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SUPPLEMENTARY INFORMATION

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Effective strategies for rebutting science denialism in public discussions

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Supplementary Methods

In the following we will report the general methods and materials of the six single experiments.

For data analysis of single studies, we used IBM SPSS 23. For analysis of meta results and forest plots we used Review Manager 5.3 from the Cochrane Collaboration[1]. In addition, we used Meta Essentials[2] to calculate meta effect-sizes of repeated measures. In all experiments we used a repeated measurements ANOVA to analyse the influence of the denier and the effectiveness of topic rebuttal and technique rebuttal to mitigate the influence. To compare the effectiveness of any kind of rebuttal we used a planned contrast to compare the three rebuttal conditions with the advocate absent condition (advocate absent vs. any kind of rebuttal): -3 1 1 1). A second planned contrast assessed the effectiveness of the combination of topic and technique rebuttal compared to the single strategies (single strategies vs. combined strategy): 0 -1 -1 2). ANCOVAs included preregistered control variables to test for the robustness of the effects (Supplementary Tables 7–9). The control variables were not preregistered for Experiment 5 by mistake; however, we applied these control variables to all datasets. The analyses of potential mediators and moderators of the effectiveness of the rebuttal strategies in single studies (see specific Methods of single experiments below) were analysed using the PROCESS macro for SPSS[3]. The significances or p-values for hypothesis tests in all models are two-sided. Data distributions were assumed to be normal and variances were assumed to be homogeneous but this was not formally tested (see Figure 2 for data distributions). All reported error bars are 95% confidence intervals except for partial eta-squared. 90% confidence intervals are reported for partial eta-squared due to the characteristics of the F-distribution[4].

Experiment 1

Participants of Experiment 1 were students of the University of Erfurt and received the invitation to participate via a mailing list. For compensation, participants entered a lottery and had the chance of winning one of two €10 vouchers for a café on campus. Experiment 1 was not preregistered. We aligned analysis and exclusion criteria with preregistration forms of Experiment 2, 3, 4 and 6. Participants of Experiment 1 received the materials of the discussion in audio format. Due to the presentation format we excluded the relevance of the internet as a control variable in the ANCOVA (see Supplementary Tables 7–9) because the scenario included radio as a source of information only. In this experiment we measured the perceived persuasiveness[5] of the denier and advocate as potential mediators of the effectiveness of the rebuttal strategies. The full list of items, scales, sources and reliability scores for this experiment are also available in Supplementary Table 6.

Experiment 2

Participants of Experiment 2 received the invitation to participate via the recruiting agency Norstat from which they received compensation (bonus points to exchange into money). The recruiting agency used stratified sampling to recruit a more heterogenous sample compared to Experiment 1. The sample of Experiment 2 was representative for the general German population with regard to age, gender and education (Quotas: 23.5% low education; 51.41% middle education; 25.06% high education; 48.55% males; 18.07% males aged 18 – 29; 15.2% males aged 30 – 39; 21.36% males aged 40 – 49; 17.25% males aged 50– 59; 28.13 males with age > 59; 16.67% females aged 18 – 29; 13.95% females aged 30 – 39; 19.38% females aged 40 – 49; 16.28% females aged 50– 59; 33.72 females with age > 59). The quotas are representative

for the German population. Sampling took place until the quotas were reached. Experiment 2 was preregistered via aspredicted.org (see https://aspredicted.org/3hv7m.pdf). Participants of Experiment 2 received the same materials as in Experiment 1, however this time in written format (the materials are available at https://osf.io/xx2kt/). In this experiment we measured the perceived argument strength[6] of the denier and advocate as potential mediators of the effectiveness of the rebuttal strategies. In addition we measured general confidence in vaccination[7] as a potential moderator of the effectiveness of messages of science denial and the effectiveness of rebuttal strategies (see main text for the rationale). The full list of items, scales, sources and reliability scores for this experiment are also available in Supplementary Table 6.

