Research note

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Public Understanding of Science
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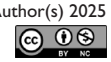
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Long-term media effects on public attitudes toward science in Switzerland: A panel survey of the Swiss population

Lena Zils[1], Julia Metag[1], Niels G. Mede[2] and Mike S. Schäfer[3]

Abstract

Understanding how media influence public attitudes toward science during societal challenges is crucial for effective science communication. This study examines the role of media use and sociodemographic factors in shaping public attitudes toward science in Switzerland using panel data from three surveys over 6 years (N_{2016} = 1,051; N_{2019} = 339; N_{2022} = 122). Results show that media usage and sociodemographics influenced attitudes, especially during the COVID-19 pandemic. Lower education and stronger religiosity correlated with reduced interest in or trust in science. Use of online legacy media showed rally-around-the-flag effects, but we found no clear differences between public and private broadcasters regarding their impact on science attitudes. These findings highlight the relationship of media use, sociodemographics, and public attitudes during societal uncertainty and over time, offering insights for targeted, context-sensitive science communication.

Keywords

attitudes to science, media use, panel survey, science communication

1. Background and research questions

Global crises like the COVID-19 pandemic and the climate crisis have impacted public discourse and daily life. They underscore the critical role of science in tackling societal challenges, with the importance of scientific findings and their societal implications moving into the spotlight, for example, during the COVID-19 pandemic (Bavel et al., 2020; Eisenegger et al., 2020). Crises like

[1]University of Münster, Germany
[2]Wageningen University & Research, Netherlands
[3]University of Zurich, Switzerland

Corresponding author:
Lena Zils, Department of Communication, University of Münster, Bispinghof 9–14, Munster 48143, Germany.
Email: lena.zils@uni-muenster.de

these can affect public attitudes toward science on different dimensions, encompassing cognitive, affective, and evaluative components.

For example, research revealed that citizens' interest in, and attention to, science was high during the COVID-19 crisis (Sígolo et al., 2023). Moreover, many citizens appreciated the dissemination of scientific information: societal crises often create a context of concern and uncertainty, which leads many individuals to seek stability and authority, as was the case during the COVID-19 pandemic (Heinzel and Liese, 2021). This aligns with the "rally around the flag" effect, where perceived crises drive increased public support for established authorities (Yam et al., 2020). Research suggests that in situations of heightened threat, people are driven by an evolutionary need for security, which motivates them to support institutions they perceive as capable of providing it (Van Der Toorn et al., 2015).

Societal crises can also spark *skepticism* toward scientific findings and raise concerns about the transparency of decision-making processes. This skepticism often coincides with a critique of technocratic tendencies and a broader distrust of social elites (Post, 2022), including academic elites (Mede et al., 2021). Such skepticism may also affect individuals' positivistic attitudes toward science, i.e. their belief in science as a unique and authoritative way of knowing about the world (Brossard and Nisbet, 2006). These attitudes represent relatively stable worldviews about the cultural authority of science and are linked to trust in scientific institutions and scientists' credibility (Howell et al., 2020; Roberts et al., 2013). These competing dynamics suggest that attitudes toward science may shift as societal circumstances evolve, calling for longitudinal analyses.

Surveys during the pandemic indicate rising support for political (Yam et al., 2020) and scientific (Mede and Schäfer, 2022) authorities across populations in many (Western) countries. Studies reveal that trust in science and scientists increased during the pandemic in several countries (Bromme et al., 2022; Jensen et al., 2021). However, most of these studies were cross-sectional studies unable to track changes in attitudes within the same individuals over time. Therefore, a longitudinal approach allows us to capture how the same individuals' attitudes evolve in response to changing societal contexts, particularly during key events such as the COVID-19 pandemic.

When scientific facts are intertwined with political values—as frequently occurred during the value-laden debates of the COVID-19 pandemic—this has been shown to foster mistrust in science (Nisbet et al., 2015; Post and Bienzeisler, 2024). Individuals' ability to navigate such polarized debates may depend on their scientific literacy—the capacity to understand and evaluate scientific information—as well as their self-perceived knowledge about science, both of which influence confidence in making science-related judgments and engaging with contentious scientific topics (Howell and Brossard, 2021).

