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Research Article

Unwarranted Trust and Unwarranted Punishment: Scientistic Beliefs Predict Support for Penalizing Science Skeptics

Petar Lukić [1]✉, Iris Žeželj [1]

[1] *LIRA Lab, Department of Psychology, Faculty of Philosophy, University of Belgrade, Serbia*

ABSTRACT

Contemporary society demands laypeople to articulate their attitudes towards science. Whilst distrust in science undeniably has detrimental outcomes, we argue that its opposite, uncritical trust in science and scientists (i.e., scientism) also leads to potential unwarranted societal polarization. In Study 1, we observed that people who endorsed scientistic beliefs supported discriminatory policies against people who ignore scientific knowledge or promote anti-scientific views, ranging from restrictions on their media appearance to imprisonment and denial of healthcare. Study 2 replicated the effect and tested its potential mechanism: the tendency to moralize rationality mediated the relationship between scientistic beliefs and support for penalizing measures. Our findings demonstrate that unwarranted beliefs, even if desirable in their moderate version, are associated with increased support for unwarranted measures against dissenters.

Keywords: scientism, trust in science, trust in scientists, science skepticism, penalization

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✉ Corresponding author's email: petar.lukic@f.bg.ac.rs

Introduction

"In science we trust."

Sticker/Yard sign for sale on Amazon, 2024

The COVID-19 pandemic showcased that debates between people who trust science (*the believers*) and those who ignore official recommendations or even support non-scientific accounts *(the skeptics*) can be quite heated. In November 2021, two groups of Australian citizens protested: one vehemently opposing COVID-19 vaccines and the other supporting compulsory vaccination with similar passion (Kelley, 2021). Twitter exchanges on COVID-19 between believers and skeptics typically contained offensive language (Liao et al., 2023). Despite inadequate expertise, laypeople strongly advocated for or against medical recommendations (e.g., wearing masks, vaccination), often accusing their opponents of ignorance or worse. Heated debates about scientific issues are, of course, not reserved for public health issues; Moernaut et al. (2022) documented the exchange between global warming skeptics and believers, in which they accused each other of lack of intelligence, irrationality, or immorality.

Distrusting science may hinder societal progress and endanger the safety of individuals, as well as society as a whole. For example, distrust in science was found to be related to lower compliance with COVID-19 health recommendations, such as wearing masks or vaccination (Hromatko et al., 2021; Plohl & Musil, 2021). Climate change skepticism is also related to a lower willingness to behave in a way that would mitigate the effects of climate change (Huber et al., 2022; Liu et al., 2022; Spence et al., 2011). In comparison, the consequences of unwarranted trust in science are not so clear. We argue that understanding this mechanism may help in preventing further societal divisions. In this paper, we examine how uncritical trust in science and scientists relates to penalizing practices against science skeptics. While we fully agree that laypeople should delegate their trust to science and scientists and follow their recommendations, in light of their lack of expertise, it is worth asking how they become so confident or even radicalized that they argue for harsh treatment of science skeptics or even deny them basic rights. It could be that both extremes of (dis)trust in science

that lead to intolerance have a certain form of misunderstanding of the nature of scientific enterprise at their core. This misunderstanding is closely related to the philosophical concept of *scientism*.

Scientistic Beliefs

Scientism refers to the attribution of undisputed epistemic and moral status to science, a belief that scientific knowledge has no boundaries and can answer all relevant societal questions, including moral or existential ones (Haack, 2012; Stenmark, 2018). Scientistic views can also incorporate an idealized view of scientists, i.e., seeing them as absolutely truthful, motivated solely by knowledge acquisition, and, in general, exceptionally virtuous. These two aspects of scientistic views are conceptually separated: we can imagine a person who believes science is an infallible and all-powerful method for discovering the truth while also acknowledging that scientists, as human beings, are susceptible to accidental or deliberate mistakes. Empirically, uncritical trust in science and scientists are correlated but separate factors, which suggests their potential independent predictive value for various constructs (Lukić & Žeželj, 2024).

