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Article

How Politicians' Attacks on Science Communication Influence Public Perceptions of Journalists and Scientists

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Abstract
In today's "post-truth" world, concerns over political attacks on the legitimacy of expert knowledge and scientific facts are growing. Especially populist politicians frequently use their social media platforms to target science and journalism, arguing these are part of an "evil elite," deliberately misleading the public by spreading disinformation. While this type of discourse is highly concerning, thus far, we lack empirical evidence on how these accusations affect the public perceptions of scientists and journalists. To fill this gap, this study tests how politicians' attacks affect citizens' trust in journalists and scientists and the information provided by them. Furthermore, it investigates whether this discourse renders hostility towards journalists and scientists acceptable and whether there are effects on the image of politicians using such anti-science rhetoric. Findings suggest that the effects of politicians' attacks on citizens' perceptions of scientists and journalists are limited. Only individuals with strong anti-elitist attitudes are susceptible to disinformation accusations and indicate less belief in discredited scientific information. Interestingly, these individuals also perceive politicians using such attacks as more trustworthy and authentic.

Keywords
anti-elitist attitudes; disinformation accusations; incivility; media trust; political attacks; populist communication; science communication; science trust

Issue
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1. Introduction

While not new, concern over harsh criticism and direct attacks on scientists and journalists—also expressed by political officials—has been growing in recent years (Krämer & Klingler, 2020; Nogrady, 2021; United Nations et al., 2021). Especially on social media, which has become a growing platform for science communication (Schäfer, 2017), accurate media portrayals of scientific findings are frequently shared alongside critical commentary and anti-science rhetoric (Schäfer et al., 2019). Political actors regularly attack media and science when it contradicts their political agenda (Druckman, 2017; Krämer & Klingler, 2020; Smith, 2010), frequently portraying them as a source of "fake news" and disinformation. This disinformation discourse is particularly popular among populist politicians, who argue that scientists and journalists are part of an "evil elite," deliberately misleading the public (Egelhofer et al., 2021; Egelhofer & Lecheler, 2019; Hameleers & Van der Meer, 2021; Mede & Schäfer, 2020). In the context of decreasing trust in science and journalism and growing online hostility towards experts, this type of discourse is highly concerning and has been characterized as "one of the most important challenges to science communication today" (Krämer & Klingler, 2020, p. 254). If these verbal attacks impede effective science communication on pressing challenges such as climate change or pandemics, it can have severe consequences for humanity (e.g., Druckman, 2017). However, thus far, there is minimal evidence of the effects of politicians' attacks on science and journalism (but see Hameleers & Van der Meer, 2021). Against this backdrop, this pre-registered survey experiment (N = 548) explores how politicians' attacks

affect citizens' perceptions of scientists and journalists, the information they provide, and the perceptions of the politicians using these accusations. It furthermore considers whether anti-elitist attitudes moderate any of these effects.

2. Politicians' Attacks Against Journalists and Scientists on Social Media

Public perceptions of science are not only determined by the communicative efforts of science itself but shaped by (political) communication *about* science (Akin & Scheufele, 2017). Given that most people only come in contact with science through its media portrayals, media presentation is a crucial factor influencing citizens' trust in science and scientific knowledge (Schäfer, 2016; Schäfer et al., 2019). However, today, news consumption increasingly takes place on social media (Newman et al., 2019), where (science) news is not presented in isolation but is frequently accompanied by harsh criticism (Schäfer et al., 2019; Wyatt, 2018). In other words, the consumption of science communication on social media is often intertwined with the consumption of its criticism.

Of course, criticism of science and journalism is not destructive per se; it is even necessary to ensure that these institutions fulfill their democratic functions (e.g., Wyatt, 2018). However, many political actors increasingly discredit science and media strategically to undermine narratives that contradict their political agenda (Corbyn, 2019; Druckman, 2017; Egelhofer et al., 2021). While politicians' criticism of science or media is nothing new (Oreskes & Conway, 2011; Watts et al., 1999), social media enable the dissemination of attacks that otherwise would not have passed through journalistic gatekeeping. Especially populist politicians frequently use social media to spread anti-media and anti-science criticism and highlight their opposition to elite institutions (Egelhofer et al., 2021; Engesser et al., 2017; Hameleers & Van der Meer, 2021).

Such criticism is likely with consequences. There is considerable evidence of the persuasiveness of political elite cues. Verbal cues from politicians can serve as heuristics that people rely on to form beliefs without investing much mental energy (Smith, 2010; Watts et al., 1999). For example, extant research shows that media bias accusations—a persistent theme in politicians' media criticism—increase citizens' bias perceptions, even for unbiased news coverage (Smith, 2010).

Today, one central theme of politicians' anti-media and anti-science communication is accusing these sources of spreading disinformation, "fake news," or "fake science." In doing so, these media and science are portrayed as malicious groups that intentionally lie and pursue hidden interests (Egelhofer & Lecheler, 2019; Hameleers & Van der Meer, 2021). The threat of (scientific) mis-and disinformation is a prominent theme in public discourse (Scheufele & Krause, 2019), leaving citizens highly concerned about being deceived by available information (Newman et al., 2019). Thus, citizens are likely susceptible to politicians' attacks featuring disinformation accusations.