Experiment 3

Participants of Experiment 3 received the invitation to participate via the recruiting agency Norstat from which they received compensation (bonus points to exchange into money). Again, the recruiting agency used stratified sampling to recruit a more heterogenous sample compared to Experiment 1. The sample of Experiment 3 was representative for the general German population with regard to age, gender and education (see Experiment 2 for quotas). This study explored the influence of the denier and the effectiveness of rebuttal with increasing time between encoding and measurement. Therefore, participants additionally indicated their intention and attitude one week after the first measure. Experiment 3 was preregistered via aspredicted.org (see https://aspredicted.org/ve6hv.pdf). Participants of Experiment 3 received the same discussion materials as in Experiment 2. A minor change was conducted regarding the penultimate sentence of the science advocate in the technique rebuttal only condition. It read: "What we are absolutely certain about is that the risk of the disease by far outweighs the risk of

the disease." This sentence could additionally provide a topic rebuttal rather than only concluding a technique rebuttal. To avoid potential overlap of topic rebuttal and technique rebuttal, we changed this sentence to "Therefore, the claims of *[name of science denier]* are not tenable."

In this experiment we measured individuals' persuasion knowledge[8] as a potential mediator of the effectiveness of the rebuttal strategies. In addition we measured general confidence in vaccination[7] and conservatism as potential moderators of the effectiveness of messages of science denial and the effectiveness of rebuttal strategies (see main text for the rationale). The full list of items, scales, sources and reliability scores for this experiment are also available in Supplementary Table 6.

Experiment 4

Participants of Experiment 4 received the invitation to participate via Amazon Mechanical Turk. The invitation was restricted to US residents to recruit a sample from a different country with a different language compared to the previous experiments. Participants received the fixed amount of $2 for participation. Participants of Experiment 4 received the same materials as in Experiments 1-3. The materials were translated into English. Compared to previous experiments, the last sentence of the science advocate in the technique only condition was changed slightly. The technique only condition failed to reach the same effectiveness in Experiment 3 compared to the previous experiments. The change of the last sentence in Experiment 3 ("Therefore, the claims of *[name of science denier]* are not tenable."; Method section of Experiment 3) might have been perceived as too devaluing compared to the previous ones. In fact, participants of the technique only condition in Experiment 3 rated the character of the advocate as more negative

compared to the other rebuttal conditions, ($F(2, 150) = 5.32$, $p = .006$, $\eta^2_p = .066$, [.012, .131]). We therefore aligned the final sentence in all rebuttal conditions using the following wording: "The vaccine improves the health standard for all individuals and that is why we recommend it." This direct recommendation is neither specific for topic rebuttal nor technique rebuttal. Experiment 4 was preregistered via aspredicted.org (see https://aspredicted.org/bf9qe.pdf). Following our preregistration form we included two screener questions in Experiment 4 to stratify results by attention of participants (see Supplementary Table 6). This has been recommended for online experiments[9]. As data revealed that 94% of participants passed both screener questions we thus chose not to report stratified results. Attention measured via screener questions was no preregistered exclusion criteria. Therefore, all following analyses are based on the full sample. In this Experiment we measured general confidence in vaccination[7] and conservatism as potential moderators of the effectiveness of messages of science denial and the effectiveness of rebuttal strategies (see main text for the rationale). The full list of items, scales, sources and reliability scores for this experiment are also available in Supplementary Table 6.

Experiment 5

Participants of Experiment 5 received the invitation to participate via a mailing list and advertisement on social media. For compensation, participants entered a lottery and had the chance of winning one of three €15 vouchers for an online store. Participants of Experiment 5 received materials adapted to the context of climate change (available at https://osf.io/xx2kt/; Supplementary Figure 1 provides one example). Experiment 5 was preregistered via aspredicted.org (see https://aspredicted.org/ce2am.pdf).The dependent variables in this experiment were the attitude towards actions against climate change adapted from Askelson et