Recently, research showed that scientistic beliefs are related to dogmatism (Lukić & Žeželj, 2024), viewed as "a relatively closed cognitive organization of beliefs and disbeliefs about reality, organized around a central set of beliefs about absolute authority which, in turn, provides a framework for patterns of intolerance and qualified tolerance toward others" (Rokeach, 1954, p. 195). Such rigid organization of reality is typically related to intolerance to the ones opposing it — we thus believe that unwarranted idealization of science and scientists may carry the risk of blaming the science skeptics for setbacks of scientifically driven policies.

Trust in Science and Penalization of Science Skeptics

Deviations from the group norms call for measures to regulate behavior, such as ridicule, punishment, or even ostracism (Jetten & Hornsey, 2014; Schachter, 1951). Moreover, our need to regulate socially deviant behavior is shown to be stronger when the behavior seems to negatively affect our well-being, including our safety or health (Brauer & Chekroun, 2005). The norm of trusting science was especially prominent in the case of

the COVID-19 pandemic (Bicchieri et al., 2021). Several recent papers explored how science believers treat science skeptics, typically regarding vaccination. For example, vaccinated people were more likely to endorse fines for those who did not get vaccinated themselves or did not vaccinate their children or even to advocate for taking away their childcare benefits (Blanchard-Rohner et al., 2021). Similarly, in certain contexts, vaccinated people supported restricting basic human rights to non-vaccinated ones - for example, restricting healthcare for non-vaccinated people in case they get infected (Kasper et al., 2022). Vaccinated people also felt a specific type of pleasure (*Schadenfreude*) when presented with a scenario of an anti-vax physician dying due to COVID-19 complications (Barlett & Meier, 2023), which is in line with other similar findings about decreased levels of compassion for those not vaccinated (Claudy et al., 2022; Hatchman et al., 2024).

In addition to these penalizing actions being hurtful per se, advocating for such harsh measures can prove inefficient or even backfire. That is, such a way of communication might not be optimal for winning the skeptics over to trust science as it may further alienate them and entrench their positions (Henkel et al., 2023; Prosser et al., 2020).

Present Research

Across two studies, we tested whether support for penalizing measures against science skeptics related to scientistic beliefs, i.e., uncritical trust in science and scientists. In Study 1, we explored the support for penalizing measures against people who neglect scientific recommendations and their relationship with scientistic beliefs. In Study 2, we introduced the potential mechanism underlying this relationship, assuming moralizing rationality as its mediator. The study design and data collection were approved by the Institutional Review Board of the Department of Psychology, University of Belgrade (Protocol no. ##2021-100).

Study 1

We expected that both Uncritical trust in science and Uncritical trust in scientists would positively correlate with Support for penalization (H1.1). We also expected that both Uncritical trust in science and Uncritical trust in scientists would independently predict Support for penalization (H1.1a).

Method

Open science practices

The study is part of the first author's PhD thesis, and its design, hypotheses, and analyses were preregistered (https://aspredicted.org/V37_JPQ). All data and supplemental materials are available at https://osf.io/a9g7x/.

Sample

From the initial database of 272 entries, 67 participants were excluded (17 entries were incomplete, 34 participants failed attention checks, and 16 completed the questionnaires too quickly). Thus, a final sample of 205 psychology and sociology students (171 females, 33 males, one undeclared, M_{AGE} = 20.90, SD_{AGE} = 3.45) was retained. The planned sample size allowed us to detect correlations of r = .20 (80% power and p = .05).

Variables and instruments

Scientific beliefs

To measure *scientistic beliefs* we used the 20-topic Scientistic Beliefs Questionnaire (Lukić & Žeželj, 2024) containing a 12-topic Uncritical trust in science subscale (α = .65) and 8-topic Uncritical trust in scientists subscale (α = .67). Each topic represents a five-option Thurstone-type scale ranked from extremely scientistic, through moderately scientistic, balanced view of science/scientists, moderately antiscientific, to extremely antiscientific. For example, one of the topics is "The Possibility of Reaching the Truth," where the extremely scientistic claim is "Science can reach the absolute truth about everything that exists", and the extremely antiscientific

claim is “Science can never truly reach any truth.” The respondents were instructed to choose the option that captures their opinion best. To capture scientistic beliefs only, we awarded participants two points for each extremely scientistic answer and one point for each moderately scientistic answer; all other answers were scored zero, meaning the mean score range for both subscales was 0 to 2. We opted for the Thurstone-type scale to ensure we have grounds to claim there is a mid-score reflecting a balanced view towards science, and to make a finer distinction between unwarranted trust, balanced view, and distrust in science and scientists. To make sure these were truly reflected in the options we offered participants, the scale had gone through a five-stage expert validation process that included philosophers of science and psychometricians (for details on the construction procedure, consult Lukić & Žeželj, 2024). The full questionnaire is available at https://osf.io/tznk5.