The aforementioned changes in attitudes, particularly in response to societal crises, are likely related to various factors, including media usage (Schäfer and Metag, 2021). Multiple surveys indicate that using legacy media, such as newspapers or TV, is associated with a more positive impression of science (Besley and Shanahan, 2005; Dudo et al., 2011; Liu and Priest, 2009). However, beyond general media consumption patterns, trust in science coverage specifically—that is, confidence in how media accurately represent scientific findings—constitutes a distinct dimension that may independently influence science attitudes (Brossard and Nisbet, 2006).

People encounter science also on social media (Newman et al., 2024). Nevertheless, some scholars highlight that users may be more likely to come across misinformation and conspiracy narratives that undermine narratives dominant in traditional media and foster skepticism toward established authorities, including scientific experts (Mede et al., 2024; Rooke, 2021). However, the relationship between social media use and trust in science appears more complex than initially assumed. While some studies suggest that frequent social media users are more critical of science

(Ruth et al., 2019; Schäfer and Metag, 2021), other research demonstrates a positive relationship between social media news use and trust in science across multiple countries (Huber et al., 2019).

Given the dynamic nature of media landscapes and crisis contexts, we expect that media-attitude relationships change over time, particularly as the salience and framing of scientific topics in media coverage shifts during different phases of societal challenges.

These assumptions and findings regarding the effect of different media on attitudes toward science have been contextualized by many scholars, who emphasize the role of other relevant drivers, such as sociodemographic factors (Besley, 2013). For instance, a segmentation analysis of the Swiss population revealed that individuals with less formal education and limited proximity to science are more likely to be disengaged from science (Schäfer et al., 2018). Furthermore, being male and having a lower level of education were identified as significant predictors of skepticism toward science (Azevedo and Jost, 2021; Evans and Hargittai, 2020). Political orientation, in particular, is frequently discussed as a driving factor of polarization of trust in science (Altenmüller et al., 2024; Li and Qian, 2022). The COVID-19 pandemic has also highlighted shifts in these dynamics. For example, Radrizzani et al. (2023) found that self-reported increases in trust in science during the pandemic were especially pronounced among older individuals. In countries with high levels of legacy news media usage during the pandemic, public trust in authorities was often bolstered (Merkley and Loewen, 2021).

These findings suggest that media usage (e.g. traditional news, online news, and social media) and sociodemographic characteristics (e.g. education, gender, age, religiosity, and political orientation) may play a significant role in shaping how attitudes toward science evolve in response to societal challenges in recent years.

RQ: To what extent do different types of media use for science information and sociodemographic characteristics explain changes in public attitudes toward science over time?

Our study focuses on Switzerland, a country characterized by a highly educated population, strong scientific innovation, and a dense landscape of higher education institutions that rank among the best globally (Luca et al. 2021). Trust in science is robust and considerable (Cologna et al. 2025). The country's direct democratic system fosters active public participation in decision-making, creating a unique interplay between science and the public and a high relevance of public attitudes toward science (Mede and Schäfer, 2022). With its largely publicly funded higher education institutions, a strong private research sector, its close international ties and demographic similarities with many other Western countries, Switzerland is an interesting case for analysis.

2. Data, method & analysis

We investigate drivers for changes in attitudes toward science based on individual-level panel data[1] from the "Science Barometer Switzerland" a nationally representative survey of public attitudes, beliefs, and knowledge about science in Switzerland. The initial 2016 sample was drawn using a two-stage random-quota procedure: households were randomly selected from the electronic telephone directory, followed by quota sampling within households based on combined age-gender quotas to match population proportions. Data collection was conducted by a professional survey institute via computer-assisted telephone interviews (CATI). The 2019 and 2022 waves used mixed-mode data collection (online and paper-based questionnaires) to

maximize retention, with multiple contact attempts and reminder mailings. In 2016, 2019, and 2022, respondents were asked if they would be willing to participate in a follow-up study.

After excluding cases with implausible or inconsistent response data, such as changes in gender between waves or discrepancies in age (less than 2 years or more than 4 years difference between two waves), the samples consisted of 1,051 respondents (2016), 339 (2019), and 122 (2022). Panel attrition was non-random with dropout rates of 67.7% (2016–2019) and 64.0% (2019–2022), resulting in systematic overrepresentation of older and higher-educated participants. In 2019, panel participants were 48.97% female (total sample: 51%), mean age 54 years ($SD = 15.63$; total sample: 47 years, $SD = 18.49$), with 43% holding university degrees (total sample: 14.8%). In 2022, participants were 48.41% female (total sample: 50.7%), mean age 59 years ($SD = 13.82$; total sample: 46 years, $SD = 19.06$), with 50% university-educated (total sample: 14.3%). This educational and age bias limits generalizability to younger and lower-educated populations.