al.[10] and the intention to take action against climate change with 7 specific behaviours adapted from Montada et al.[11]. In addition, we gave participants the opportunity to donate their prize of €15 to an environmental organization (e.g., World Wide Fund for Nature, WWF) instead of receiving a voucher. This option was given before and after the debate. Differences in changes in the decision to donate between groups were analysed using Generalized Estimating Equations (GEE). Results of the GEE model are discussed below. In this experiment we measured the perceived argument strength[6] of the denier and advocate as a potential mediator of the effectiveness of the rebuttal strategies. In addition, we measured conservatism as a potential moderator of the effectiveness of messages of science denial and the effectiveness of rebuttal strategies (see main text for the rationale). The full list of items, scales, sources and reliability scores for this experiment are also available in Supplementary Table 6.

Experiment 6

Participants of Experiment 6 received the invitation to participate via Amazon Mechanical Turk. The invitation was restricted to U.S. residents. Participants received the fixed amount of $1.5 for participation. Experiment 6 was preregistered via aspredicted.org (see https://aspredicted.org/ij55n.pdf). Participants of Experiment 6 received the same materials and the same screener questions as in Experiment 4. As data revealed that 94% of participants passed both screener questions, we thus chose not to report stratified results. Attention measured via screener questions was no preregistered exclusion criteria. Therefore, all following analyses are based on the full sample. In this experiment we measured general confidence in vaccination[7] and conservatism as potential moderators of the effectiveness of messages of science denial and the

effectiveness of rebuttal strategies (see main text for the rationale). The full list of items, scales, sources and reliability scores for this experiment are also available in Supplementary Table 6.

Supplementary Results

In the following we will report the results of the six single experiments.

Experiment 1

N = 202 participants clicked on the link, 168 proceeded after the introduction page and 125 finished the experiment. The exclusion of 13 participants due to the specified criteria (see Methods section in the main text) resulted in a sample size of n = 112 for all following analyses (age: M_{age} = 22.81, SD_{age} = 4.10; gender: 84% female; education: 99% reported a university entrance diploma or a higher education). Participants of Experiment 1 indicated a high willingness to get vaccinated ($M_{prior\_intention}$ = 76.68, $SD_{prior\_intention}$ = 21.77) prior to the stimulus material. On average they reached 57.14% ($SD_{knowledge}$ = 27.82) of the maximum possible knowledge score. Participants reported a low relevance of radio as an information source about vaccination ($M_{relevance\_radio}$ = 10.34, $SD_{relevance\_radio}$ = 9.42). There was no evidence of differences between conditions in intention to get vaccinated (ANOVA, $F(3, 108) = 1.29$, $p = .281$, effect size $\eta^2_p = .035$, 90% confidence interval [.000, .085]), knowledge about vaccination ($F(3, 108) = 1.00$, $p = .396$, $\eta^2_p = .027$, [.000, .071]) and relevance of radio ($F(3, 108) = 0.55$, $p = .649$, $\eta^2_p = .015$, [.000, .046]).

Influence of the Denier and Effectiveness of Rebuttal. The cell sizes, means, and standard deviations of changes in intention and attitude for all conditions of all experiments are reported

in Supplementary Table 10 and Supplementary Table 11. Across all conditions the discussion with the science denier significantly decreased individuals' intention to get vaccinated (repeated-measurement ANOVA, $F(1, 108) = 35.45$, $p < .001$, $\eta^2_p = .247$, [.136, .351]). Planned contrast analysis reveals that the science denier had a stronger effect when the advocate was absent compared to conditions where the advocate was present ($F(1, 108) = 9.89$, $p = .002$, $\eta^2_p = .084$, [.019, .174]).

The influence of the science denier decreased when the advocate used technique rebuttal compared to no technique rebuttal ($F(1, 108) = 4.93$, $p = .028$, $\eta^2_p = .044$, [.002, .120]). The effect of topic rebuttal in decreasing the influence of the denier compared to no topic rebuttal was marginally significant ($F(1, 108) = 3.34$, $p = .070$, $\eta^2_p = .030$, [.000, .099]). There was no evidence of an interaction effect of topic and technique rebuttal on changes of individuals' intention to get vaccinated ($F(1, 108) = 1.57$, $p = .213$, $\eta^2_p = .014$, [.000, .071]).

