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The future might be female: how does the public perceive experts?

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ABSTRACT

Recently, scientific experts have become increasingly influential in political decision-making. Although previous research has examined the extent and conditions under which politicians use scientific evidence, we know less about how citizens perceive scientific experts. In this study, we argue that the credibility of experts depends not only on the message they deliver or the medium they use, but also on the individual characteristics of the experts. Using data collected from an original survey experiment among Swiss citizens on climate change ($N = 1{,}854$), this study analyses whether the gender and discipline of experts influence citizens' perceptions of their credibility. The results show that, contrary to our assumptions, citizens do not perceive female experts as less credible than their male colleagues. However, this effect is mainly driven by female citizens who consider female and social science experts as more credible. These findings have important implications for the role of experts in policy-making.

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KEYWORDS Scientific expertise; expert credibility; evidence-informed policy making; climate change; gender bias

Introduction

Scientific experts have recently become more influential in political decision-making in times of crisis (Comfort *et al.*, 2020; Pattyn *et al.*, 2021; Van Dooren & Noordegraaf, 2020). They provide scientific evidence to political elites, who can use this information to make policy decisions. Despite this undeniable importance, scientists do not always receive the highest level of attention in

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our society, especially women. Gender equality has improved significantly in recent years, but women are still often not taken seriously as experts or professionals. Several studies show that women are discriminated against because of their gender, be it in campaigns for political office (Meeks, 2012), in the labour market (Fossati & Liechti, 2020), or in academia (Wilson *et al.*, 2010). Particularly in academia, women are still underrepresented at the faculty level (Avolio *et al.*, 2020). In addition, several studies show that their expertise is often less demanded than that of their male counterparts (Greve-Poulsen *et al.*, 2023; Niemi & Pitkänen, 2017). Despite having the same jobs and skills, women are less likely to be invited to speak publicly about their expertise.

One explanation that is often put forward is that female experts are perceived as less credible than male experts. According to previous studies, credibility can change attitudes (Druckman & Bolsen, 2011), correct misperceptions (Vraga & Bode, 2017) and affect individual behaviour (Muñoz *et al.*, 2016). Credibility is also central to policy advice, as scientific evidence is more likely to find its way into the policy arena if the source is perceived as credible (Bauer *et al.*, 2016; Doberstein, 2017; Montpetit, 2011). Credibility is therefore one of the most important qualities of an expert (Druckman, 2001).

Although previous research has examined the extent to which, and the conditions under which, preferences for evidence-informed policymaking occur (e.g., Bundi & Pattyn, 2023), our understanding of the public's perception of expert credibility is still limited. In particular, we know little about how different experts are perceived and how attributed credibility influences the likelihood of seeking expert advice. While previous studies have examined general perceptions of experts (Dommett & Pearce, 2019; Lachapelle *et al.*, 2014), few studies have explored how citizens distinguish between different experts, i.e., women and men. If true, this could have important implications for the relationship between science and the political arena (see Weible *et al.*, 2020). If citizens do not trust or value scientific evidence, politicians may be less likely to prioritise scientific research and expertise when making policy decisions. Moreover, we argue that these effects may vary according to the background characteristics of citizens. Such subgroup analyses of perceptions of expertise remain limited, focusing on specific variables such as prior attitudes (e.g., Baekgaard *et al.*, 2019) or political ideology (e.g., Bolsen *et al.*, 2015). Our study bridges two key areas of research: While research on expert credibility examines how the public perceives experts, communication studies have primarily examined how female experts are portrayed in the media. We aim to bring these strands together by examining how the public perceives the gender of experts, considering differences across disciplines. Thereby, this study addresses an often-neglected aspect in the literature and highlights the importance of considering discipline-specific differences (Lachapelle *et al.*, 2014).

In this article, we argue that the effectiveness of expert advice does not always depend on the content of its message, but also on who delivers the

message. We investigate whether experts are discriminated against on the basis of their gender and academic discipline. Empirically, we use novel data from a factorial survey experiment conducted in Switzerland in 2019 ($N = 1{,}854$). In the experiment, citizens rated the credibility of an expert based on factually correct statements about the natural and social consequences of climate change. While the statements remained the same throughout the experiment, we randomised the gender and the discipline of the expert who delivered the statement.

The results of the survey experiment show that contrary to our assumptions, female experts are not considered less credible than male experts; in fact, citizens consider them more credible than male experts. This effect is mainly driven by women, who rate female experts as significantly more credible than male experts, while male citizens do not distinguish between male and female experts. Consequently, we find no evidence for the 'Goldberg paradigm' (i.e., female experts are not prejudged by female citizens). Moreover, we do not observe substantial differences in credibility between experts representing the natural and social sciences, and women evaluate social scientists more favourably than men.