Politicians' attacks can aim at two different addressees relevant to science communication: (a) scientific actors and institutions as the original source of science communication and (b) journalistic actors and institutions as the mediating source of science communication. In this study, we test the effects of attacks against both types. Specifically, we expose participants to social media posts by a politician who shares science news stories accompanied by disinformation attacks that either target the journalists as the source of the news stories or the scientists as the source of the scientific findings that the news report on.

First, politicians' media attacks likely impact citizens' trust in journalists. Journalists hold a central role as mediators of science communication (Schäfer, 2016). That is, most citizens have no direct interaction with scientific actors or institutions. Their knowledge and perceptions about science are thus primarily based on media representations (Schäfer, 2016). Unable to fact-check each piece of information themselves, citizens need to trust journalists' intentions and capabilities to provide them with accurate scientific knowledge (Strömbäck et al., 2020). However, extant research shows that trust in journalists is vulnerable to politicians' criticism (Ladd, 2012). Specifically, if politicians accuse them of spreading disinformation, citizens might conclude that journalists intentionally disseminate inaccurate scientific information. Thus, these attacks might harm their trust in journalists:

> H1a: Exposure to politicians' attacks against journalists decreases trust in journalists.

Second, politicians' science attacks likely also affect citizens' trust in scientists as the source of scientific information. As "science is a specialized, expert endeavor difficult to comprehend for outsiders" (Schäfer, 2016, p. 1), to learn about and make use of science, citizens need to trust that scientists have the expertise, integrity, and benevolence to provide them with factual scientific information (Hendriks et al., 2016). However, if scientists are accused of intentionally spreading false information, it likely hurts public perceptions of their integrity and benevolence and thus results in decreased trust in scientists. In line with this, Hameleers and Van der Meer (2021) find that when scientists are blamed for being dishonest, it has adverse effects on how the public perceives them:

> H1b: Exposure to politicians' attacks against scientists decreases trust in scientists.

In addition, we expect a spill-over effect in that politicians' attacks on journalists might also decrease trust in scientists, while politicians' attacks on science might also decrease trust in journalists. There are several reasons

for this assumption: First, when politicians' attacks are attached to science news on social media, both journalistic actors (source of the news story) and scientific actors (source of scientific information) are salient. Thus, even though the actual attack might target only one of these actor groups, people might interpret it as criticism of both the involved journalistic and science actors. Second, since most people only come across scientific information through *mediated* science communication (Schäfer, 2016), some people might generally not differentiate between the originating (scientific) and the mediating (journalistic) source. These people might lack knowledge about the science communication process and may consequently perceive scientific information as a product of one common group of knowledge-generating actors. Therefore, when a politician attacks one part of this group, people might infer that the entire group is not trustworthy. Third, people who differentiate between scientists and journalists might still be prone to this spill-over effect. On the one hand, they may assume that if a journalist is spreading disinformation about a study, the scientists must also be unreliable because they did not prevent or even support the spread of false reports of their study. On the other hand, people may react with decreased trust in journalists when a politician accuses the scientists of disinformation because they assume the journalist did not fact-check the scientific information and allowed the misleading information to be disseminated:

> H2: There are spillover effects such that politicians' attacks against journalists decrease trust in scientists, while attacks against scientists decrease trust in journalists.

These attacks might also have negative consequences beyond trust perceptions. For example, it is argued that politicians' increasing usage of incivility, untruths, and "outright denials of facts" has helped normalize such discursive practices (Higgins, 2016, p. 9; see also Levitsky & Ziblatt, 2018). Accusing others of intentionally lying is usually considered disrespectful or uncivil (Coe et al., 2014). However, witnessing political elites using these harsh accusations might desensitize citizens to uncivil behavior toward scientists and journalists:

> H3a: Exposure to politicians' attacks against scientists increases the acceptance of incivility toward scientists.

> H3b: Exposure to politicians' attacks against journalists increases the acceptance of incivility toward journalists.

Moreover, attacks featuring disinformation accusations likely also affect attitudes toward the information journalists and scientists provide. As outlined before, citizens are likely quite susceptible to disinformation accusations and, thus, potentially misled in their assessment of the accuracy of accused information. Indeed, initial studies show that when disinformation accusations accompany news stories on social media, citizens perceive discredited news content as less accurate (e.g., Egelhofer et al., 2022). Furthermore, citizens who feel disinformed about scientific issues are likely less willing to conform to policies based on scientific evidence (Hameleers et al., 2020). Therefore, the following hypothesis reads:

> H4: Exposure to politicians' attacks against scientists or journalists has a negative effect on belief in discredited scientific information and support for related policies.

Lastly, we pre-registered an exploratory analysis of whether using attacks against science and journalism might also affect citizens' perceptions of the politician using such attacks. Specifically, we consider how this rhetoric affects politicians' perceived trustworthiness and authenticity. On the one hand, uncivil lying attacks violate citizens' social norms about public discourse. In line with this, politicians' use of uncivil rhetoric has been found to decrease their perceived trustworthiness (Goovaerts & Marien, 2020). On the other hand, such violations of conversational norms might affect their perceived authenticity (Hahl et al., 2018). Authenticity is a fluid concept that can be defined in different ways. Still, many scholars agree that the perceived authenticity of politicians can be understood as the degree to which they remain true to themselves (Luebke, 2021, p. 635). Thus, violating social norms of discourse by attacking established institutions in an uncivil way might be perceived as authentic in times of anti-establishment politics (Hahl et al., 2018). Therefore, we investigate the following:

> RQ1: How does exposure to politicians' attacks against scientists or journalists affect the perceived trustworthiness and authenticity of politicians?

