populist parties and vaccine hesitancy (0.131, 95% CI: −0.255 to 0.480, $p = 0.508$) (figure 2). The relationship is also not statistically significant if we examine only the same 14 countries of Kennedy's analysis (0.437, 95% CI: −0.121 to 0.786, $p = 0.118$). There is also no relationship if the sample is restricted to populist far-right parties, i.e. once we exclude left wing populist parties (0.055, 95% CI −0.325 to 0.419, $p = 0.781$), or when we use the alternative categorization of populist parties by Norris[36] (0.321, 95% CI: −0.060, 0.620, $p = 0.096$). All correlations are based on weighted vaccine hesitancy scores. Individual-level data may elucidate these conflicting results.

Consistent with our hypotheses, table 1 shows that anti-establishment worldview is a statistically significant predictor of vaccine hesitancy. Citizens who are not concerned by the rise of opposition to 'traditional' elites exhibit more vaccine hesitancy than those who are concerned (table 1, model 1). Our alternative measures reinforce those results (table 1, model 2): we find greater vaccine hesitancy among individuals who do not trust the media; placing greater trust in the internet or one's personal social network than in healthcare professionals for information on vaccines is associated with the largest coefficients in the model.
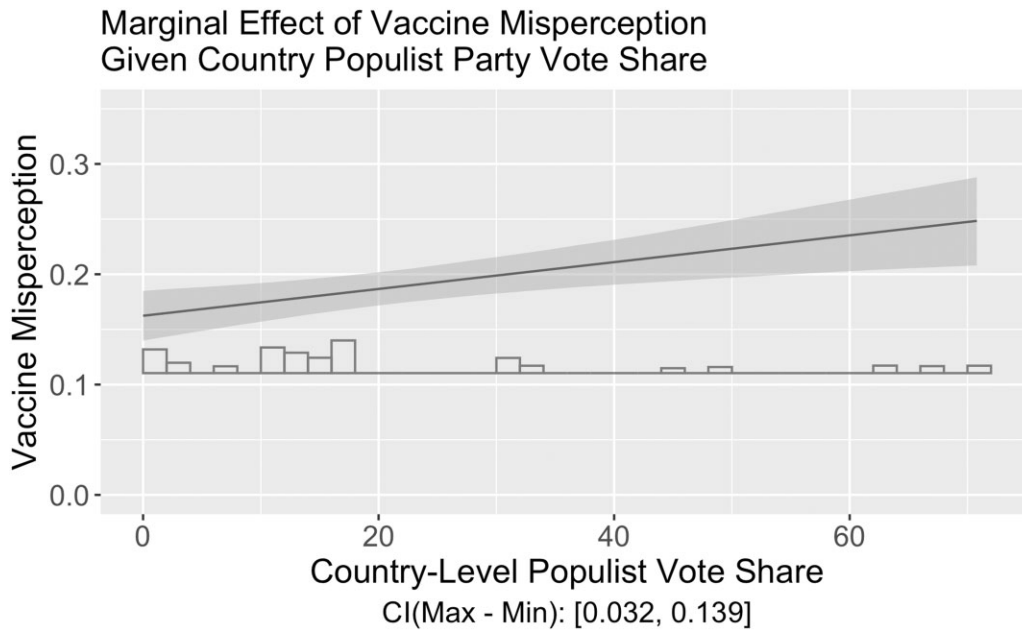
Figure 3 Marginal effects plot showing the marginal effect of vaccine misperceptions on vaccine hesitancy by populist party vote shares

Citizens' positions on the cultural dimension of conflict are statistically significant and substantively important. In contrast, measures capturing the conventional left-right political ideology dimension are mostly not statistically significant. For instance, we find respondents who are left leaning to exhibit less vaccine hesitancy than those who position themselves in the centre. Even these differences are only statistically significant in models 1 and 2 (see also the Supplementary appendix).

Our socio-economic controls variables—social class, education and urban/rural residence—have a significant relationship with vaccine hesitancy, but the effect sizes are smaller than those of anti-establishment worldviews and cultural ideology. A higher social class and higher levels of education are related to lower levels of vaccine hesitancy. Individuals in rural areas and small towns exhibit more vaccine hesitancy than those in large towns.

We do not find that the strength of populist parties is a statistically significant predictor of vaccine hesitancy (table 1, models 3–4). We also do not find an effect when restricting the sample to far-right populist parties (Supplementary appendix table S4), nor when we only include Western European countries (in line with Kennedy[4]; Supplementary appendix table S4, model 2).

Additionally, we test the relationship between populist parties and vaccine hesitancy at the regional level (Supplementary appendix tables S4–S6). This allows us to conduct a more fine-grained analysis and enlarges the N to 245 regions (rather than 28 countries). Our subnational analysis adds populist and far-right populist vote shares from the 2019 EP election to the multilevel model as a predictor at the subnational level nested in the country level. Populist and far-right parties are again identified with the PopuList.[29] Neither populist vote shares nor the vote shares of far-right populist parties are a statistically significant predictor of vaccine hesitancy. This remains the case when restricting the country sample to the countries in Kennedy's analysis and when broadening out the sample to more EU countries.