Planned contrast analysis revealed no evidence of a benefit of the combination compared to the single strategies in mitigating the influence of the denier ($F(1, 108) = 0.42$, $p = .519$, $\eta^2_p = .004$, [.000, .045]).

Repetition of all ANOVAs with control variables revealed the same pattern of results (see Supplementary Table 7–9 for ANCOVA results).

Indirect Effects of Rebuttal – Mediation Analysis. In the following analysis we explore whether the significant effect of technique rebuttal (vs. no technique rebuttal) on mitigating the influence of the denier on individuals' attitude and intention could be explained via a decreased perceived persuasiveness of the denier and/or an increased perceived persuasiveness of the advocate (see Supplementary Table 6 for items). The perceived persuasiveness of the denier (Model 1) and the

perceived persuasiveness of the advocate (Model 2) are analysed as mediators in separate models due to different sample sizes of the models (values of the perceived persuasiveness of the advocate are missing in the advocate absent condition).

The mediation models revealed that increased perceived persuasiveness of the denier decreases the intention to get vaccinated (Model 1: B = -0.51, 95% confidence interval [-0.63, -0.39], $p < .001$) and that an increased perceived persuasiveness of the advocate mitigates the decrease (Model 2: B = 0.47, [0.27, 0.68], $p < .001$). However, the analyses showed no evidence of an effect of technique rebuttal on the perceived persuasiveness of the denier or advocate (Model 1: B = -4.52, [-13.19, 4.16], p = .304; Model 2: B = -2.41, [-10.38, 5.57], p = .550). Bootstrap estimation approaches with 1,000 samples revealed no evidence of indirect effects of technique rebuttal on changes in intention via perceived persuasiveness of the denier (Model 1: B = 2.30, [-1.45, 7.07]) or advocate (Model 2: B = -1.14, [-4.91, 2.01]). Repetition of all mediation models with control variables (see Method section) revealed a similar pattern of results (see Supplementary Table 12). Hence, there was no evidence that technique rebuttal mitigated the influence of the denier via a decreased perceived persuasiveness of the denier or an increased perceived persuasiveness of the advocate.

Experiment 2

N = 260 participants clicked on the link, 238 proceeded after the introduction page and 206 finished the experiment. The exclusion of 42 participants due to the exclusion criteria (see Methods section in the main text) results in a sample size of n = 164 for all following analyses (age: M_{age} = 49.58, SD_{age} = 14.70; gender: 54% female; education: 40% reported a university entrance diploma or a higher education). Participants of Experiment 2 were moderately confident

in vaccination in general ($M_{confidence}$ = 59.60, $SD_{confidence}$ = 26.76). They indicated a moderately positive attitude towards vaccination against dysomeria ($M_{prior\_attitude}$ = 70.33, $SD_{prior\_attitude}$ = 23.43) and a moderate willingness to get vaccinated ($M_{prior\_intention}$ = 68.71, $SD_{prior\_intention}$ = 27.97) prior to the stimulus material. On average they reached 54.27% ($M_{knowledge}$ = 54.27, $SD_{knowledge}$ = 29.42) of the possible maximum knowledge score. Participants reported a low relevance of radio ($M_{relevance\_radio}$ = 12.64, $SD_{relevance\_radio}$ = 12.67) and a low relevance of the internet ($M_{relevance\_internet}$ = 16.80, $SD_{relevance\_internet}$ = 14.84) as an information source about vaccination. There was no evidence of significant differences between conditions in prior attitude towards vaccination (F(3, 160) = 0.16, p = .926, η^2_p = .003, [.000, .006]), prior intention to get vaccinated (F(3, 160) = 0.70, p = .551, η^2_p = .013, [.000, .038]), relevance of radio (F(3, 155) = 0.77, p = .512 η^2_p = .015, [.000, .042]), relevance of the internet (F(3, 159) = 0.39, p = .758, η^2_p = .007, [.000, .024]) and knowledge about vaccination (F(3, 160) = 2.37, p = .073, η^2_p = .043, [.000, .090]).