3. The Role of Anti-Elitist Attitudes

Attacks against science and journalism are arguably most effective for people who are already skeptical of these actors. When individuals hold anti-elitist attitudes, i.e., hostile and distrustful views of elites, they are likely more easily convinced that these actors are lying. Anti-elitism is the core of populism and describes a view of an inherent conflict between "good" and ordinary people and an "evil" privileged societal elite (Jagers & Walgrave, 2007; Merkley, 2020; Mudde, 2004). Importantly, this Manichean worldview "stands in opposition to the possibility of truth-telling as a collective effort to produce agreed-upon facts and reach consensus on the correspondence between assertions and reality" (Waisbord, 2018, p. 18). Therefore, anti-elitism is directed toward all elite institutions that once held a hegemonic position

in defining what is true, mainly the political elites, mainstream news media, and scientific actors and institutions (Waisbord, 2018). In line with that, populist actors not only attack the political establishment but increasingly target media and science elites. These are often blamed for either conspiring with or being instrumentalized by the political elites (Eberl et al., 2021; Fawzi, 2020; Jagers & Walgrave, 2007; Krämer, 2018; Mede & Schäfer, 2020). While populism research long conceptualized the political establishment as the main elite that populists are opposed to, recent work stresses the importance of expanding this conceptualization to the media elites (coined as "anti-media populism"; Krämer, 2018) and scientific or academic elites (coined as "science-related populism"; Mede & Schäfer, 2020; see also Eberl et al., 2021). Therefore, in this study, we conceptualize anti-elitism as negative attitudes towards the political elite, the media elite, *and* the academic elite.

Importantly, extant research shows that anti-elitist attitudes are related to negative attitudes toward the media (Fawzi, 2019) and science (Eberl et al., 2021). Specifically, studies that investigate how the individual components of populist attitudes (i.e., anti-elitism, homogeneity of the people, demand for sovereignty, and anti-outgroup attitudes) each relate to negative media perceptions suggest that anti-elitist attitudes are the strongest predictor of negative media perceptions (e.g., Fawzi, 2019). Anti-elitism is furthermore linked to conspirational thinking, another attitude related to mistrust of experts and established knowledge (Castanho Silva et al., 2017). Therefore, we expect that:

> H5: The negative effects of politicians' attacks on (a) trust in journalists and scientists, (b) acceptance of incivility towards journalists and scientists, and (c) issue perceptions are stronger for individuals with strong anti-elitist attitudes.

4. Method

4.1. Design and Procedure

This study was preregistered (https://bit.ly/3SBvpJ3) and approved by the university institutional review board. We deviate from this preregistration in two ways: First, the wording and numbering of the hypotheses changed slightly (but the expectations remain the same); second, we preregistered a sample size of 750 to account for main and interaction effects. However, due to a large part of the sample failing the attention checks, the sample size is smaller (as discussed in Section 4.3).

Our study is set in Austria, where populist anti-elite rhetoric and disinformation accusations against media and science have been used frequently by political actors (e.g., by the Austrian Freedom Party and the People's Party; e.g., Wodak, 2019). Furthermore, in a recent survey of public attitudes towards science across European countries, Austrians rank below the European average for most surveyed attitudes (European Commission, 2021). For example, almost one-third of Austrians indicated that the characteristic "honest" describes scientists badly (European Commission, 2021, p. 182), and more than half (54%) think scientists are not altruistic (European Commission, 2021, p. 184).

We used a between-subjects online survey experiment, including a 3 (journalism attack vs. science attack vs. control) factorial design. Participants were randomly assigned to one of the three groups. After providing informed consent, participants answered questions about their socio-demographics and anti-elitist attitudes. Then, they were exposed to the stimulus and responded to questions measuring the dependent variables, followed by manipulation checks and a thorough debrief.

4.2. Stimulus

All groups were exposed to a fictional politician's Twitter page on which two news article previews are shared that each report on the findings of a scientific study. One news headline reports the scientific finding that e-cars are more environmentally friendly than diesel/gas cars. The second news article covers research that finds that women are considered more competent in leadership positions. Some tweets by the politician provide additional information from these articles. In the science attack condition, the politicians' tweets included accusations against scientists as the producers of the studies (e.g., "What the scientists have come up with again #fakescience" or "it is hardly news that scientists lie"). In the journalism attack condition, the politician attacked journalists as the messengers of the scientific studies (e.g., "What the journalists have come up with again #fakenews'' or "it is hardly news that journalists lie"). In the control condition, there are no attacks.

To ensure mundane realism to the best extent, a real news outlet was indicated as the source (i.e., the Austrian daily newspaper *Kleine Zeitung*). The news previews focused on factual information from actual news coverage of existing scientific studies. Furthermore, the page featured some non-related, private tweets (e.g., "Happy weekend"). The entire stimulus material is provided as supplementary materials.