These findings make an important contribution to the literature on evidence-informed policymaking by identifying causal effects on how the credibility of experts depends on their characteristics. One of the key challenges in evidence-informed policy making is the gap between the expertise of scientists and the public's understanding and acceptance of scientific evidence. Our study highlights the importance of considering characteristics of experts rather than only focusing on the message of the evidence itself (Cairney, 2016; Greve-Poulsen *et al.*, 2023). In addition, the study adds to our understanding of how gender influences policy design. We already know that women are underrepresented in media coverage (Albaek *et al.*, 2003; Niemi & Pitkänen, 2017) and politics (Barnes & Holman, 2020; Dingler *et al.*, 2019), but our paper shows that increasing the number of women in expert advice may have a more positive value than simply equalising gender representation. It follows that our society may not overvalue male experts regardless of their message, but that a substantial portion of citizens – women – perceive more positively the message from someone of the same in-group (Crepaz *et al.*, 2017). Thus, our findings provide new insights into the factors that influence citizens' perceptions of experts' credibility, which can help inform how experts communicate their findings and recommendations to the public.

We begin the study with a discussion of expert credibility and gender discrimination. Based on previous literature, we argue that experts are judged negatively because of their gender and discipline, even though they may provide the same information. However, we specify several hypotheses in which we expect this discriminatory effect to be conditioned by other

individual factors, such as the respondent's gender, political ideology, and education. This section is followed by a presentation of the experimental design and the data used in the analysis. We then present the results and discuss the normative significance and implications of our findings. We conclude with possible avenues for future research to better understand this phenomenon.

Theory

Policy advice has a long tradition in modern democracies, where individuals or groups with specific knowledge provide information to public authorities. Thus, linking science and policy is seen as an effective way to deal with the uncertainty inherent in complex issues (Ingold *et al.*, 2019). In so doing, policymakers benefit from the knowledge and experience of scientific experts. This so-called *evidence-informed policy-making* is at the heart of the science-policy interface (Head, 2016). According to Sager *et al.* (2020, p. 1338), policy advice is addressed not only to policymakers, but also to the interested public and the media. By stating the nature of a problem and suggesting a possible solution, advice creates bottom-up societal pressure that pushes the political arena to address a problem. Scientists often serve as such experts, especially since the COVID-19 health crisis (e.g., Cairney & Wellstead, 2021; Hadorn *et al.*, 2022; Kuhlmann *et al.*, 2022; Eichenberger *et al.*, 2023). And even more often, experts use the media such as newspapers (Baekkeskov & Öberg, 2017; Pritoni & Galanti, 2022) or social media to disseminate their knowledge (Della Giusta *et al.*, 2021; Zhang *et al.*, 2022).

Previous studies show that female experts are significantly less visible in the media than men (Albaek *et al.*, 2003; Niemi & Pitkänen, 2017). Journalists may select expertise on the basis of relative importance, which is often perceived to be predominantly provided by men (Greve-Poulsen *et al.*, 2023). In general, previous studies argue that how an objective is presented to the audience influences how people process that information (Lecheler & De Vreese, 2019). According to this line of thought, this perception becomes ineffective when its source is considered unbelievable, i.e., the sender (expert) of the message influences how the receiver (public) perceives the information. Consequently, experts quoted in newspapers and the like must be credible to have an impact on their audience (Druckman, 2001).

Credibility is therefore a crucial variable for the relevance of expert advice. We understand credibility as a situational evaluation involving information processing (Go *et al.*, 2016), which distinguishes credibility from related concepts such as trust. Psychologists and communication scholars generally understand credibility as a quality that individuals attribute to various objects or subjects (Hovland *et al.*, 1953; Metzger *et al.*, 2003). However, the conceptualisation and measurement of the construct remain controversial.

For example, source credibility is often conceptualised as multidimensional. Scholars disagree on which dimensions are relevant (McCroskey & Teven, 1999). Moreover, conceptualizations that target expert credibility more specifically are scarce (e.g., Haynes *et al.*, 2011; Hendriks *et al.*, 2015). In this study, we follow Hovland and colleagues (1953) by adopting a two-dimensional understanding of expert credibility consisting of perceptions of expertise and trustworthiness. Expertise is the key aspect of why expert sources are perceived as credible, as experts are considered persons who know what they are talking about (Collins & Evans, 2007), and expert credibility is rooted in perceptions of competence, intelligence, and knowledge (e.g., Gieryn, 1999). Hovland *et al.* (1953) describe credibility as the intention of the source to tell the truth and to communicate what they believe to be most accurate (Hovland *et al.*, 1953). More specifically, with respect to scientific experts, trustworthiness is rooted in perceptions of an expert's honesty, value freedom, and objectivity (Shapin & Schaffer, 1985).

One characteristic that may influence the perception of information – and therefore potentially also its credibility – is the gender of the sender of the message (Greve-Poulsen *et al.*, 2023). Gender bias is well documented in the gender studies literature. According to Ridgeway (2014), modern societies have a 'status hierarchy' between men and women based on historical resource allocations. The more resources a particular group has, the more competent that group is perceived to be, creating status beliefs about social groups. There are several studies that show that the assessment of a group's social status is related to its perceived competence (Fiske, 2017). Greve-Poulsen *et al.* (2023) argue that gender stereotyping may be prevalent even in high-status settings, although their study shows that female experts are not perceived as less competent than male experts. Previous research on gender and competence reveals that men are rated better in teaching evaluations (MacNell *et al.*, 2015), their research output is perceived more highly (Knobloch-Westerwick *et al.*, 2013), and men have their research proposals evaluated more favourably (Wenneras & Wold, 1997; Witteman *et al.*, 2019). Although some studies find no differences in the perceptions of men and women (e.g., Greve-Poulsen *et al.*, 2023), it appears that the studies finding a discriminatory effect dominate.