Next, we test whether the political context conditions the relationship between vaccine misperceptions and vaccine hesitancy by including an interaction between vaccine misperceptions and populist party vote shares. Figure 3 shows a marginal effect plot of the interaction. Where populist parties are stronger, the association between vaccine-related misperceptions and vaccine hesitancy seems to be stronger. However, additional robustness diagnostics[37] do not show unequivocal support for an interaction (see Supplementary

appendix figures S1 and S2). We conclude that there is not enough evidence to support hypothesis 4. In sum, we believe that more research is needed to assess the role of populist parties in the relationship between vaccine-related misperceptions and vaccine hesitancy.

Finally, to examine the potential relationship between populism and vaccine behaviour over time, we conduct a time-series analysis based on aggregate support for these parties from 2002 to 2018 and corresponding immunization coverage rates in subsequent years. If populist parties drive vaccine hesitancy, we would expect an increase in populist party support to be related to a subsequent decrease in vaccination uptake. We employ random and fixed effects time-series models with a time lag of $t - 1$ (Supplementary appendix tables S8 and S9). Irrespective of whether the model includes country fixed effects or country random effects, we do not find a relationship between populist party support and vaccine uptake (i.e. an increase in populist party support at time $t - 1$ does not present as lower vaccine uptake at time t).

Discussion

Our analysis shows that vaccine hesitancy is associated with anti-elite sentiment. We also find that vaccine hesitancy is related to ideological positions, but more in terms of the cultural dimension of political conflict than the conventional (and more economic) left-right dimension. While we do not find the relationship at the aggregate level that Kennedy[4] showed, we do find support for the argument on the relationship between anti-elite sentiments and vaccine hesitancy that he outlined. The result of our time-series analysis further suggests that populist parties themselves are not likely to directly drive vaccine hesitancy.

The relationships between anti-expert world views, populist parties and vaccine hesitancy raises an important question of causality: do populist parties fuel vaccine hesitancy or is it citizens' ideological orientations that are the antecedent of both the success of populist parties and vaccine hesitancy? We shed light on this question, but more research is needed. Our analysis of the (pre-pandemic) EU in 2019 suggests that the attitudes that underlie support for populism are also linked with vaccine hesitancy. While party leaders may not cue supporters to lose trust in vaccines directly, our findings are consistent with an account in which these parties instead mobilize

general anti-elite sentiment, which may have an unwelcome 'side effect' of increasing vaccine hesitancy.

As with any study, our analysis comes with limitations. The cross-sectional nature of our data does not allow us to show the causal direction. While our time-series analysis helps in that regard, ecological inference problems remain a challenge. That said, we believe that general political orientations would drive attitudes towards vaccines,[38] rather than the reverse. Future research should engage this issue with panel data or, where possible and ethical, through vignette or conjoint experiments. Omitted variable bias also remains a concern. For instance, attitudes towards vaccines can be driven by conspiratorial thinking,[39] which is itself associated with anti-elite beliefs. No study can realistically account for every variable that might matter. We are confident that we have an appropriate set of controls, but future work could employ additional ones (e.g. conspiratorial thinking).

Perhaps most importantly, we note that there are multiple theoretical mechanisms behind a populist party support and vaccine hesitancy correlation. We contribute evidence that may support an account in which anti-elitism increases both, such that populist party support could be correlated with vaccine hesitancy if we do not take into account anti-elitism. However, anti-elitism may also increase hesitancy under conditions in which populist parties fail to gain electoral support. This account departs from what others often pose—that certain political parties may engage in anti-vaccine messaging, which in turn may influence supporters.[4,7] Kennedy[4] uses anecdotes from Italy, France and Greece to illustrate this point. Like prior work, however, our study is likewise ill-suited to test this mechanism. Indeed, research establishing the vaccine positions of parties across Europe would be an important first step on this front.

The suboptimal levels of vaccine confidence and the rise of European populist parties are likely both tied to more fundamental dimensions of contestation. Successful interventions may need to address broader societal concerns rather than simply refuting vaccine misperceptions. Employing more comprehensive strategies that address the risks of globalization and inequality might be a way to address disenchantment with politics as well as widespread vaccine hesitancy.[40]

Supplementary data

Supplementary data are available at *EURPUB* online.

Funding

Key points

- Vaccine hesitancy is associated with anti-elite worldviews.
- Vaccine hesitancy is associated with culturally closed (authoritarian) ideology, but not a left-right measure of ideology.
- In contrast to previous findings, we show that vaccine hesitancy is not consistently associated with the strength of populist parties in Europe.
- Pro-vaccine interventions need to consider the underlying worldview, rather than simply targeting misperceptions.

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