4.3. Sample

A varied sample of Austrian citizens (18 and older; M = 47.85, SE = 0.66; 51.09% female) was recruited by panel agency *Dynata*. Power analysis with G*power estimated that a sample size of 550 is necessary to identify even small main effects (f^2 = 0.02, power of 0.80, given α = 0.05). We included two attention checks in our survey. One was an instructed-response item inserted in the item battery on trust in journalists asking respondents to "please select '10 Agree completely'" (see, e.g., Kung et al., 2018). The second attention check entailed a multiple-choice question, asking for the topics of the

two news article previews that were present in all three conditions (one correct answer out of four options). Participants who failed one of them were excluded, resulting in a final sample of N = 548. It is important to note that this sample size might be suboptimal for analyzing interaction effects which are said to require up to 16 times bigger sample sizes. Therefore, we will interpret these effects with caution (see also Hameleers & Van der Meer, 2021)

4.4. Manipulation Check

Respondents indicated their agreement with two statements about the Twitter page: "The politician criticized journalists" and "the politician criticized scientists." Participants in the science attack condition were more certain that scientists were criticized (M = 4.95, SE = 1.69) than participants in the journalism attack condition (M = 4.05, SE = 1.76) and the control condition (M = 2.69, SE = 1.61), F(2, 548) = 84.47, p < 0.001. Post hoc analyses indicated that all three conditions significantly differed from each other in their assessment of science criticism.

Participants in the journalism attack condition (M = 4.92, SE = 1.67) were slightly more convinced that journalists were criticized than participants in the science attack condition (M = 4.64, SE = 1.70) and control condition (M = 2.98, SE = 1.77), F(2, 548) = 66.69, p < 0.001. However, post hoc analyses indicated that the attack conditions significantly differed from the control condition but not from each other. Therefore, we will treat direct comparisons between the experimental conditions with caution.

4.5. Measures

If not stated otherwise, all items were measured on 7-point scales. Trust in Journalists was adapted from Strömbäck et al. (2020), asking how suitable the characteristics "fair," "unbiased," "tell the whole story," "accurate," and "separate facts from fiction" are to describe journalists in Austria, who work for major TV stations and newspaper publishers (Cronbach's α = 0.90, M = 3.77, SE = 0.5). Trust in Scientists was measured by two items for three dimensions (expertise, integrity, benevolence; Hendriks et al., 2016): Again, participants rated the suitability of different characteristics to describe scientists in Austria: competent, qualified, honest, sincere, responsible, moral (Cronbach's α = 0.94, M = 4.89, SE = 0.5).

The measurement of Acceptance of Incivility Towards Journalists [Scientists] was adapted from Post (2017). Participants rated whether an example of an uncivil social media comment is (a) justified, (b) understandable, or (c) unacceptable (Journalists: Cronbach's α = 0.78, M = 2.86, SE = 0.07; scientists: Cronbach's α = 0.75, M = 2.66, SE = 0.06).

Politician Perceptions were measured by asking respondents to indicate how trustworthy (M = 4.74, SE = 0.07) and authentic (M = 4.61, SE = 0.07) they perceived the politician.

As explained above, we conceptualize Anti-Elitist Attitudes as negative attitudes toward the political, journalistic, *and* academic elite. However, to the best of our knowledge, no scale currently exists that assesses negative attitudes towards all three of these groups. Therefore, we have utilized items from established scales that measure negative attitudes towards one of these elite groups, which have been validated in prior research. Specifically, for the political elite, we chose two items with the highest factor loadings from Schulz et al. (2018), e.g., "Politicians are not really interested in what people like me think." For the scientific elite, we chose those two items from Mede et al. (2021) that measure anti-science elite attitudes: "Scientists are in cahoots with politics and business" and "scientists are only after their own advantage." To the best of our knowledge, there is no validated scale for measuring anti-media-elite attitudes. Therefore, we selected one item from Fawzi (2019, p. 159) that alludes to anti-elite perceptions of news media: "With their media coverage, the media support the country's powerful, that is, the state, government or businesses." Additionally, we adapted one item from Mede et al. (2021): "Journalists are only after their own advantage." This combination showed sufficient scale reliability (Cronbach's α = 0.83, M = 4.36, SE = 0.06).

5. Results

5.1. Effects on Perceptions of Scientists and Journalists

To test the effects of politicians' attacks on the perceptions of scientists and journalists (H1a–H5b), a series of OLS regressions were conducted (see Table 1). The main effect analyses were conducted on the whole sample, while the models, including the interaction coefficients, compared one experimental group with the control.

We expected that exposure to politicians' attacks on journalism decreases trust in journalists (H1a) and politicians' attacks on science decrease trust in scientists (H1b). As shown in Table 1, there is no effect of an accusation against journalism on trust in journalists (b = −0.17, SE = 0.13 p = 0.18, Model 1) and no effect of an accusation against science on trust in scientists (b = 0.11, SE = 0.11, p = 0.31, Model 4). Next, we expected that there would be spillover effects such that the politicians' attacks against journalists (scientists) decrease trust in scientists (journalists; H2). Again, there is no effect of a science attack on trust in journalists (b = −0.17, SE = 0.12 p = 0.15, Model 1) and no effect of a journalism attack on trust in scientists (b = 0.15, SE = 0.11, p = 0.18, Model 4). In sum, reported levels of trust in journalists did not differ between the control group (M = 3.86, SE = 0.09) and two experimental groups (journalism attack: M = 3.74, SE = 0.1 Cohen's d = 0.1; science attack: M = 3.71, SE = 0.09, Cohen's d = 0.12). Similarly, reported levels of trust in scientists did not differ between the control

Table 1. OLS regression models predicting citizens' perceptions of scientists and journalists.