We included measures of trust in science coverage, self-perceived knowledge, interest in science, trust in science and trust in scientists (all measured on a 5-point scale) and a quiz-tested and standardized index scientific literacy (Mede et al. 2025). Positivistic attitudes were assessed with seven statements (e.g. "Science and research can solve any problem") on a five-point scale ranging from 1 = completely disagree to 5 = completely agree. For further analysis, a mean index was computed (*Cronbach's* $\alpha_{2016} = .55$; *Cronbach's* $\alpha_{2019} = .64$, *Cronbach's* $\alpha_{2022} = .70$). These items are well-established in survey research on public perceptions of science and have been used in numerous large-scale international surveys (e.g. European Commission, 2021; Wintterlin et al., 2022). Our survey project adopted them to ensure comparability with international data, acknowledging, however, ongoing debate about their conceptual and methodological limitations.

To check whether media use had an influence on changes in attitudes toward science during the time span under investigation, we included measures that capture the frequency of media use as a source for information about science on a five-point scale ranging from 1 = never to 5 = very frequently. We included the media channels public TV, private TV, public radio, private radio, newspapers, online newspapers, science magazines, social media (e.g. Facebook), Wikipedia and video platforms (e.g. YouTube).

Moreover, we measured a range of sociodemographic covariates: age, gender, education (dummy coded for university degree and compulsory school), proximity to science (sum index of four statements; for example, "Do you personally know a scientist?"), political orientation (7-point-scale) and religiosity (5-point-scale). For an overview of all items in the analysis, see Table A1 in the Supplemental Material.

To answer our research question, we used a linear regression model predicting 2019 differences with 2016 measurements and 2022 differences with 2019 measurements[2]. As part of the study, we preregistered the overall research question and the data collection procedures for the 2022 wave before data collection began and prior to any analyses being conducted (see: https://osf.io/x2drc/?view_only=c90cc824529e46fd9eb3db30945b9fad; RQ4)[3].

3. Results

For both periods, we find that baseline attitude levels (2016 values for 2016–2019 data; 2019 values for 2019–2022 data) predicted changes in these attitudes. Specifically, the coefficients for the initial levels of "Scientific Literacy," "Trust in Science Coverage," "Self-Perceived Knowledge," "Positivistic Attitudes," "Interest in Science," "Trust in Science," and "Trust in Scientists" were all significantly negative ($p < 0.05$). This indicates that individuals with higher baseline scores in 2019 exhibited smaller positive changes or larger negative changes over time compared to those with lower initial scores.

These findings align with expected patterns of regression to the mean, suggesting that individuals with initially high scores in these domains had limited room for further improvement. In contrast, those with lower initial scores tended to show greater shifts, either positive or less negative, during the observation period.

When examining sociodemographic characteristics and media use, a more nuanced picture emerges: looking at the time period 2016–2019 (see Table 1), during which scientific literacy, trust in science coverage, self-perceived knowledge, and positivistic attitudes decreased on average, while interest in science, trust in science, and trust in scientists increased slightly on average (see Tables A2), we find that the level of formal education and religiosity appear to be main drivers of differential changes in attitudes toward science. For individuals with a university degree, the average increase in trust in science was smaller (b=-.53; $p<.01$), as was the average increase in trust in scientists (b=-.36; $p<.05$). Among people who tend to be religious, the average increase in trust in science was smaller (b=-.12; $p<.05$), while they experienced a larger decrease in positivistic attitudes toward science compared to the sample average (b=-.14; $p<.01$). Moreover, among individuals who frequently watched public TV, the decrease in positivistic attitudes was more pronounced (b=-.13; $p<.05$). In contrast, individuals who often listened to public radio exhibited a more pronounced increase in trust in science (b=.18; $p<.01$).