Another important characteristic of experts is their academic discipline. Discipline binds the expert to a particular epistemology, theoretical approach, and empirical method. We argue that the expert's discipline may also influence how citizens evaluate the credibility of an expert. First, natural sciences deal with phenomena that can be observed and measured in controlled settings, such as laboratories, whereas social sciences often deal with subjective and complex phenomena such as human behaviour, attitudes, and beliefs that are more difficult to observe directly. As a result, social sciences research is more likely to be scrutinised by the public for the proper

methods or empirical approach. Second, natural sciences are often associated with technological progress and innovation, leading to the perception that scientists are more knowledgeable and competent in this area (Juma, 2016). Third, the media tends to pay more attention to natural science discoveries because they are often more sensational and have a broader public appeal. This leads to a higher public profile for natural science experts and a perception of greater expertise and authority (Cassidy, 2021). Based on this literature above, we formulate our first two hypotheses that male resp. natural science experts are perceived more credible than female and social science experts.

H1a: Citizens perceive male experts as more credible than female experts.

H1b: Citizens perceive natural science experts as more credible than social science experts.

Furthermore, it is conceivable that the evaluation of women's credibility (in comparison to men) also depends on their discipline. We would expect female experts in the natural sciences to be evaluated more negatively in terms of competence and credibility. Research in psychology shows that women are more negatively stereotyped in fields where they are underrepresented (Smyth & Nosek, 2015). Women, at least in Switzerland, are significantly less represented in STEM than in the social sciences. We therefore expect that female experts from the natural sciences will be perceived as less credible than those from the social sciences.

H1c: The positive effect of natural science experts over social science experts decreases if the natural science expert is female.

However, we expect differences across subgroups of the public. The seminal experiment conducted by Goldberg in 1968 assessed the effect of journalists' gender on female audience approval. Female readers who were exposed to stimuli of professional articles written either by John McKay or by Joan McKay consistently rated the article of 'John' higher than the article of 'Joan'. In short, most findings support the 'Goldberg paradigm' according to which women are themselves prejudiced against other women. More recent studies show that women see themselves both as less competent (Quinn *et al.*, 2006) and they more often question their own abilities (Fox & Lawless, 2014; Lawless & Fox, 2010). More importantly, there is some evidence that women project these evaluations on other women (Strelan & Hargreaves, 2005).

It is also conceivable that men perceive natural science experts as more credible than social science experts due to several factors. First, men may have been socialised to believe that natural sciences are more important or valuable fields than social sciences, which may influence their perceptions

of the credibility of experts in these fields (Eccles, 2015). This societal bias toward the natural sciences may lead men to place more trust in natural sciences experts, even if they have less experience or expertise only in a particular topic. Thus, men's perception of natural science experts as more credible than social science experts may be influenced by the perceived objectivity and tangibility of natural sciences, as well as societal biases. We therefore expect that women evaluate female experts less credible than male experts, while men evaluate natural science experts more positively.

H2a: Women perceive female experts as less credible than male experts.

H2b: Men perceive natural science experts as more credible than social science experts.

Several studies suggest that political ideology also influences how experts are perceived. Bundi and Pattyn (2024) show that public support for evidence substantially varies across the political spectrums. In particular, scholars revealed that anti-science attitudes are associated with right-wing populism, as experts are perceived as non-accessible elites (Motta, 2018). It is argued that right-wing citizens are generally more skeptical of experts such as scientists because of their aversion to complexity (Kahan, 2013), which they generally associate with science. Other studies argue that right-wing populists tend to mistrust experts as they think their opinion is ideologically driven (Mede & Schäfer, 2020; Ylä-Anttila, 2018) and thus they are not objective (Funk *et al.*, 2019; Steel *et al.*, 2006). Moreover, higher skepticism amongst right-wing citizens is also tied to the political philosophy of conservatism, as science can challenge traditional structures (Mooney, 2007). In addition, prior studies report a strong correlation between right-wing populist ideology and attitudes towards misogyny (De Lange & Mügge, 2015; Dietze & Roth, 2020). For instance, Giger *et al.* (2022) show that the right-populist Swiss People's Party has the lowest percentage of women on their party list for the federal election in 2019.

We also expect citizens with right ideological preferences to evaluate social science experts more negatively than natural science experts. On the one hand, experts often deal with issues related to politics, culture, and society. McCright *et al.* (2013) argues that social sciences are more often concerned with the impact of humans on health, the environment, etc., which goes against the politically right's preference for scientific studies that serve economic production (e.g., technological inventions, etc.). As a result, citizens may believe that social science experts are more likely to hold views that align with the left side of the political spectrum, leading some on the political right to perceive them as biased. On the other hand, people tend to seek out information that confirms their existing beliefs and worldview (Meppelink *et al.*, 2019), and may discount information that

contradicts these beliefs. Therefore, individuals on the political right may be more likely to discount social sciences research that challenges their beliefs or goes against their preferred policy positions, even if it may come from natural science experts. However, we still argue that they will perceive them as more credible than social science experts. In this sense, we expect that political ideology will influence how the public perceives the credibility of female experts, but also those from social sciences disciplines.