	Trust						Acceptance of Incivility			
	Journalists			Scientists			Journalists		Scientists	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Journalism attack	–0.166	–0.120		–0.148	–0.091		0.056	–0.619	0.051	
	(0.125)	(0.452)		(0.110)	(0.396)		(0.148)	(0.521)	(0.141)	
Science attack	–0.174		0.467	–0.109		0.173	–0.027		0.024	0.261
	(0.121)		(0.420)	(0.107)		(0.366)	(0.144)		(0.137)	(0.484)
Anti-elitist attitudes	–0.379***	–0.321***	–0.321***	–0.412***	–0.383***	–0.383***	0.492***	0.408***	0.507***	0.506***
	(0.038)	(0.072)	(0.069)	(0.034)	(0.063)	(0.060)	(0.046)	(0.083)	(0.043)	(0.079)
Journalism attack * anti-elitist attitudes		–0.009			–0.013			0.154		
		(0.099)			(0.087)			(0.114)		
Science attack * anti-elitist attitudes			–0.146			–0.064				–0.055
			(0.092)			(0.080)				(0.106)
Constant	5.541***	5.284***	5.284***	6.770***	6.645***	6.645***	0.707***	1.081***	0.425**	0.431
	(0.191)	(0.329)	(0.315)	(0.168)	(0.288)	(0.274)	(0.226)	(0.379)	(0.215)	(0.363)
Observations	548	#	373	548	352	373	548	352	548	373
Adj. *R*-squared	0.151	0.105	0.176	0.212	0.182	0.228	0.173	0.170	0.198	0.175

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

group (M = 4.95, SE = 0.07) and the two experimental groups (journalism: M = 4.85, SE = 0.09, Cohen's d = .09; science: M = 4.87, SE = 0.83, Cohen's d = 0.07).

Moreover, there is no significant interaction between anti-elitist attitudes and the journalism attack on trust in either journalists (b = −0.01, SE = 0.1, p = 0.93, Model 2) or scientists (b = −0.01, SE = 0.09, p = 0.89, Model 5). Similarly, there is no interaction between anti-elitist attitudes and the science attack on trust in either journalists (b = −15, SE = 0.09 p = 0.11, Model 3) or scientists (b = −0.06, SE = 0.08, p = 0.42, Model 6). We thus find no support for H1a, H1b, H2, and H5a.

Furthermore, there are no significant effects of the attacks on acceptance of incivility towards journalists (journalism attack: b = 0.06, SE = 0.15, p = 0.71; science attack: b = −0.03, SE = 0.14, p = 0.85, Model 7) or scientists (b = 0.05, SE = 0.14, p = 0.72, b = 0.02, SE = .14, p = 0.87, Model 9). That is, individuals exposed to a journalism attack did not indicate higher levels of acceptance of incivility towards journalists (M = 2.88, SE = 0.12, Cohen's d = −0.00) compared to individuals in the control condition (M = 2.88, SE = 0.11). Participants exposed to a science attack did not indicate higher levels of acceptance of incivility towards scientists (M = 2.67, SE = 0.11, Cohen's d = 0.06) than participants in the control group (M = 2.66, SE = 0.11). Lastly, there is no significant interaction between anti-elitist attitudes and the journalism attack on acceptance of incivility towards journalists (b = 0.15, SE = 0.11, p = 0.18, Model 8) or scientists (b = −0.06, SE = 0.11, p = 0.61, Model 10). The results do not support H3 and H5b.

5.2. Effects on Issue Perceptions

To test the effects of politicians' attacks on belief in the scientific information and support for related policies (H4), as well as the moderating role of anti-elitist attitudes for these effects (H5c), we pooled the two attack conditions (see Table 2). Model 1 shows that there is no effect of the attacks on participants' belief that women have better leadership competence (b = −0.10, SE = 0.14, p = 0.46, Model 1; attack conditions: M = 4.05, SE = 0.08; control: M = 4.15, SE = 0.11; Cohen's d = 0.07). Similarly, there are no direct effects of the accusations on participants' belief that E-cars elicit fewer greenhouse gases than conventional cars (b = −0.24, SE = 0.17, p = 0.15, Model 3; attack conditions M = 4.60, SE = 0.10; control: M = 4.81, SE = 0.14; Cohen's d = 0.11). There is no support for H4. However, there are marginally significant interaction effects of anti-elitist attitudes and the attack conditions on both the belief that women have better leadership competence (b = −0.21, SE = 0.11, p = 0.05, Model 2) and the belief that E-cars elicit fewer greenhouse gases than conventional cars (b = −0.26, SE = 0.13, p = 0.05, Model 4). Figure 1 plots the marginal effects and shows that the attacks (versus the control condition) only have a negative effect on individuals with very strong anti-elitist attitudes.