Support for penalization

To measure Support for penalization, we constructed a novel 20-item questionnaire with a 5-point Likert-type scale. Items (Table 1) were related to topics such as healthcare restrictions (e.g., “Companies should not give paid sick leave to those who deliberately did not get vaccinated and then got sick”), traditional media and social media visibility restrictions (e.g., “People who question scientific facts should be restricted from appearing in the media”), and fines or prison sentencing (e.g., ”Dissemination of information that is contrary to scientific evidence should be punishable by a prison sentence”). Based on face validity, before the items were administered to participants, the initial pool of 25 items was shortened to 20 to avoid content overlap. The scale's internal consistency was high (α = .93). To test the structure of the instrument, we conducted principal component analysis; the loadings on the first component ranged from .37 to .81 (for details, consult Supplemental files). Additionally, confirmatory factor analysis showed single factor solution had excellent fit indices (*CFI* = .975, *TLI* = .972, *NFI* = .966, *GFI* = .972) except for χ2 (χ2(170) = 631.15, $p < .001$) and *RMSEA* (RMSEA = .11 [95% CI .11 - .13]) which slightly exceeded values for acceptable fit with all items loadings significant on the level of $p < .001$ (for details, consult Supplemental files). This is why we proceeded to calculate a single score on the Support for penalization scale (fully available at https://osf.io/a9g7x).

Results

Distributions of responses showed a significant portion of respondents were supportive of penalizing measures towards science skeptics, ranging from 4.9% for the most radical ones aimed directly at people (denying healthcare) to 50.3% for the ones aimed at media that platform the skeptical views (additional taxing) (Table 1). The average support for penalization across measures was 2.53 (*SD* = 0.83). As for the scientistic views, their average endorsement on a scale ranging from 0 to 2 was 0.37 (*SD* = 0.24) for Uncritical trust in science and 0.38 (*SD* = 0.30) for Uncritical trust in scientists.

In line with H1.1, both Uncritical trust in science ($r = .46$, $p < .001$) and Uncritical trust in scientists ($r = .18$, $p = .012$) were positively related to Support for penalization. As in the previous studies (Lukić & Žeželj, 2024), Uncritical trust in science and Uncritical trust in scientists were positively related ($r = .30$, $p < .001$).

To test if Uncritical trust in scientists predicted Support for penalization independently of Uncritical trust in science, we set Support for penalization as the dependent variable and introduced Uncritical trust in science in the first block and Uncritical trust in scientists in the second. The model was significant ($F(2,202) = 27.6$), explaining 21% of the total variance. Contrary to our expectations (H1.1a), only Uncritical trust in science proved to be a significant predictor ($\beta = .45$, $p < .001$); Uncritical trust in scientists did not independently contribute to the prediction ($\beta = .04$, $p = .52$).

We further examined relations between scientistic beliefs and specific penalizing measures. All but one behavior (i.e., denying medical care to unvaccinated people) listed in the Support for penalization questionnaire positively correlated with Uncritical trust in science, while around half of the behaviors positively correlated with Uncritical trust in scientists (Table 1). Both Uncritical trust in science ($r = .43$) and Uncritical trust in scientists ($r = .28$) correlated the most with the endorsement of the immediate deletion of anti-scientific internet comments.