H3a: The more citizens lean to the political right, the less they perceive female experts as credible.

H3b: Citizens perceive natural science experts as more credible than social science experts. This effect increases, the more citizens lean to the political right.

One of the most important factors explaining positive attitudes towards science is education, as more educated citizens are in principle more familiar with such evidence due to their educational training. Moreover, we argue that more educated citizens do not differentiate between female and male experts when evaluating their credibility. Highly educated citizens are more likely to have been exposed to diverse perspectives and experiences, including those of women (Funk *et al.*, 2019). Therefore, they may be more likely to recognise the importance of including and valuing the perspectives of female experts in various fields. This exposure may lead to a greater appreciation for the expertise and knowledge of female experts. Second, it is also known that education can help individuals overcome gender stereotypes and biases that may be present in society (Ellemers, 2018). In general, education promotes critical thinking, which can help individuals to question and challenge stereotypes and prejudices against women. Thus, through education, individuals can learn to recognise the harmful effects of stereotypes and the importance of gender equality.

In addition, we argue that the more educated do not discriminate against social science experts, i.e., perceive them as equally credible as natural science experts. First, more educated citizens have a better understanding of research methods. They also understand that both natural and social sciences use empirical methods to derive credible knowledge. For example, Blank and Shaw (2015:, p. 31) argue that individuals with higher levels of education may be more familiar with '(…) the scientific method and the benefits of scientific inquiry'. Second, education can help citizens recognise the importance of social issues such as inequality, poverty, and discrimination. Social science experts often work in these areas, and their research can help provide valuable insights into these issues. Third, more educated citizens are exposed to a variety of disciplines during their education. This may lead to a greater appreciation of both types of expertise, as they are able

to understand the importance and relevance of social science research. We therefore propose the following two hypotheses:

H4a: Citizens perceive female experts as less credible than male experts. However, this effect decreases with citizens' increasing educational level.

H4b: Citizens perceive social science experts as less credible than natural science experts. This effect decreases with citizens' increasing educational level.

Data and experimental design

To test the hypotheses outlined above, we conducted an online 2×2 factorial survey experiment[1] with Swiss citizens in February 2022 ($N = 1{,}854$). Before the start of the survey, we pre-registered the experiment in the Open Science Framework Registry.[2] We include citizens from the German- and French-speaking parts of Switzerland, excluding the canton of Ticino, where Italian is the main language. The sample is roughly representative of the general population in terms of gender, education, political ideology and region, with French-speaking citizens slightly overrepresented due to a planned oversampling (36.19 per cent vs. 22.80 per cent).[3]

We recruited respondents through a partnership with sample provider Dynata. They curated groups of respondents from a national survey panel, ensuring that quotas for gender, age and education level were met. Despite our best efforts, certain groups, such as those with lower levels of education and older individuals, were occasionally underrepresented in our sample. As a result, throughout the study, we applied probability weights to factors such as age, gender, education, and party preference based on the most recent election to ensure a more accurate reflection of the Swiss population.

Switzerland is a 'most-likely case' (Rapport, 2015) to test whether our theoretical hypotheses are supported by empirical evidence. Indeed, the country features several characteristics that should facilitate the expected outcomes (e.g., women experts are perceived as less credible than their male counterparts). First, social norms about women are less progressive in Switzerland than in other democracies, as evidenced by the country being late in granting women the right to vote (1971). Furthermore, the gender equality policy implemented by Swiss authorities has not been effective yet. Women are still underrepresented in politics at all institutional levels, wage discrimination remains blatant, and gender segregation in the choice of higher education programmes is obvious. In Switzerland, 'the promotion of women in traditional male-dominated subjects (e.g., STEM) (…) has barely challenged gender stereotypes related to subjects that have seen an historical concentration of women' (Engeli, 2023, p. 14). Second, due to the strong decentralisation, many public policies are organised directly by

either municipalities or regions (see Dardanelli & Mueller, 2019). We can assume that citizens in federalist countries are likely to be more involved in politics, since important decisions are made at the local level and are therefore directly felt by citizens at that level (public calls to avoid flying, use public transportations, eat less meat, etc. for limiting climate change). Third, policy advice in Switzerland is mostly provided by ad hoc advisory commissions or external consultants, which means that policy-relevant knowledge is often based on scientific evidence rather than personal expertise (Hadorn *et al.*, 2022). Consequently, citizens may also frequently be confronted with expert opinions in Switzerland.

The survey starts with general questions, where we obtained the information for all exogenous variables. In the experiment that followed, respondents read a factually correct expert quote on the consequences of climate change, based on two expert opinions found on the BBC and the Guardian website, translated into German and French. The quote was one-sided on the negative consequences of climate change and provided evidence from a social and natural science perspective. We chose climate policy since a consultation on climate issues is a very likely scenario for citizens. This policy domain is particularly salient in Switzerland and citizens have strong preferences regarding this issue (Kolcava *et al.*, 2021; Lüth & Schaffer, 2022). In addition, climate change and solutions are frequently discussed by experts in the media (Nordbeck *et al.*, 2019).