Influence of the Denier and Effectiveness of Rebuttal. The discussion with the science denier significantly decreased individuals' positive attitude towards vaccination, repeated-measurement ANOVA (F(1, 160) = 36.15, p < .001, η^2_p = .184, [.101, .270]. This was also observed for the intention to get vaccinated (F(1, 160) = 26.77, p < .001, η^2_p = .143, [.069, .226]). Planned contrast reveals that the science denier had a stronger effect on individuals' intention when the advocate was absent compared to conditions where the advocate was present (F(1, 160) = 6.72, p = .010, η^2_p = .040, [.005, .100]). There was no evidence of this effect for attitude (F(1, 160) = 0.87, p = .351, η^2_p = .005, [.000, .039]).

In line with Experiment 1, the influence of the science denier decreased when the advocate used technique rebuttal compared to no technique rebuttal, (attitude: F(1, 160) = 4.34,

p = .039, η^2_p = .026, [.001, .079]; intention: F(1, 160) = 8.95, p = .003, η^2_p = .053, [.011, .118]). Evidence for this mitigating effect when using topic rebuttal was absent (attitude: F(1, 160) = 0.07, p = .791, η^2_p < .001, [.000, .018]; intention: F(1, 160) = 2.62, p = .108, η^2_p = .016, [.000, .062]). There was also no evidence of an interaction effect of topic and technique rebuttal on changes of individuals' intention to get vaccinated (F(1, 160) = 0.27, p = .870, η^2_p < .001, [.000, .027]) or changes of attitude towards vaccination (F(1, 160) = 0.56, p = .457, η^2_p = .003, [.000, .034]).

Planned contrast analysis revealed a significant benefit of the combination compared to the single strategies for mitigating the influence of the denier on the audience's intention (F(1, 160) = 4.00, p = .047, η^2_p = .024, [.000, .076]), but there was no evidence of a benefit for mitigating the influence on the audience's attitude (F(1, 160) = 2.42, p = .122, η^2_p = .015, [.000, .060]).

Repetition of all ANOVAs with control variables revealed a similar pattern of results (see Supplementary Tables 7–9 for ANCOVA results). However, two relevant changes occurred. After controlling for the covariates, the mitigating effect of technique rebuttal on the audience's attitude was only marginally significant and there was no evidence of a benefit of the combination compared to the single strategies on the audience's intention.

Indirect Effects of Rebuttal – Mediation Analysis. In the following analysis we explore whether the significant effect of technique rebuttal (vs. no technique rebuttal) on mitigating the influence of the denier could be explained via decreased perceived argument strength of the denier and/or increased perceived argument strength of the advocate (see Supplementary Table 6 for items). The perceived argument strength of the denier (Model 1 outcome: change in attitude; Model 2

outcome: change in intention) and the perceived argument strength of the advocate (Model 3 outcome: change in attitude; Model 4 outcome: change in intention) are analysed as mediators in separate models due to different sample sizes of the models (perceived argument strength of the advocate are lacking in the advocate absent condition).

The mediation models revealed that increased perceived argument strength of the denier decreases the positive attitude towards vaccination (Model 1: B = -0.45, [-0.60, -0.29], p < .001) and decreases the intention to get vaccinated (Model 2: B = -0.61, [-0.77, -0.45], p < .001). Furthermore, an increased perceived argument strength of the advocate mitigates the decrease of attitude (Model 3: B = 0.45, [0.25, 0.64], p < .001) and intention (Model 4: B = 0.51, [0.31, 0.71], p < .001). However, the analyses showed no evidence of an effect of technique rebuttal on the perceived argument strength of the denier (Model 1 and Model 2: B = -1.44, [-7.37, 4.48], p = .631) or advocate (Model 3 and Model 4: B = 2.51, [-4.16, 9.19], p = .458). Bootstrap estimation approaches with 1,000 samples revealed no evidence for indirect effects of technique rebuttal on attitude (Model 1: B = 0.64, [-1.54, 3.68]; Model 3: B = 1.12, [-1.59, 5.30]) or intention (Model 2: B = 0.88, [-2.34, 5.48]; Model 4: B = -1.29, [-2.00, 5.68]) via perceived argument strength of the denier or advocate. Repetition of all mediation models with control variables (see Method section) revealed a similar pattern of results (see Supplementary Table 13). Hence, there was no evidence that technique rebuttal mitigated the influence of the denier via a decreased perceived argument strength of the denier or an increased perceived argument strength of the advocate.