During the second time period (2019–2022, including the outbreak of the COVID-19 pandemic; see Table 2), during which trust in science coverage and positivistic attitudes increased on average, trust in science remained stable, while scientific literacy, self-perceived knowledge, interest in science, and trust in scientists decreased on average (see Table A3), a greater number of significant drivers of changes in attitudes toward science were identified compared to the previous period. The average increase in trust in science coverage was more pronounced among women (b=.50; $p<.05$) and individuals who frequently listened to public radio (b=.33; $p<.01$) or watched private TV (b=.26; $p<.05$). Conversely, this average increase was less pronounced among individuals who frequently watched public TV (b=-.24; $p<.05$) or listened to private radio (b=-.25; $p<.05$). Furthermore, the average decrease in self-perceived knowledge was less pronounced among people with a rather right-leaning political orientation (b=.16; $p<.05$) and those who frequently read science magazines (b=.15; $p<.05$). The average increase in positivistic attitudes toward science was more pronounced among individuals with compulsory school as their highest level of education (b=.81; $p<.05$). However, for these individuals the average decrease in interest in science was more pronounced (b=-1.73; $p<.01$). In contrast, the average decrease in interest in science was less pronounced among individuals who frequently used Wikipedia (b=.21; $p<.01$) as a source of information about science. Finally, among people who frequently read online newspapers, the average increase in trust in science was more pronounced (b=.17; $p<.05$), and the average decrease in trust in scientists was less pronounced (b=.16; $p<.05$).

4. Discussion

This study provides insights into how sociodemographic factors and media usage influence changes in attitudes toward science during times of societal challenges. Across both time periods (2016–2019 and 2019–2022), we identified multiple drivers of changes in attitudes toward science.

Formal education and religiosity were key drivers during the first time span (2016–2019). Individuals with a university degree exhibited less pronounced increases in trust in science and trust in scientists, suggesting a ceiling effect for this group. In contrast, individuals with higher religiosity showed a more pronounced decrease in positivistic attitudes, potentially reflecting tensions between religious beliefs and overly technocratic or positivistic views of science.

Table 1. Multiple linear regressions predicting science-related attitudes with baseline values of covariates (2016 & 2019).