Table 1

The Distribution of Answers to Penalizing Behaviors and Their Correlations with Scientistic Beliefs - Study 1

	Answers							Correlation (*r*)	
Item	1 Extremely Antiscientific	2	3	4	5 Extremely Scientistic	*M*	*SD*	Uncritical trust in science	Uncritical trust in scientists
Newspapers, magazines, and books promoting anti-scientific views and pseudoscience should be additionally taxed.	15.1%	18.0%	16.6%	28.8%	21.5%	3.23	1.37	.26***	.15*
This society should be much less tolerant of people who spread anti-scientific views.	14.6%	15.1%	22.0%	32.7%	15.6%	3.20	1.29	.41***	.17**
It should be prohibited by law to organize protests against scientifically proven practices, such as protests against compulsory vaccination of children.	25.4%	15.6%	22.4%	22.0%	14.6%	2.85	1.40	.31***	.16*
People who do not vaccinate their children simply because they do not believe in the effectiveness and safety of vaccines should be seriously financially sanctioned.	25.4%	17.6%	19.5%	22.4%	15.1%	2.84	1.42	.22***	.03
Persons who bring disrepute to science should not go without some kind of sanction.	19.5%	23.4%	24.4%	24.4%	8.3%	2.79	1.25	.31***	.17**

People who treat their children with homeopathy or other pseudoscientific means should be severely sanctioned.	24.9%	23.4%	17.1%	23.9%	10.7%	2.72	1.35	.33***	.05
Comments on the Internet written by people with anti-scientific views should be deleted without hesitation.	23.4%	22.4%	26.8%	16.6%	10.7%	2.69	1.29	.43***	.28***
Parents who do not believe in the safety of vaccines should not be allowed to send their children to kindergarten.	30.2%	17.6%	22.4%	12.2%	17.6%	2.69	1.46	.35***	.01
It would be good if there were some system of sanctioning people who advocate anti-scientific views.	24.4%	23.4%	21.0%	22.9%	8.3%	2.67	1.29	.34***	.14*
Those who write comments with anti-scientific content on the Internet should somehow be restricted from accessing public platforms such as Facebook, Twitter, YouTube, or online newspapers.	26.3%	24.9%	17.1%	21.5%	10.2%	2.64	1.35	.34***	.20**
Persons who advocate anti-scientific views deserve the public condemnation of the entire society.	25.9%	20.0%	27.8%	20.0%	6.3%	2.61	1.24	.32***	.06
People who criticize science should be restricted from appearing in the media.	25.4%	27.3%	19.0%	21.5%	6.8%	2.57	1.27	.33***	.20**
People who criticize scientists should not be given space in the media.	28.3%	31.2%	21.5%	15.6%	3.4%	2.35	1.15	.39***	.18**

People who do not get vaccinated despite the doctor's recommendation should be fined.	32.2%	28.3%	19.5%	14.1%	5.9%	2.33	1.23	.25***	.07
Dissemination of information that is contrary to scientific evidence should be punishable by a fine.	36.1%	28.3%	21.0%	10.2%	4.4%	2.19	1.16	.37***	.12*
Dissemination of information that is contrary to scientific evidence should be punishable by a prison sentence.	36.1%	28.3%	21.0%	10.2%	4.4%	2.19	1.16	.30***	.09
People who question scientific facts should be restricted from appearing in the media.	36.6%	29.8%	18.5%	9.8%	5.4%	2.18	1.18	.38***	.15*
People who do not vaccinate their children just because they do not believe in the effectiveness and safety of vaccines should be punished with prison.	46.3%	25.4%	15.1%	9.8%	3.4%	1.99	1.15	.13*	-.01
Companies should not give paid sick leave to those who got sick and deliberately did not get vaccinated.	59.0%	17.6%	13.7%	8.3%	1.5%	1.76	1.07	.19**	.05
The state should not medically treat those people who got sick and who deliberately did not get vaccinated.	70.2%	16.6%	8.3%	4.4%	0.5%	1.48	0.86	.07	.06

Note. The items are ordered by the average endorsement from the highest to the lowest.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Discussion

As expected, individuals with stronger scientistic beliefs were more inclined to express support for penalization of science skeptics. This was consistently observed across different penalizing measures - from additional taxing the media that promote anti-science, through restricting the right to protest against science-based practices, banning skeptics from the media, or even fining or imprisoning them for promoting anti-science, to fining and imprisoning people for disregarding official medical practices. On the other hand, we only found the hypothesized contribution of uncritical trust in science, not in scientists, indicating the former to be more crucial for understanding the support for penalization.