The main experimental variable was the credibility of the expert, which respondents had to rate after the expert's statement. As a treatment, we varied the gender of the expert (female vs. male professor) as well as the discipline of the expert (environmental physics vs. sociology). We chose two disciplines that are usually quite dominant in policy advice on climate change. All other expert characteristics were held constant (e.g., academic degree), which is why we will not include any pre-treatment measures in the empirical analyses. According to Klar *et al.* (2020, p. 58), pre-treatment measures may risk priming effects, which have the potential to change the definition of the causal parameter to be estimated, shifting from assessing the effect of treatment when identity is not salient to when it is salient. This shift may be inconsistent with the specific effect that our experiment aims to identify. Thus, we performed randomisation checks, and they show no systematic differences between the experimental groups.[4]

During the experiment, the expert is mentioned before and after the quotation, which is why we did not introduce a manipulation check.[5] We chose not to use real names as Crabtree *et al.* (2023) show that names signal more than just gender, but also ethnicity or citizenship. In the survey, we used the terms 'Professor(e)' and 'Professor(in)' to indicate the gender of the expert, since it was conducted in German and French. Box 1 displays

the survey experiment; the underlined parts highlight the manipulations added by the authors:

Box 1. Survey Experiment

There are constant calls for political action to combat climate change. In recent years, [natural science | social science] has uncovered important insights into this issue. The following quote from a [female | male] professor of [environmental physics | sociology] at a Swiss university appeared in a newspaper article. The [female | male] professor studies the [natural science | social] consequences of climate change: 'Each additional 0.5°C of warming leads to a clearly identifiable increase in the intensity and frequency of extreme events such as heat waves, heavy rainfall, and droughts. In addition, climate change also aggravates problems such as poverty or terrorism', explains the [female | male] professor.

The dependent variable *expert credibility* is adapted from previous studies of expert perception (Hendriks *et al.*, 2015; Hanimann *et al.*, 2023). After the above treatment, we asked respondents the following question: '*What qualities would you ascribe to the expert quoted? Please decide for each adjective pair*'. The variable consists of a semantic differential scale of six adjective pairs covering two dimensions: expertise (competent/incompetent, well trained/ill trained, experienced/inexperienced) and trustworthiness (sincere/insincere, fair/unfair, trustworthy/untrustworthy). Since these two dimensions cover the same variable ($\alpha = 0.95$), we calculated a mean index of the six items using listwise deletion, ranging from 1 (non-credible expert) to 7 (credible expert) (see Box A4 in the appendix).

Independent variables used in the study were all collected prior to the survey experiment. A *respondent's gender* was measured using binary logic with male and female categories and was self-reported by the respondent. Citizens who support *right-wing ideology* were measured by the following question: '*In politics, we sometimes talk about 'left' and 'right'. Where would you place yourself on this scale, where 0 is the most left wing and 10 the most right-wing?*' The *education* level was measured by the following question: '*What is your highest diploma degree*?' The respondents could select between four categories (none or primary; secondary; tertiary: vocational training; tertiary: university).

Since our dependent variable is continuous, we specify linear regressions (OLS) with robust standard errors.

Experimental findings

Table 1 reports the results of the experiment, i.e., the direct effect of the expert's gender on perceived credibility – independent of each characteristic of the respondent that made the evaluation. In Model 1, we test the direct effect of an expert's gender on perceived credibility (H1a). Contrary to our assumptions, female experts are not rated as less credible than their male counterparts. In fact, respondents rate female experts as about 0.2

Table 1. Experiment findings.

	Expert's gender (1)	Expert's discipline (2)	Interaction model (3)
Female Expert	0.110		0.128
	(0.060)		(0.084)
Social Science Expert		−0.015	0.003
		(0.060)	(0.085)
Female Expert* Social Science Expert			−0.036
			(0.120)
Constant	4.948	5.010	4.946
	(0.043)	(0.042)	(0.060)
N	1,837	1,837	1,837

Note: Results are from a linear regression model (OLS). Standardised regression coefficients shown with robust standard errors in parentheses.

percentage points more credible than male experts on average. Regarding the expert's discipline, Model 2 shows that there is only a small difference between social science and natural science experts (H1b). Finally, the interaction between the two treatments shows no significant effect on expert credibility (H1c). In contrast, female experts seem to be perceived as slightly more credible if they come from a natural science discipline. Figures 1 and 2 illustrates both effects for the expert's gender resp. discipline.

Subgroup findings

Next, we move from experimental design to statistical control in subgroup analyses, which represents a change in assessment from internal to external

Figure 1. Credibility of experts by gender.

Figure 2. Credibility of experts by discipline.

validity. In our view, it is important to recognise that this transition represents a move from examining the specific effects of the experimental treatment in a controlled setting to examining how these effects might generalise to different subgroups or populations. In moving away from non-experimental research designs, we have also included socioeconomic variables such as political ideology and education as controls.