	Differences between 2016 and 2019 in. . .(Mean diff.)																				
	Scientific Literacy (-.03)			Trust in Science Coverage (-.19)			Self-Perceived Knowledge (-.12)			Positivistic Attitudes (-.06)			Interest in Science (0.14)			Trust in Science (0.02)			Trust in Scientists (0.01)		
Predictors (2016 values)	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*
(Intercept)	1.57	0.74	**0.035**	1.09	0.68	0.112	0.74	0.56	0.192	2.36	0.42	**<0.001**	2.39	0.60	**<0.001**	3.22	0.55	**<0.001**	3.16	0.61	**<0.001**
Scientific Literacy	-0.52	0.10	**<0.001**																		
Trust in science Coverage				-0.59	0.11	**<0.001**															
Self-Perceived Knowledge							-0.45	0.11	**<0.001**												
Positivistic Attitudes										-0.56	0.11	**<0.001**									
Interest in Science													-0.60	0.10	**<0.001**						
Trust in Science																-0.52	0.11	**<0.001**			
Trust in Scientists																			-0.60	0.12	**<0.001**
Age	-0.01	0.01	0.303	0.00	0.01	0.814	0.00	0.01	0.883	0.00	0.00	0.903	0.01	0.01	0.421	0.00	0.01	0.627	-0.00	0.01	0.996
Gender (1 = female)	0.22	0.21	0.299	-0.22	0.18	0.222	-0.18	0.16	0.287	-0.01	0.11	0.945	-0.16	0.18	0.364	0.02	0.15	0.873	0.00	0.15	0.986
Education (1 = University degree)	0.04	0.26	0.891	0.20	0.21	0.343	0.07	0.20	0.731	-0.25	0.14	0.073	-0.08	0.21	0.713	-0.53	0.18	**0.004**	-0.36	0.18	**0.048**
Education (1 = Compulsory school)	0.54	0.78	0.491	-0.04	0.63	0.946	0.81	0.59	0.172	0.33	0.42	0.430	0.71	0.63	0.264	-0.39	0.54	0.473	-0.94	0.54	0.087
Proximity to science	0.13	0.10	0.214	0.13	0.09	0.174	0.03	0.09	0.690	-0.00	0.05	0.934	0.16	0.08	0.059	0.02	0.07	0.803	0.10	0.07	0.143
Political orientation (7 = right)	0.04	0.09	0.633	-0.07	0.07	0.318	0.01	0.07	0.921	-0.01	0.05	0.863	0.02	0.07	0.785	-0.02	0.06	0.790	-0.00	0.06	0.961
Religiosity	-0.02	0.09	0.845	0.09	0.07	0.232	-0.05	0.07	0.422	-0.14	0.05	**0.003**	-0.09	0.07	0.217	-0.12	0.06	**0.050**	-0.07	0.06	0.228
Newspapers	-0.02	0.10	0.855	0.15	0.08	0.054	0.13	0.08	0.100	0.10	0.05	0.070	0.09	0.08	0.290	-0.02	0.07	0.741	-0.01	0.07	0.834
Online Newspapers	-0.03	0.09	0.763	0.00	0.08	0.984	-0.08	0.07	0.278	0.02	0.05	0.753	-0.04	0.08	0.647	-0.03	0.07	0.604	-0.00	0.07	0.992
Public TV	0.02	0.10	0.822	0.04	0.08	0.661	-0.02	0.08	0.802	-0.13	0.05	**0.015**	-0.05	0.08	0.512	-0.11	0.07	0.117	-0.14	0.07	0.056
Public Radio	0.04	0.09	0.639	0.12	0.08	0.141	0.13	0.07	0.085	0.04	0.05	0.462	-0.13	0.08	0.101	0.07	0.07	0.320	0.18	0.07	**0.008**
Science Magazines	0.04	0.09	0.672	-0.07	0.07	0.317	0.05	0.07	0.486	-0.02	0.05	0.643	-0.01	0.07	0.909	0.02	0.06	0.782	0.02	0.06	0.777
Social Media	-0.08	0.10	0.444	-0.05	0.09	0.558	-0.05	0.08	0.517	-0.07	0.05	0.203	-0.12	0.08	0.159	0.00	0.08	0.976	-0.00	0.08	0.961
Wikipedia	0.10	0.09	0.316	-0.14	0.08	0.088	0.02	0.07	0.738	0.02	0.05	0.706	-0.08	0.08	0.294	0.03	0.07	0.652	-0.02	0.07	0.804
Video Platforms	0.02	0.09	0.840	0.09	0.07	0.251	-0.01	0.07	0.923	0.02	0.05	0.633	0.13	0.08	0.086	-0.07	0.07	0.262	-0.08	0.06	0.196
Private TV	0.03	0.10	0.791	0.02	0.08	0.846	0.04	0.07	0.551	0.01	0.05	0.825	0.02	0.08	0.762	-0.01	0.07	0.871	-0.00	0.07	0.948
Private Radio	-0.02	0.11	0.871	-0.06	0.10	0.531	-0.05	0.09	0.577	-0.08	0.06	0.212	-0.00	0.09	0.981	-0.15	0.08	0.062	-0.16	0.08	0.055
Observations	110			94			105			111			109			107			109		
R^2 / R^2 adjusted	0.292 / 0.152			0.400 / 0.256			0.277 / 0.126			0.437 / 0.327			0.418 / 0.302			0.421 / 0.302			0.386 / 0.264		

Note: Positive coefficients indicate that the predictor is associated with larger increases or smaller decreases in attitudes, while negative coefficients suggest smaller increases or larger decreases, depending on the mean differences.

Table 2. Multiple linear regressions predicting science-related attitudes with baseline values of covariates 2019 & 2022.