We may expect people uncritically trusting science to be more likely to deem rationality (well represented by scientific thinking) morally virtuous and thus more likely to penalize those who think or behave anti-scientifically, which is often considered irrational. There is some experimental evidence for this assumption: Ståhl et al. (2016) found that individuals prone to moralizing rationality are more likely to punish a fictional religious doctor for advising prayer to a patient who later died.

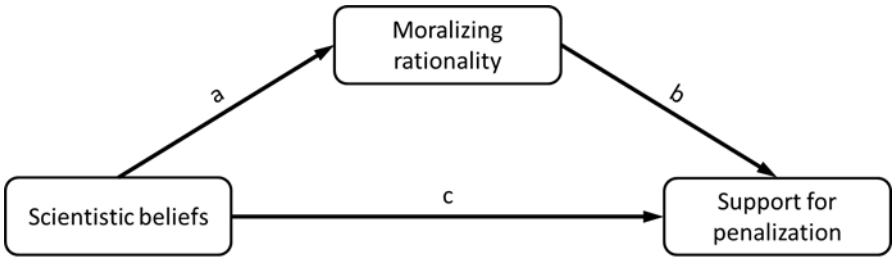
Study 2

In this study, we aimed to replicate the observed relationship between uncritical trust in science and support for discriminatory measures against skeptics in a more diverse sample. We also aimed to examine *moralizing rationality* as a potential underlying mechanism.

We expected that both Uncritical trust in science and Uncritical trust in scientists would correlate positively with the Support for penalization (H2.1). We also expected that moralizing rationality would mediate (Figure 1) the previously documented relationship between Uncritical trust in science and the Support for penalization (H2.2).

Figure 1

Mediation model



Method

Open science practices

The design of Study 2, hypotheses, and analyses were preregistered (https://aspredicted.org/3M5_HZW). All data and supplemental files are available at https://osf.io/a9g7x.

Sample

From the initial pool of 472 entries, after preregistered exclusions (231 entries were incomplete, 19 failed attention checks, and 5 completed the questionnaires too quickly), we were left with a total of N = 217 participants (142 females, 75 males, M_{AGE} = 39.13, SD_{AGE} = 11.79). They were recruited via posts on social media (i.e., Facebook and Instagram) and snowballing techniques. The sample was composed mostly of highly educated participants — 52.1% held an MA degree or higher, 27.2% had a university/college degree, 8.8% were students, and 13.0% had only a high school education.

Variable and instruments

To assess scientistic beliefs and the support for penalizing measures against skeptics, we used the same instruments as in Study 1. Uncritical trust

in science (α = .82), Uncritical trust in scientists (α = .77), and Support for penalization (α = .95) showed satisfactory internal consistencies.

We also used the 9-item Moralized rationality scale by Ståhl et al. (2016) with a 7-point (1- *Completely disagree*, 7 - *Completely agree*) Likert scale (e.g., "Being skeptical about claims that are not backed up by evidence is a moral virtue"), translated and adapted to Serbian via a parallel translation with consultations (α = .79).

Results

The frequencies of answers to Support for penalization items showed an even stronger endorsement of penalizing measures toward science skeptics than in Study 1. The average support for penalization was 3.09 (*SD* = 0.98). The average endorsement for Uncritical trust in science was 0.52 (*SD* = 0.37) and 0.43 (*SD* = 0.37) for Uncritical trust in scientists, both higher than in Study 1. Finally, people were moderately prone to moralize rationality (*M* = 4.02, *SD* = 1.13 on a scale from 1 to 7).

Table 2

The Distribution of Answers to Penalizing Behaviors and Their Correlations with Scientistic Beliefs - Study 2

	Answers							Correlations (*r*)	
Item	1 Extremely Antiscientific	2	3	4	5 Extremely Scientistic	*M*	*SD*	Uncritical trust in science	Uncritical trust in scientists
Newspapers, magazines, and books promoting anti-scientific views and pseudoscience should be additionally taxed.	13.4%	11.1%	12.4%	19.8%	43.3%	3.69	1.45	.45***	.36***
This society should be much less tolerant of people who spread anti-scientific views.	13.8%	9.7%	15.2%	25.8%	35.5%	3.59	1.41	.44***	.38***