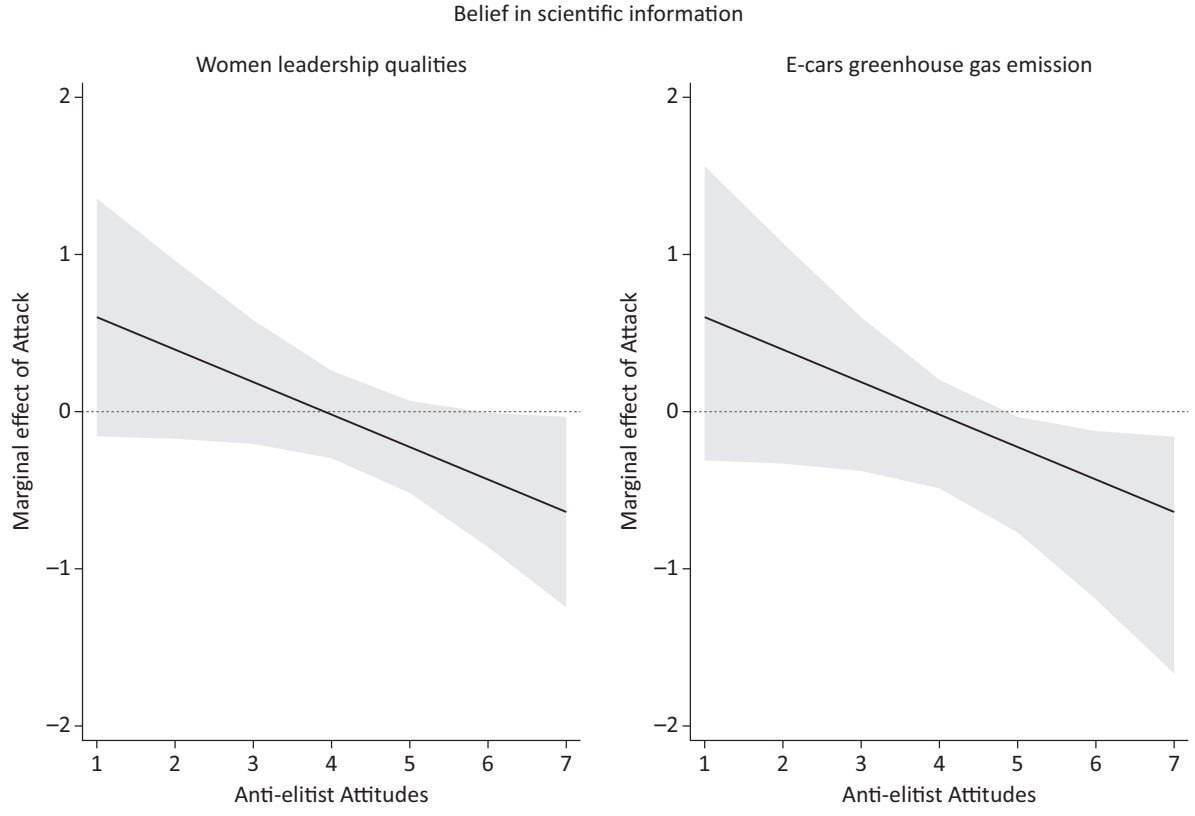

Figure 1. Average marginal effects of attack conditions (vs. control) on belief in scientific information for different levels of anti-elitist attitudes.

Next, we find no effect of the accusations on participants' support for policies relating to the scientific information (i.e., policy 1—a gender quota in supervisory boards: b = 0.00, SE = 0.18, p = 0.98, Model 5; attack conditions: M = 4.55, SE = 0.10, control condition: M = 4.54, SE = 0.15, Cohen's d = −0.01; and policy 2—governmental subsidies for the purchase of e-cars: b = −0.03, SE = 0.18, p = 0.89, Model 7; attack conditions: M = 4.43, SE = 0.12, control condition: M = 4.41, SE = 0.15, Cohen's d = −0.01). Moreover, there is also no interaction between anti-elitist attitudes and attacks on support for related policies (policy 1: b = −0.23, SE = 0.14, p = 0.1, Model 6; policy 2: b = −0.03, SE = 0.14, p = 0.86, Model 8). Taken together, these findings provide only limited support for H5c.

5.3. Effects on Politician Perceptions

Lastly, we again pooled the attack conditions to test the effects of science/media attacks on perceptions of the politician using these. As shown in Table 3, attacks on science and media have a significant main effect on how authentic (b = −0.52, SE = 0.14, p = 0.00, Model 1) and trustworthy (b = −0.66, SE = 0.14, p = 0.00, Model 3) people perceive politicians using these accusations. That is, participants in the attack conditions perceived the politician as less authentic (M = 3.12, SE = 0.08) compared to the control condition (M = 3.71, SE = 0.10; Cohen's d = 0.40) and less trustworthy (M = 3.05, SE = 0.09) compared to the control condition (M = 3.71, SE = 0.10; Cohen's d = 0.42). Furthermore, there are significant interaction effects of the attacks and anti-elitist attitudes on perceived authenticity (b = 0.57, SE = 0.42, p = 0.00, model 2) and trustworthiness (b = 0.56, SE = 0.11, p = 0.00., Model 4). Figure 2 plots the marginal effects and shows that the attacks only appear to have a negative effect on individuals with weak to medium anti-elitist attitudes. However, individuals with strong anti-elitist attitudes perceive politicians using these attacks as more authentic and trustworthy.

6. Conclusions

In today's digitalized information environment, science communication is increasingly accompanied by politicians' criticism. Particularly notable are disinformation accusations as a political strategy to exploit citizens' fears about being fooled by fake news and pseudo-science. While concerns about this discourse of science denial are growing, thus far, we do not know much about its consequences.

Our findings suggest that politicians' attacks on science and journalism have no impact on citizens' general trust in these institutions. We also do not find evidence that these attacks desensitize people to incivility toward scientists and journalists. Thus, our study provides initial evidence that public perceptions of scientists and journalists are quite resistant to criticism by unknown politicians. In this aspect, the null findings provide evidence for the stability of *generalized* attitudes toward these institutions. However, suppose we had tested the effects of attacks on the perceptions of a

Table 2. OLS regression models predicting citizens' perceptions of scientific information.