Hence, we examine whether the effect of the expert's gender and discipline is stronger for certain groups in our sample (Table 2). Models 4 to 7

Table 2. Subgroup analyses for gender treatment.

	Female interaction (4)	Left-Right interaction (5)	Education interaction (6)	Full model (7)
Female Expert	−0.053	0.203	0.190	0.069
	(0.086)	(0.169)	(0.202)	(0.274)
Female Citizen	−0.086			−0.109
	(0.085)			(0.084)
Political Ideology		−0.104***		−0.105***
		(0.019)		(0.018)
Education			0.130***	0.123**
			(0.049)	(0.049)
Female Citizen*Female Expert	0.314***			0.269**
	(0.120)			(0.119)
Political Ideology*Female Expert		−0.017		−0.009
		(0.026)		(0.026)
Education*Female Expert			−0.027	−0.017
			(0.069)	(0.068)
Constant	4.992***	5.581***	4.585***	5.297***
	(0.061)	(0.121)	(0.144)	(0.194)
N	1,837	1,834	1,837	1,834

(gender) and models 8 to 11 (disciplines) show that we can only observe such an effect for the gender of the respondent. While men do not differentiate between female and male experts in terms of credibility, women rate female experts significantly more positively than male experts (0.17, $p < 0.01$) (H2a, see Figure 3). We observe the same results for the expert's discipline, although the effect is much smaller and barely significant: female respondents rate social science experts significantly more positively than natural science experts (0.09, $p < 0.1$) (H2b). (Table 3)

In contrast, the models show that the effect of an expert's gender and discipline on perceived credibility does not vary with political ideology (H3a and H3b) or education level (H4a and H4b): right-wing ideology and less education are not correlated with significantly lower credibility ratings of female experts compared to male experts or social sciences vs. natural sciences. However, there is a significant negative effect of ideology on expert perceptions. Right-wing citizens tend to rate the credibility of the expert significantly lower than left-wing citizens (see also Hanimann, 2023). This suggests that right-wing citizens may differ in how they evaluate experts in general but may not indicate that there are preferences for specific experts. Finally, our findings also suggest that education is positively correlated with the perceived credibility of an expert.

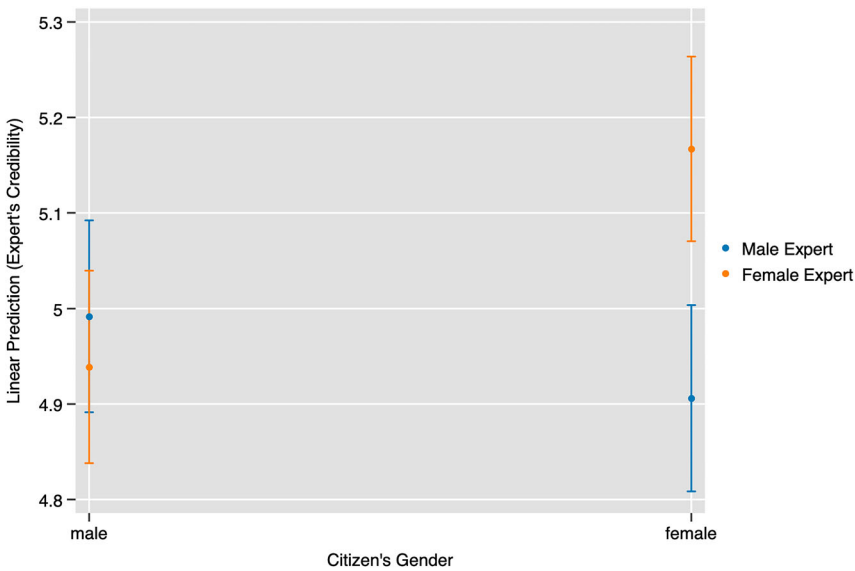

Figure 3. Credibility of experts by experts' and respondents' gender.

Note: Interaction effect of experts' gender (male, female) and gender of respondent on expert's perceived credibility. Mean predicted perceived credibility surrounded by 95% confidence intervals. Predicted values are derived from a linear regression model.

Table 3. Subgroup analyses for discipline treatment.

	Female interaction (8)	Left-Right interaction (9)	Education interaction (10)	Full model (11)
Social Sciences Expert	−0.126	0.180	0.221	0.229
	(0.086)	(0.169)	(0.202)	(0.274)
Female Citizen	−0.035			−0.088
	(0.085)			(0.084)
Political Ideology		−0.097***		−0.099***
		(0.018)		(0.018)
Education			0.159***	0.152***
			(0.050)	(0.049)
Female Citizen*	0.216*			0.231*
Social Sciences Expert	(0.120)			(0.119)
Political Ideology*		−0.031		−0.026
Social Sciences Expert		(0.026)		(0.026)
Education*			−0.086	−0.072
Social Sciences Expert			(0.070)	(0.069)
Constant	5.028***	5.597***	4.571***	5.230***
	(0.061)	(0.118)	(0.144)	(0.195)
N	1,837	1,834	1,837	1,834

Note: Results are from a linear regression model (OLS). Standardised regression coefficients shown with robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Discussion

Does the credibility of scientific experts depend on the individual characteristics of the experts? Using data from a survey experiment on climate change among Swiss citizens, we show that the expert's gender influences citizens' perceptions of the expert's credibility. Contrary to our theoretical assumptions, female experts are perceived as more credible than their male counterparts – an effect driven mainly by women's more positive evaluation of female experts.