Persons who bring disrepute to science should not go without some kind of sanction.	14.3%	9.7%	26.3%	20.7%	29.0%	3.41	1.37	.33***	.27***
Dissemination of information that is contrary to scientific evidence should be punishable by a fine.	13.4%	15.7%	19.8%	22.6%	28.6%	3.37	1.39	.45***	.41***
It would be good if there were some system of sanctioning people who advocate anti-scientific views.	16.1%	14.3%	19.4%	22.1%	28.1%	3.32	1.43	.39***	.37***
Persons who advocate anti-scientific views deserve the public condemnation of the entire society.	16.1%	15.7%	18.4%	23.0%	26.7%	3.29	1.42	.42***	.37***
Parents who do not believe in the safety of vaccines should not be allowed to send their children to kindergarten.	19.8%	14.3%	19.4%	18.4%	28.1%	3.21	1.49	.34***	.26***
People who do not vaccinate their children simply because they do not believe in the effectiveness and safety of vaccines should be seriously financially sanctioned.	21.7%	10.6%	22.1%	18.9%	26.7%	3.18	1.49	.31***	.34***
It should be prohibited by law to organize protests against scientifically proven practices, such as protests against compulsory vaccination of children.	21.2%	14.8%	18.0%	18.0%	28.1%	3.17	1.51	.37***	.30***

People who criticize science should be restricted from appearing in the media.	17.5%	17.5%	19.4%	26.3%	19.4%	3.12	1.38	.37***	.26***
Those who write comments with anti-scientific content on the Internet should somehow be restricted from accessing public platforms such as Facebook, Twitter, YouTube, or online newspapers.	20.7%	17.5%	21.2%	18.9%	21.7%	3.03	1.44	.35***	.36***
Comments on the Internet written by people with anti-scientific views should be deleted without hesitation.	20.7%	18.0%	24.0%	16.6%	20.7%	2.99	1.42	.36***	.36***
People who treat their children with homeopathy or other pseudoscientific means should be severely sanctioned.	23.5%	18.4%	17.5%	18.0%	22.6%	2.98	1.49	.37***	.25***
People who do not get vaccinated despite the doctor's recommendation should be fined.	29.0%	13.8%	20.7%	19.8%	16.6%	2.81	1.46	.27***	.30***
Dissemination of information that is contrary to scientific evidence should be punishable by a prison sentence.	25.4%	18.4%	24.4%	15.2%	16.6%	2.79	1.41	.43***	.33***
People who criticize scientists should not be given space in the media.	24.4%	18.9%	24.9%	18.4%	13.4%	2.77	1.36	.34***	.28***

People who question scientific facts should be restricted from appearing in the media.	28.6%	21.2%	23.0%	13.8%	13.4%	2.62	1.38	.34***	.30***
People who do not vaccinate their children just because they do not believe in the effectiveness and safety of vaccines should be punished with prison.	39.6%	17.5%	21.2%	10.6%	11.1%	2.36	1.38	.25***	.19**
Companies should not give paid sick leave to those who got sick and deliberately did not get vaccinated.	43.8%	16.6%	18.0%	10.6%	11.1%	2.29	1.40	.33***	.11
The state should not medically treat those people who got sick and who deliberately did not get vaccinated.	56.2%	17.1%	14.8%	4.6%	7.4%	1.90	1.25	.20**	.13*

Note. The items are ordered by the average endorsement from the highest to the lowest.

* $p < .05$, ** $p < .01$, *** $p < .001$.

As expected, the correlation between Uncritical trust in science and Uncritical trust in scientists was high ($r = .41$, $p < .001$). Support for penalization correlated positively with both Uncritical trust in science ($r = .49$, $p < .001$) and Uncritical trust in scientists ($r = .41$, $p < .001$), in line with H2.1. Moralized rationality correlated positively with all three other variables, more strongly with Support for penalization ($r = .43$, $p < .001$) and Uncritical trust in science ($r = .42$, $p < .001$) than with Uncritical trust in scientists ($r = .27$, $p < .001$).

An exploratory regression analysis (specified in the same way as in Study 1) now showed both Uncritical trust in science ($\beta = .39$, $p < .001$) and Uncritical trust in scientists ($\beta = .25$, $p < .001$) to independently predict Support for penalization ($F(2,214) = 44.6$), explaining 29% of its total variance.