Experiment 3

N = 383 clicked on the link, 333 proceeded after the introduction page and 261 finished the experiment. The exclusion of 60 participants due to the exclusion criteria (see main text Methods section) results in a sample size of n = 201 for all following analyses (age: M_{age} = 50.90, SD_{age} = 15.90; gender: 55% female; education: 42% reported a university entrance diploma or a higher education). Participants of Experiment 3 were rather liberal ($M_{conservatism}$ = 44.92, $SD_{conservatism}$ = 20.60) and moderately confident in vaccination in general ($M_{confidence}$ = 63.31, $SD_{confidence}$ = 27.73). They indicated a moderately positive attitude towards vaccination against dysomeria ($M_{prior\_attitude}$ = 74.71, $SD_{prior\_attitude}$ = 22.52) and a moderate willingness to get vaccinated ($M_{prior\_intention}$ = 71.23, $SD_{prior\_intention}$ = 26.85) prior to the stimulus material. On average they reached 57.6% ($M_{knowledge}$ = 57.60, $SD_{knowledge}$ = 28.57) of the maximum possible knowledge score. Participants reported a low relevance of radio ($M_{relevance\_radio}$ = 15.67, $SD_{relevance\_radio}$ = 16.03) and a low relevance of the internet ($M_{relevance\_internet}$ = 17.85, $SD_{relevance\_internet}$ = 15.11) as an information source about vaccination. There was no evidence of differences between conditions in prior attitude towards vaccination ($F(3, 197) = 0.74$, $p = .531$, $\eta^2_p = .011$, [.000, .033]), prior intention to get vaccinated ($F(3, 197) = 0.87$, $p = .456$, $\eta^2_p = .013$, [.000, .037]), relevance of radio ($F(3, 194) = 0.82$, $p = .483$, $\eta^2_p = .013$, [.000, .036]), relevance of the internet ($F(3, 197) = 1.34$, $p = .263$, $\eta^2_p = .020$, [.000, .050]) and knowledge about vaccination ($F(3, 197) = 1.20$, $p = .312$, $\eta^2_p = .018$, [.000, .046]).

Influence of the Denier and Effectiveness of Rebuttal. In line with Experiment 2, the discussion with the science denier significantly decreased individuals' attitude towards vaccination ($F(1, 197) = 87.40$, $p < .001$, $\eta^2_p = .307$, [.221, .385]) and individuals' intention to get vaccinated ($F(1, 197) = 39.88$, $p < .001$, $\eta^2_p = .168$, [.095, .245]). Planned contrast analysis reveals that the denier

had a stronger effect when the science advocate was absent compared to conditions where the advocate was present (attitude: $F(1, 197) = 9.66$, $p = .002$, $\eta^2_p = .047$, [.010, .103]; intention: $F(1, 197) = 10.01$, $p = .002$, $\eta^2_p = .048$, [.011, .105]).