These surprising findings, which largely contradict theoretical expectations based on status theory and gender stereotypes (Ridgeway, 2014), are rather good news for gender equality. They are in line with the main conclusions of a recent study that there is no gender bias in the ability of experts to persuade media audiences (Greve-Poulsen *et al.*, 2023). Conversely, they challenge the less optimistic findings of several previous studies that found male experts to be more credible than their female counterparts (e.g., Embacher *et al.*, 2018; Klaas & Boukes, 2020). Moreover, we highlight the fact that Swiss women do not discriminate against female experts advising on climate policy. Our empirical findings clearly contradict the famous 'Goldberg paradigm' that women discriminate against other women. On the contrary, we find evidence that women find female experts more credible than male experts. This provides partial support for the 'matching hypothesis' (O'Keefe, 2015), which claims that credibility and persuasiveness are enhanced when the source (i.e., expert) and the receiver (i.e., citizen) are similar in terms of sociodemographic characteristics, i.e., have the same

gender. However, we do not observe the same effect for men (i.e., a preference for male experts over female experts).

The question remains as to why women are more likely to find other women credible. In this regard, social identity theory could provide an explanation. Social identity theory which suggests that people tend to identify with and prefer others who share similar social characteristics to themselves (Huddy, 2001). As women share the same gender identity, they may be more likely to view other women as credible and trustworthy. Another possible explanation is that women may have experienced discrimination and bias in male-dominated fields, and thus, seek out and trust other women in those fields (Eagly & Steffen, 1984; Schmader, 2023). This is especially true in areas where women are underrepresented, such as in politics or STEM (science, technology, engineering, and mathematics).

In addition, research has shown that women often communicate differently than men, with a greater focus on building relationships and establishing trust. Much of the literature on source credibility separates expertise from trustworthiness (Hovland & Weiss, 1951). Cialdini *et al.* (1981) argue that a communicator's credibility is a critical factor in the persuasion process. According to this theory, source credibility consists of two primary components: expertise and trustworthiness. While expertise refers to the perceived level of knowledge or skill a communicator possesses on a particular topic, trustworthiness refers to the degree to which a communicator is seen as honest, sincere, and unbiased. Communicators who are perceived as trustworthy are more likely to be believed and to persuade others. Even though the message in the experiment is exactly the same, women may develop a habit of believing female experts over male experts. Women may be more likely to listen to and empathise with other women, leading them to view other women as more credible and trustworthy. Thus, the fact that women tend to evaluate other women more positively raises the question of whether this is due to their greater trustworthiness. For example, the concept of women trusting women is consistent with source effect studies in the gender and behaviour literature. Previous studies of perceptions of the First Lady of the United States show that women show higher levels of approval of the First Lady than men (Sulfaro, 2007; Elder & Frederick, 2019). However, these studies argue that the effect of gender on support is emblematic of some form of symbolic representation for women in politics. Understanding the factors that influence how women evaluate other women could help inform policies and initiatives aimed at promoting gender equality and reducing gender bias. Our study is a first step, but it goes without saying that further studies focusing on how trust is established within the same gender are urgently needed.

Conclusion

In this study, we examined the intersection of expert credibility, gender, and scientific discipline to shed light on how the public perceives experts. In a world where scientific advice is increasingly influencing policy decisions and public behaviour, understanding the dynamics of expert credibility is paramount. Surprisingly, our findings challenge the assumption of gender bias, revealing that female experts are not perceived as less credible than their male counterparts; in fact, female experts are perceived as more credible, especially by women. In addition, the study shows that the academic discipline of the expert does not significantly affect his or her perceived credibility. These findings challenge conventional wisdom and offer a new perspective on the role of gender and discipline in expert advice.

This research contributes to the existing literature on source effects in at least two ways: First, existing research mainly focuses on how expert and non-expert sources are perceived by audiences (e.g., Brewer & Ley, 2013). Few studies have investigated perceptions of different types of experts (e.g., Doberstein, 2017). Thus, we add to this emerging and still rather limited strand of literature on perceptions of different types of experts. Second, we argue that source effects are not the same across groups, but that source effects may vary depending on individual characteristics. Such subgroup analyses of perceptions of expertise are still limited and focus on specific variables such as prior attitudes (e.g., Baekgaard *et al.*, 2019) or political ideology (e.g., Bolsen *et al.*, 2015). Ultimately, our research contributes to evidence-informed policymaking by highlighting the importance of expert characteristics in shaping public perceptions, potentially bridging the gap between scientific expertise and public understanding (Cairney, 2016; Greve-Poulsen *et al.*, 2023). In addition, it highlights the potential value of increasing the representation of women in expert advice (Barnes & Holman, 2020; Dingler *et al.*, 2019), not only for gender equality, but also for improving public reception of scientific evidence. By exploring these nuanced dynamics, our study pioneers a deeper understanding of how experts can effectively communicate their recommendations to the public and highlights future avenues for research in this area.