Mediation analysis

The mediation analysis was conducted in the R *lavaan* package (R Core Team, 2021; Rosseel, 2012). The analysis (ML as an estimator) was conducted with 5,000 bootstrapped samples to estimate the indirect effect and its confidence intervals. The results revealed a significant positive effect of Uncritical trust in science on Support for penalization (c = .49, SE = .06, t = 8.34, p < .001). When Moralized rationality was introduced in the model, the direct effect of Uncritical trust in science on Support for penalization remained significant but was reduced (c' = .38, SE = .06, t = 6.82, p < .001). As expected (H2.2), the indirect path from Uncritical trust in science to Support for penalization through Moralized rationality was significant (ab = .11, SE = .03, t = 3.46, p < .001), with a 95% bootstrapped confidence interval [0.05, 0.18], indicating partial mediation. The model explained 30% of the variance of Support for penalization. For the complete set of regression coefficients, consult the Supplemental files.

While we did not preregister our hypothesis regarding the effect of Uncritical trust in scientists on Support for penalization through Moralized rationality, the effect was significant (ab = .09, SE = .03, t = 3.45, p < .001), with a 95% bootstrapped confidence interval [0.05, 0.15]. The direct effect was significant before (c = .41, SE = .06, t = 6.62, p < .001) and after the inclusion of Moralized rationality (c' = .32, SE = .05, t = 6.13, p < .001). This model explained 28% of the variance of Support for penalization.

Discussion

Study 2 corroborated the relationships between scientistic beliefs and support for penalizing measures against science skeptics. The correlations were even stronger than in Study 1, especially the one between Uncritical trust in scientists and Support for penalization. Moreover, the endorsement of penalizing measures was higher than in the previous study, which may be attributed to the increased diversity of the sample in terms of gender, age, and education. Participants agreed the most with the item suggesting that media promoting anti-scientific views and pseudoscience should be additionally taxed (63%). As in Study 1, participants agreed the least with denying medical care to people who deliberately did not get vaccinated but got ill (12.0%). On this micro level, we also observed stronger

correlations than in Study 1, as Uncritical trust in science correlated positively with all specific penalizing measures, and Uncritical trust in scientists with all but one (In Study 1, it only correlated with around half of these measures).

We further revealed individuals who uncritically trusted science and scientists more were also more likely to moralize rationality (i.e., to perceive scientific thought and rationality as a moral imperative). Thus, trust in science and scientists seems to have transcended from the domain of evidence and rationality to the domain of values, so violating these moral values further calls for sanctions. The proposed mediation effect, however, was only partial, leaving a significant direct path from scientistic beliefs to penalizing measures. Since no causal relations could be inferred, this suggests that broader beliefs about the moral value of being rational could explain the relationship between scientistic beliefs and the support for penalization of science skeptics, but that there is still a remaining shared variance specific to the relationship between beliefs about science and penalization.

Our results suggest that uncritical trust in science plays a more central role in driving support for the penalization of science skeptics than uncritical trust in scientists. This could be partially due to the fact that the former correlates with moralizing rationality more strongly than the latter. It suggests that scientific thought is held as more "sacred" than its actual practitioners, i.e., violations of scientific thought are more likely to elicit penalization than distrust in scientists themselves. We have also observed an incremental contribution of Uncritical trust in scientists to the prediction of penalization only in Study 2 and not in Study 1. One possible explanation is that the distribution of this measure was better in the community sample, compared to the student sample in Study 1, in which its range was more restricted.

General Discussion

Across two studies, we compellingly showed that people who deemed science and scientists supreme were also more prone to endorse different penalizing measures against people who ignore scientific recommendations or advocate for anti-scientific views.

We found that a significant portion of respondents in both studies supported each of the penalization items. Even very harsh sanctions, such as imprisonment or denying state-funded medical treatment, were endorsed by more than 10% of the respondents in the online community sample in Study 2. Around 46% of these respondents, the majority of whom are highly educated, agreed that skeptics should be prohibited from protesting, while around one-third thought that people who question scientific facts or criticize scientists should be prohibited from appearing in the media.