	Differences between 2019 and 2022 in. . .(Mean diff.)																				
	Scientific Literacy (-.05)			Trust in Science Coverage (.12)			Self-Perceived Knowledge (-.06)			Positivistic Attitudes (.09)			Interest in Science (-.05)			Trust in Science (.01)			Trust in Scientists (-.10)		
Predictors (2019 values)	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*
(Intercept)	1.95	0.77	**0.014**	0.76	0.76	0.322	1.03	0.61	0.092	0.90	0.46	0.057	1.48	0.70	**0.038**	1.68	0.70	**0.019**	1.22	0.81	0.138
Scientific Literacy	-0.64	0.11	**<0.001**																		
Trust in science Coverage				-0.52	0.13	**<0.001**															
Self-Perceived Knowledge							-0.65	0.11	**<0.001**												
Positivistic Attitudes										-0.25	0.10	**0.012**									
Interest in Science													-0.61	0.12	**<0.001**						
Trust in Science																-0.65	0.12	**<0.001**			
Trust in Scientists																			-0.37	0.15	**0.015**
Age	0.00	0.01	0.597	0.01	0.01	0.294	0.01	0.01	0.083	0.00	0.00	0.554	0.01	0.01	0.263	0.01	0.01	0.375	-0.00	0.01	0.743
Gender (1 = female)	-0.20	0.20	0.324	0.50	0.21	**0.018**	-0.10	0.17	0.562	-0.10	0.12	0.416	-0.04	0.18	0.822	0.00	0.17	0.983	-0.10	0.18	0.564
Education (1 = University degree)	0.25	0.21	0.236	0.10	0.21	0.624	0.15	0.17	0.377	0.03	0.12	0.833	-0.00	0.19	0.981	-0.17	0.17	0.328	-0.21	0.18	0.257
Education (1 = Compulsory school)	0.46	0.65	0.477	0.32	0.63	0.620	-1.27	0.77	0.102	0.81	0.38	**0.037**	-1.73	0.59	**0.005**	0.21	0.55	0.701	-0.54	0.60	0.376
Proximity to science	0.04	0.09	0.625	-0.06	0.08	0.456	0.03	0.08	0.652	-0.06	0.05	0.215	0.08	0.08	0.310	0.05	0.07	0.494	0.07	0.07	0.365
Political orientation (7 = right)	-0.10	0.07	0.185	0.15	0.08	0.061	0.16	0.06	**0.012**	-0.04	0.04	0.390	0.01	0.07	0.931	-0.04	0.06	0.480	0.01	0.07	0.918
Religiosity	0.00	0.09	0.977	-0.17	0.09	0.056	-0.06	0.07	0.435	0.01	0.05	0.893	-0.11	0.08	0.154	-0.08	0.07	0.257	-0.08	0.08	0.279
Newspapers	-0.06	0.09	0.503	0.03	0.10	0.741	-0.03	0.08	0.732	-0.04	0.05	0.464	0.01	0.09	0.927	-0.02	0.08	0.784	-0.02	0.08	0.824
Online Newspapers	-0.03	0.08	0.664	0.03	0.08	0.694	-0.04	0.06	0.577	0.01	0.05	0.837	0.00	0.07	0.952	0.17	0.07	**0.014**	0.16	0.07	**0.025**
Public TV	0.18	0.10	0.085	-0.24	0.11	**0.025**	0.03	0.08	0.733	0.01	0.06	0.867	-0.09	0.09	0.306	0.04	0.09	0.665	0.08	0.09	0.392
Public Radio	0.04	0.09	0.688	0.33	0.10	**0.002**	0.01	0.08	0.899	0.05	0.06	0.349	-0.00	0.09	0.995	0.11	0.08	0.158	0.03	0.08	0.702
Science Magazines	-0.04	0.08	0.634	0.04	0.08	0.607	0.15	0.07	**0.047**	-0.07	0.05	0.172	0.14	0.08	0.091	0.04	0.07	0.548	0.09	0.07	0.215
Social Media	-0.06	0.12	0.610	-0.07	0.12	0.573	-0.11	0.10	0.275	-0.12	0.07	0.093	-0.12	0.11	0.267	-0.12	0.10	0.235	-0.03	0.11	0.781
Wikipedia	0.15	0.09	0.074	-0.12	0.09	0.199	-0.04	0.07	0.577	0.09	0.05	0.086	0.21	0.08	**0.009**	0.03	0.07	0.694	-0.02	0.08	0.809
Video platforms	0.03	0.09	0.719	0.03	0.10	0.796	0.05	0.08	0.520	-0.02	0.05	0.748	0.01	0.08	0.917	0.03	0.08	0.710	0.05	0.08	0.565
Private TV	0.03	0.11	0.757	0.26	0.12	**0.036**	-0.02	0.09	0.838	-0.00	0.06	0.994	-0.02	0.10	0.865	-0.06	0.09	0.499	-0.11	0.10	0.263
Private radio	-0.10	0.11	0.333	-0.25	0.12	**0.036**	-0.07	0.09	0.434	0.02	0.06	0.707	0.07	0.10	0.490	0.11	0.09	0.216	-0.03	0.09	0.749
Observations	97			88			92			97			97			95			96		
R^2 / R^2 adjusted	0.381 / 0.238			0.410 / 0.256			0.503 / 0.381			0.209 / 0.027			0.379 / 0.236			0.402 / 0.260			0.233 / 0.054		

Note: Positive coefficients indicate that the predictor is associated with larger increases or smaller decreases in attitudes, while negative coefficients suggest smaller increases or larger decreases, depending on the mean differences.