This study also has several limitations. First, our research design focuses on maximising internal validity but may less convincingly establish external validity. Even though we can show a causal relationship between the gender of an expert and their credibility (and to some extent between the discipline and the credibility), we might not observe the same relationship between individuals beyond our sample. However, by acknowledging these limitations, experiments can be a valuable tool for elucidating causal relationships in research domains that rely primarily on observational methods (e.g., Montpetit, 2011). In addition, we have performed a subgroup analyses, in which we

believe that the observed effects might be also observed in other samples due to the *p*-values. Second, most of the relevant data were collected through a public survey. Although this approach provides us with information that we could not otherwise observe, survey data can be susceptible to sample bias, such as misreporting and overrepresentation (Dahlgaard *et al.*, 2019; Sciarini & Goldberg, 2016; Selb & Munzert, 2013). However, we have carefully analysed our sample for these methodological issues (see Table A1 in the appendix) and have performed all the necessary checks, so we are highly confident that our sample is suitable for analysing our research question. Third, we focus on citizens, but public attitudes towards experts are only one side of the coin. In fact, evidence-informed policy-making is done by political elites, such as elected officials (Cairney, 2016; Head, 2016). To be fully confident about the external validity of our empirical findings, future survey experiments should compare how decision makers assess the credibility of experts in different policy domains. Finally, Switzerland is a most-likely case for testing hypotheses about the discrimination of female experts. As discussed above, the country is a laggard for gender equality in politics, STEM education and work opportunities. As the empirical evidence of the present study indicates that female experts are not discriminated in Switzerland, one can reasonably assume that this should hold true in more progressive countries, which perform better regarding gender equality. However, we remain very cautious before concluding to the generalizability of the Swiss findings to a large population of countries. Additional characteristics of the Swiss political system might also have an impact on experts' perceptions by citizens, such as frequent popular votes and related campaigns, a strong decentralisation of policy powers and/or a low institutionalised policy advisory system.

These limitations pave the way for future comparative studies, which should first explain why we should expect a 'gender affinity effect' in the assessment of experts' credibility. Possible reasons include feelings of group/minority solidarity. Women support female experts to defend the minority to which they belong. Second, women may support female experts because they seek descriptive representation (e.g., Brians, 2005). In fact, women are still under-represented in expert committees and under-represented in media coverage (Greve-Poulsen *et al.*, 2023). Thus, the overrepresentation of male experts may be self-perpetuating. Women who want to break this monopoly, or at least reduce the overrepresentation of male experts in the media, may therefore support female experts more than their male counterparts. Third, women may perceive female experts as more credible because they expect female experts to take certain positions on (women-related) policy issues on the political agenda. This third possible explanation would be consistent with our own empirical finding that prior policy preferences are a strong predictor of expert credibility ratings

(results not showed here). For instance, Clayton *et al.* (2020) show that citizens do not distinguish between women and men with the same characteristics in elections, as their political positions are more important. In addition, future research could exploit the intersectionality between gender and other factors such as ethnicity or religion.[6] While white women might not be discriminated, this may not necessarily be the case for women from ethnic or religious minorities. For example, Blank and Shaw (2015) show that religious beliefs clearly influence attitudes towards science. Thus, it is plausible that the same characteristics shape perceptions of experts.

Our study provides new evidence on gender bias in experts' perceptions. An open question in the literature is how gender bias operates in policymaking, as women are still underrepresented in politics (Ohmura & Bailer, 2022). The two forms of bias we identify may operate differently in parliaments. Because female office holders are underrepresented, they cannot outvote their male colleagues, even though a recent comparative study by Dingler *et al.* (2019) shows that women's interests are generally better represented than men's, i.e., descriptive underrepresentation of women does not lead to less favourable substantive representation. In addition, officeholders may be less willing to listen to experts because they have stronger prior opinions on issues and are also better informed about policy issues than ordinary citizens, potentially reducing the role of expertise in policymaking or leading to a more politicised use of evidence (Bundi & Trein, 2022). These open questions, and others related to how gender biases operate in the political arena, are important avenues for future research.

Notes

1. Our experiment received ethical approval. Before we started collecting data, we submitted an ethical dossier to the university's ethics committee. On 22 October 2021, the committee informed us that it considered the project to follow established ethical standards. In addition, the data management plan was approved by the local government. All related documents, including the confidentiality agreement that all team members had to sign, can be delivered upon request.
2. The registration can be found here: https://osf.io/v8d2s/?view_only=62cfbe57faf540f58ecd2fd07382a760.
3. Table A1 in the appendix provides an overview of the sample. Another planned study will look at the relationship between language and expert credibility, so we had to make sure we had enough French-speaking respondents.
4. Table A3 in the appendix shows the number of observations by experimental group.
5. We excluded all respondents that filled out the survey too quickly (i.e., duration <= (r(mean)/3) * (Progress/100)).
6. Block et al. (2023) provide an excellent introduction to evaluating claims of intersectionality.

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