This nuanced look at the type of behaviors being penalized and the harshness of penalizing measures also revealed that scientistic beliefs related primarily to lighter forms of penalization, such as restricting their appearances in the media and heavy moderation of unscientific comments in digital space. Scientistic beliefs appeared to be less strongly related to more radical measures with health-related consequences, such as denying medical care to unvaccinated people and prison sentences to parents of unvaccinated children.

Our results, thus, show that extreme views of science are related to extreme views about how citizens should be legally regulated in the context of science-related societal issues. While it may seem reasonable to call for sanctions against some of these serious anti-scientific behaviors as they may seriously endanger our own and the well-being of others, the matter of considering and imposing sanctions would be a complex task for policymakers. For example, before introducing any sanctions against those spreading anti-scientific information, the notions of the right to free speech and the knowledge of the speaker (i.e., the differentiation between ignorance and false advertising, fraud, or hoax) should be considered (Gielow Jacobs, 2022). Also, due to civil rights, criminal law measures should only be used as the last option - when all other measures prove ineffective (Husak, 2004). Finally, legal sanctions do not necessarily prove efficient, as they often undermine the intentions to curb the consequences of anti-scientific behavior (Sun et al., 2022).

Adherence to science-based recommendations was previously shown to be moralized (e.g., Bor et al., 2023; Rozin & Singh, 1999; Salomon et al., 2017). This implies that non-adherence would consequently call for appropriate sanction. We thus hypothesized moralizing rationality might play

a role in the relationship between scientistic beliefs and the support for penalization of science skeptics. Moralizing rationality indeed partially explained the relationship between scientistic beliefs and the support for penalizing measures, suggesting a possible mechanism behind this relationship. However, other concepts could also be at the root of both scientistic beliefs and proneness to punish science skeptics. Clearly, this issue is not politics- or ideology-free, so political orientation probably plays a significant role in these relationships. The likely trait-like candidates could be dogmatism (Rokeach, 1954) and social dominance orientation — support for societal hierarchy (Pratto et al., 1994). For example, dogmatism could bridge scientistic beliefs and support for penalization by providing a wider mental framework characterized by intolerance against those who disobey the authority of science. Likewise, individuals who support social hierarchies may be more inclined to accept policies that limit the power and privileges of certain groups, especially if they view those groups' positions as unwarranted or morally wrong. However, an abundance of research shows science skepticism is stronger for those with right-leaning political attitudes (Gauchat, 2012; Hamilton et al., 2015; Mann & Schleifer, 2020). To prevent potential ideological confounds, one would thus need to use as ideology-free measures as possible, which is why we suggested trait-like ones, such as dogmatism. Finally, as these psychological processes do not happen in a vacuum, the associations we demonstrated could be even exacerbated if the context is perceived as threatening (as, for example, during the recent COVID-19 pandemic).

Limitations and Further Research

As this was the first look into the relationship between scientistic beliefs and penalization, we collected data on convenience samples. To assess the prevalence of endorsement of penalizing measures, a representative sample is needed. Next, as both the PCA and CFA were conducted on the same sample, future research should seek to validate the latent structure using independent samples to ensure the robustness and generalizability of the findings. The robustness of the observed correlations, however, is very promising, and we expect them to be replicated independently. Next, due to the correlational design, we cannot speak to the

direction of the effect. Future experimental studies should thus target scientistic beliefs and look at their subsequent effects. Other potential paths that lead to support for penalization could also be tested, for example, those originating from personality traits; the role of contextual moderators, such as a feeling of threat, might also help us better understand the observed relationships. Finally, we opted to measure policy endorsement; however, penalizing behaviors could also manifest themselves on an interpersonal level and may be measured either through self-reported (e.g., social distance towards science skeptics) or observed behavior (e.g., readiness to help, physical distancing, etc.).

Conclusion

While one cannot dispute that science skepticism endangers public health and erodes global efforts to transition to a more sustainable lifestyle, we argue that its opposite pole — idealizing science and being unaware of its limits — could backfire so that it deepens societal divisions and further alienates skeptics, making them even harder to reach. This finding adds to the existing literature showing that, even when socially desirable in its moderate form, any belief that becomes dogmatic and extreme may lead to detrimental societal consequences.

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Conflict of interest

We have no conflicts of interest to disclose.

Data availability statement

Data used in this paper can be found at https://osf.io/a9g7x.

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