The pandemic period (2019–2022) revealed more differentiated patterns, suggesting that this crisis represented a unique context that amplified the influence of various factors. However, even during the earlier period (2016–2019), we observed nuanced changes in attitudes toward science, reflecting broader societal dynamics such as growing skepticism toward media representations of science and increasingly critical audience segments (Klinger et al., 2022). During the second time span, gender differences emerged, with women showing more pronounced increases in trust in science coverage, potentially reflecting gender differences in media reception (Jakobs et al., 2021) or perceptions of trustworthiness (Evans and Hargittai, 2020). Similarly, political orientation became a significant factor, as rather right-leaning individuals exhibited less pronounced decreases in self-perceived knowledge. This finding suggests that ideological factors may buffer perceived competence in science-related domains.

In addition, interest in science decreased more prominently among individuals with lower levels of formal education. This trend may reflect barriers to understanding of or trust in science communication efforts, aligning with existing literature on trust in science (Radrizzani et al., 2023). This underscores concerns about the potential polarization of scientific knowledge and engagement, which highlight the importance of targeted efforts to make scientific information more accessible and relatable to diverse educational backgrounds, to prevent further exacerbation of knowledge gaps and disengagement. Nevertheless, we observed an increase in positivistic attitudes toward science among individuals with lower formal education during this period, which may align with the rally-around-the-flag effect observed during crises (Yam et al., 2020).

Our findings present a mixed picture of how media use drives changes in science attitudes. While some legacy media channels (e.g. public radio and private TV) appeared to foster trust in science coverage and trust in science, others (e.g. private radio and public TV) were associated with less pronounced increases or even decreases in trust in science coverage and more pronounced decreases in positivistic attitudes toward science. These results do not indicate a clear differentiation in the perceived trustworthiness of public versus private legacy media.

The role of digital media became particularly salient during the second period, with Wikipedia and online versions of legacy newspapers emerging as significant drivers of trust in science and as buffers against decreases in trust in scientists. This highlights the growing importance of digital platforms in shaping science-related attitudes, especially during periods of heightened public attention, such as the COVID-19 pandemic. In addition, these legacy media channels fostered trust in science and scientists on average, possibly reflecting the aforementioned rally-around-the-flag effect (Yam et al., 2020) during COVID-19. Although people can encounter misleading information on social media (Allcott and Gentzkow, 2017), which may be related to lower trust in science (Mede et al., 2024), we were unable to identify social media use as a driver for changes in attitudes toward science. Given the mixed findings in existing research regarding social media's impact on trust in science, our results may reflect both the complexity of this relationship and methodological limitations in our undifferentiated measurement of social media use, which did not account for the different ways users can encounter science on these platforms—whether through direct contact with experts, peer discussions, or traditional media-style content consumption (Reif and Guenther, 2021).

Although our study provides valuable insights into attitudes toward science, several limitations must be acknowledged. First, our analysis is based on relatively small, non-probability samples. These samples consisted of participants from a larger representative survey who opted in to participate again, resulting in a cohort with higher formal education and presumably more positive attitudes toward science compared to both broader survey samples and the general Swiss population.

Due to the limited sample sizes in the earlier waves, we had lower statistical power, implying that small or subtle effects might not have been detected. While our analytical approach is appropriate for examining discrete changes between survey waves, future studies with more frequent measurements (e.g. annual surveys) and longer panel periods would benefit from multilevel modeling approaches that can better capture continuous within-person attitude trajectories and provide increased statistical power for detecting subtle change patterns.

Second, the scale measuring positivistic attitudes exhibited low internal consistency in the earlier waves, which points to potential measurement imprecision and limited construct coherence. This may indicate that the construct of "positivism" encompasses several related yet not fully homogeneous dimensions of belief in science's epistemic authority and problem-solving capacity and contributed to the low Cronbach's alpha values in 2016 (.55) and 2019 (.64), which fall below commonly accepted thresholds and thus warrant caution in interpreting the results. While the improvement in 2022 ($\alpha = .70$) suggests greater attitude stability over time, this level is still at the lower bound of acceptability. We therefore acknowledge that the results on positivistic attitudes should be interpreted as indicative rather than definitive. Despite these limitations, we retained the items because they are grounded in established frameworks of public attitudes toward science (European Commission, 2021; Wintterlin et al., 2022) and for theoretical reasons: given their conceptual relevance and longitudinal comparability, we considered their inclusion analytically meaningful, while emphasizing the need for future research to develop more reliable and possibly multidimensional measures of positivistic attitudes toward science.