	Belief in Information				Policy Support			
	Women leadership competence		E-cars greenhouse gas emission		Women leadership competence		E-cars greenhouse gas emission	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	b(*SE*)	*b*(*SE*)	*b*(*SE*)	*b*(*SE*)	*b*(*SE*)	*b*(*SE*)	*b*(*SE*)	*b*(*SE*)
Attack (Science/ journalism)	−0.102 (0.137)	0.806* (0.488)	−0.244 (0.169)	0.884 (0.605)	0.004 (0.179)	1.025 (0.640)	−0.025 (0.184)	0.085 (0.660)
Anti-elitist attitudes	−0.0410 (0.049)	0.104 (0.089)	−0.363*** (0.061)	−0.183* (0.111)	−0.070 (0.064)	0.093 (0.117)	−0.479*** (0.066)	−0.461*** (0.121)
Attack * anti-elitist attitudes		−0.207* (0.107)		−0.257* (0.132)		−0.232 (0.140)		−0.025 (0.144)
Constant	4.334*** (0.244)	3.694*** (0.410)	6.411*** (0.302)	5.616*** (0.508)	4.851*** (0.319)	4.132*** (0.537)	6.529*** (0.329)	6.451*** (0.555)
Observations	548	548	548	548	548	548	548	548
Adj. R-squared	−0.001	0.004	0.061	0.065	−0.002	0.002	0.085	0.083

Note: *** p < 0.01, ** p < 0.05, * p < 0.1.

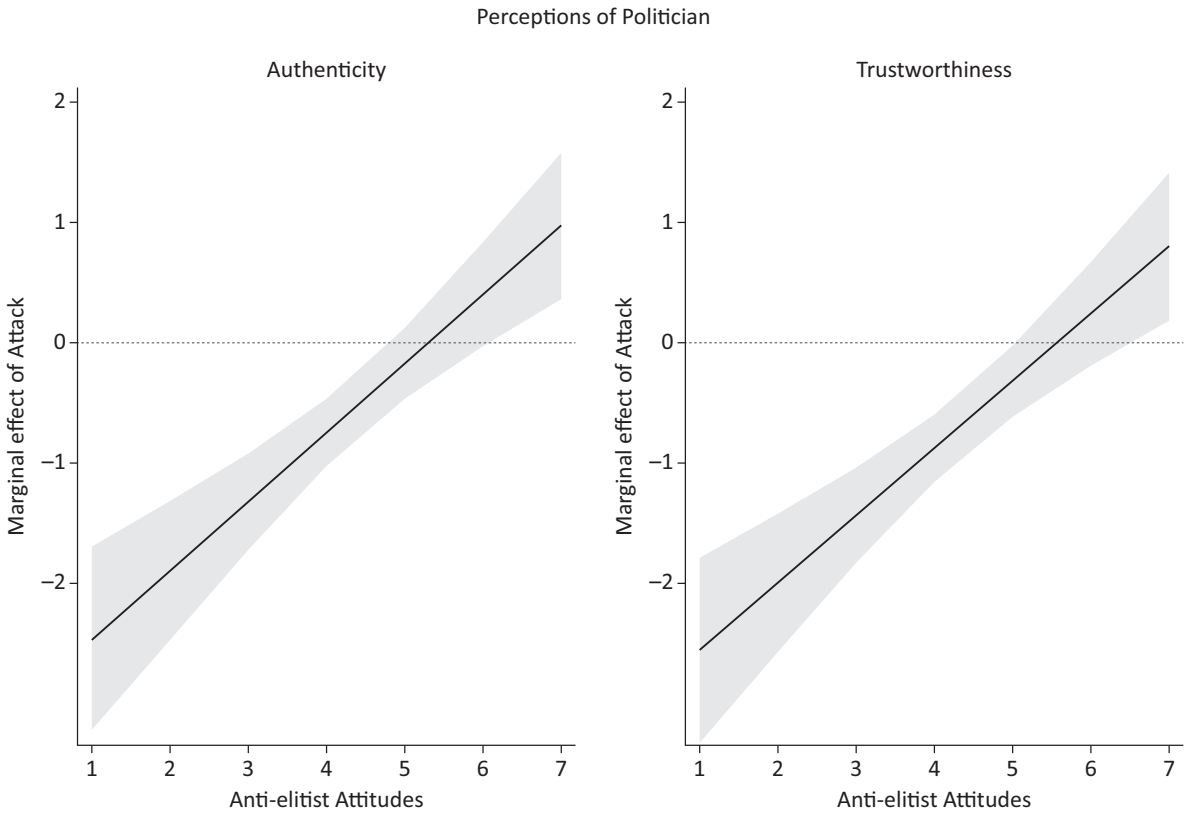

Figure 2. Average marginal effects of attack conditions (vs. control) on perceptions of politicians for different levels of anti-elitist attitudes.

Table 3. OLS regression models predicting citizens' perceptions of politicians.