In addition, our distinction of different media channels may oversimplify the complexity of media landscapes. More granular differences—such as variations between conservative and liberal outlets within these categories—are not captured in our analysis but would be helpful to understand potential polarization tendencies further.

Third, our findings are based solely on data from Switzerland, limiting the generalizability of our conclusions. Switzerland's unique political system, characterized by direct democracy, may amplify its susceptibility to populist sentiments and their related communication behavior (Mede et al., 2024), while high baseline trust in science may mitigate these effects. As such, caution is warranted when applying our findings to other national contexts.

Finally, our study spans a relatively long period of 3 years per time interval. While this allows us to capture more enduring changes in attitudes toward science, it may obscure short-term fluctuations or dynamics observable in cross-sectional studies (e.g. Bromme s., 2022) or in panel analyses with shorter intervals (e.g. Mede and Schäfer, 2022), regarding changes during the outbreak of the COVID-19 pandemic.

These findings contribute to a deeper understanding of the dynamics underlying changes in public attitudes toward science. The results underscore the interplay between sociodemographic characteristics, media usage, and broader societal contexts in shaping these attitudes. The observed patterns during the COVID-19 pandemic, in particular, suggest that crises amplify the role of media as both a source of information and a lens through which science is interpreted.

From a practical perspective, these findings suggest that science communication strategies should address the specific needs and concerns of different demographic groups. For instance, tailoring communication efforts to less-educated or more religious audiences may help mitigate declines in trust or interest in science. Similarly, leveraging digital platforms such as Wikipedia or online news outlets could be an effective strategy for reaching broader and more diverse audiences.

ORCID iDs

Lena Zils https://orcid.org/0009-0008-7252-9604

Julia Metag https://orcid.org/0000-0003-4328-6419

Niels G. Mede https://orcid.org/0000-0001-5707-7568

Mike S. Schäfer https://orcid.org/0000-0002-0847-7503

Ethical considerations

Our study included human participants. Accordingly, the first wave of the project was approved by the ethics committee of the Faculty of Arts and Social Sciences of the University of Zurich, Zurich, Switzerland (approval number: 22.6.14). Informed written consent to take part in the research was obtained prior to the commencement of the study through the first question of the survey.

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Supplemental material

Supplemental material for this article is available online.

Notes

1. For sample-level changes in attitudes toward science during the investigated time spans, refer to Supplemental Material A2 and A3, which present the results of paired samples t-tests.
2. To check robustness, we additionally estimated multilevel models including all three panel waves (2016, 2019, 2022), with random intercepts for individuals to account for within-person dependencies (Table A7). While our primary analyses focused on discrete changes between waves using multiple regression, the multilevel results confirm our main findings. In particular, key predictors such as university education, religiosity, and media use (e.g. Wikipedia, science magazines, and public radio) showed consistent associations with science-related attitudes across both modeling strategies. Differences in effect sizes and significance levels likely reflect differences in sample composition, statistical power, and the more continuous modeling of change dynamics. These multilevel results underscore the overall robustness of our conclusions.
3. For transparency and to assess multicollinearity between predictors, correlation tables for all variables included in the models are provided in Tables A4-A6 of the Supplemental Material.

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Author biographies

Lena Zils is a PhD student at the Department of Communication at the University of Muenster, Germany. Her research focuses on science communication, with particular emphasis on its target audiences and reception at the intersection with political communication. In her dissertation, she examines media coverage of the interaction between science and politics.

Julia Metag is a Professor at the Department of Communication at the University of Muenster, Germany. Her research interests include science communication, political communication, and media effects.

Niels G. Mede is an Assistant Professor of Communication Science in Life Science Contexts in the Strategic Communication Group at Wageningen University & Research (WUR), Netherlands. In his research, he focuses on science communication, public perceptions of science, populism, and survey methodology.

Mike S. Schäfer is a Full Professor of Science Communication at the Department of Communication and Media Research (IKMZ), University of Zurich, Switzerland. His research focuses on public science communication, climate change communication, and the role of AI.