	Politician Perception			
	Authenticity		Trustworthiness	
	Model 1	Model 2	Model 3	Model 4
	b(*SE*)	*b*(*SE*)	*b*(*SE*)	*b*(*SE*)
Attack (Science/journalism)	−0.518***	−3.036***	−0.659***	−3.123***
	(0.141)	(0.493)	(0.143)	(0.499)
Anti-elitist attitudes	0.011	−0.391***	0.017	−0.375***
	(0.051)	(0.09)	(0.051)	(0.09)
Attack * anti-elitist attitudes		0.573***		0.561***
		(0.108)		(0.109)
Constant	3.70***	5.47***	3.63***	5.37***
	(0.25)	(0.42)	(0.26	(0.42)
Observations	548	548	548	548
Adj. *R*-squared	0.02	0.07	0.04	0.08

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

specific journalist/scientist (e.g., the author of the news article or scientific study at hand). In that case, the results might have been different (see Egelhofer et al., 2022). Individuals tend to make quick character judgments based on little information about unknown actors. Thus, trust in specific scientists/journalists is likely more variable (Akin & Scheufele, 2017) and thus might be more easily hurt by political attacks.

Similarly, the fact that there are no direct effects of exposure to the attacks on beliefs in scientific issues shows that citizens' attitudes towards scientific issues are rather stable and not easily influenced by anti-science communication on social media. That is, participants seem to have formed stable opinions relating to the issues of gender and cars, which are not easily influenced by a single message. However, in this context, it is important to note that we did not measure pre-existing attitudes toward these issues. Citizens form rather strong attitudes toward issues that are important to them. These have been shown to be stable over time (Howe & Krosnick, 2017) and resistant to framing effects (Lecheler et al., 2009). Thus, it is likely that citizens' existing views on feminism or alternative energies might impact their response to political attacks on these topics.

Moreover, our study provides some interesting insights into the role of anti-elitist attitudes. First, contrary to our expectation, we do not find an interaction effect between the attack and anti-elitist attitudes on perceptions of science and journalism. However, Table 1 shows that anti-elitist attitudes have a direct negative effect on trust and acceptance of incivility. Arguably, individuals with strong anti-elitist attitudes already show such negative views on journalists and scientists that they do not "need to be convinced" by political attacks. Thus, these findings indicate again that generalized attitudes towards these institutions are quite stable.

However, turning to the effects on specific issues, there is marginally significant evidence that for people with strong anti-elitist attitudes, these attacks have a negative effect on the belief in scientific information at hand. Furthermore, while for individuals with weak anti-elitist attitudes, such attacks hurt perceptions of the politician, this rhetoric leads individuals with extreme anti-elitist attitudes to perceive politicians as more trustworthy and authentic. These findings indicate that while attacking science and journalism as a political strategy might not affect perceptions of these institutions, it seems to be effective in discrediting specific science communication narratives for a sub-group of the population. Moreover, it appears to be an attractive strategy for populist or "outsider'' politicians to emphasize an anti-establishment position and thereby appeal to a specific voter base (see also Van Dalen, 2021).

Our study comes with several limitations. First, our design entails single, forced exposure to social media messages by an unknown politician. While using anonymous politicians is common practice in research on the effects of political discourse because it allows for isolating the effects of the message from any ideological predispositions (e.g., Goovaerts & Marien, 2020; Van Duyn & Collier, 2019), our design does not allow for a conclusion about the effectiveness of attacks by well-known, established politicians. Future research is thus urgently needed to investigate the effects of real-life political attacks on science communication. Furthermore, as noted in Section 4.3, our sample size might not be sufficient for analyzing interaction effects. Further studies replicating the effects we found are therefore needed. Naturally, our setting also does not allow for statements about the longevity of such effects and the likelihood that participants would expose themselves to such messages in the real world. Furthermore, while we do not find evidence for a normalization of incivility toward journalists and scientists, it is possible that repeated exposure to such attacks indeed increases the acceptance of incivility over time.

Moreover, as noted in Section 4.4, the manipulation check revealed that the experimental conditions were perceived as quite similar. While there was a significant difference between both experimental groups in the perception of whether scientists were attacked, there was no significant difference between the groups in the perception of whether journalists were attacked. Participants in the journalism attack group were convinced that journalists were attacked, while participants in the science attack group were convinced that journalists *and* scientists were attacked. The wording of the tweets might have caused this. In both conditions, the politicians' attacks contained the words "studies" and "articles." Therefore, although the politician directs his attacks against scientists or journalists, participants might have perceived them as directed at both actor groups. Another possibility could be that because, in both conditions, the politician shares journalistic news articles along with his attacks, participants in both groups might have perceived journalists as addressed by the attacks independent of the wording of the tweets. For whichever reason the manipulation failed, the analysis of H2 (spillover effect of attacks) was impeded. Future research could test different wordings of attacks that allow for a cleaner comparison between addressed actors.

Furthermore, we could only include a limited number of topics in our study. Extant research shows that scientific opinions are issue-specific and dependent on predispositions (Akin & Scheufele, 2017). Future research is thus needed to understand how the effects play out for other (new) topics. As mentioned before, this research should also consider participants' existing attitudes. Moreover, we set our study in only one country. As attacks on scientists are reported around the globe (e.g., Nogrady, 2021), testing the effects of this in other national contexts is crucial. Lastly, as previously noted, to measure anti-elitist attitudes, we have employed items from various established scales. However, further research is required to develop and validate a unified

scale that specifically assesses negative attitudes toward political, media, and scientific elite groups.

In summary, this study provides cautious optimism about the impact of unknown politicians' online attacks on generalized perceptions of science communication. However, future studies are urgently needed to test other scenarios, communicators, scientific topics, and national contexts.

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Conflict of Interests

The author declares no conflict of interests.

Supplementary Material

Supplementary material for this article is available online in the format provided by the author (unedited).

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