Contrary to Experiment 1 and 2, there was no evidence that the influence of the science denier decreased when the advocate used technique rebuttal compared to no technique rebuttal, (attitude: $F(1, 197) = 1.05$, $p = .308$, $\eta^2_p = .005$, [.000, .035]; intention: $F(1, 197) = 0.45$, $p = .503$, $\eta^2_p = .002$, [.000, .026]). However, results revealed a significant effect of topic rebuttal in decreasing the influence of the denier compared to no topic rebuttal (attitude: $F(1, 197) = 12.78$, $p < .001$, $\eta^2_p = .061$, [.018, .121]; intention: $F(1, 197) = 13.34$, $p < .001$, $\eta^2_p = .063$, [.019, .125]). There was no evidence of an interaction effect of topic and technique rebuttal on changes of individuals' intention to get vaccinated ($F(1, 197) = 1.57$, $p = .222$, $\eta^2_p = .008$, [.000, .041]) or on changes of attitude towards vaccination ($F(1, 197) = 0.73$, $p = .394$, $\eta^2_p = .004$, [.000, .030]).

Planned contrast analysis revealed no evidence of a benefit of the combination compared to the single strategies for mitigating the influence on attitude and intention (attitude: $F(1, 197) = 1.47$, $p = .227$, $\eta^2_p = .007$, [.000, .039]; intention: $F(1, 197) = 0.62$, $p = .433$, $\eta^2_p = .003$, [.000, .029]).

Repetition of all ANOVAs with control variables revealed the same pattern of results (see Supplementary Tables 7–9 for ANCOVA results).

Indirect Effects of Rebuttal – Mediation Analysis. Based on the preregistration we tested whether technique rebuttal (vs. no technique rebuttal) indirectly mitigated the influence of the denier on

individuals' changes in attitude (Model 1) and change in intention (Model 2) via an increase in individuals' persuasion knowledge (see Supplementary Table 6 for items).

Contrary to our hypothesis, analyses revealed that technique rebuttal decreased individuals' persuasion knowledge (Model 1 and Model 2: B = -6.85, [-13.69, -0.00], p = .050). Moreover, there was no evidence that persuasion knowledge influenced individuals' change in attitude (Model 1: B = 0.04, [-0.06, 0.14], p = .437*)* or intention (Model 2: B = 0.11, [-0.00, 0.214], p = .053). Bootstrap estimation approaches with 1,000 samples revealed no evidence of an indirect effect of technique rebuttal on attitude (Model 1: B = -0.28, [-1.64, 0.34]) via persuasion knowledge. However, the analysis revealed a significant indirect effect on intention (Model 1: B = -0.73, [-2.46, -0.02]), which, however, contradicts the expected positive effect. Repetition of all mediation models with control variables (see Method section) revealed some relevant changes of results (see Supplementary Table 14). After controlling for the effects of the covariates, evidence of any effects was absent. To conclude, there was no evidence that technique rebuttal mitigated the influence of the denier via an increase in individuals' persuasion knowledge.

Analysis of attitudes and intention after one week. In this experiment we also collected data on individuals' attitude and intention one week after the initial experiment. All 270 participants who completed T1 received an invitation to participate at T2, 234 clicked on the link, 230 proceeded after the introduction page and 215 finished the experiment at T2. The exclusion of 63 participants due to the specified criteria (see Method section) results in a sample size of n = 152 at T2. We first analysed whether mortality from T1 to T2 (n = 49) varies systematically. We analysed whether there were systematic differences in the participants who participated vs. who

did not participate in T2. Indeed, individuals in the combined condition who did not participate again at T2 were less influenced by the denier at T1 ($M_{change\_intention}$ = -0.89, SD = 12.04) than the participants that participated at T2 ($M_{change\_intention}$ = -5.69, SD = 13.12). This pattern was reversed for the advocate absent condition (not participating at T2: $M_{change\_intention}$ = -25.34, SD = 25.80; participating at T2: $M_{change\_intention}$ = -12.23, SD = 18.24) leading to a significant interaction of these two conditions and drop out, $F(1, 99) = 5.84$, $p = .017$, $\eta^2_p = .056$, [.005, .142]. Thus, individuals who were effectively protected from the influence of the denier by the combination of topic and technique rebuttal at T1 dropped out while individuals who were strongly influenced by the denier in the advocate absent condition participated at T2. Due to this confound, we refrained from further analysing the data. For transparency the data is fully accessible via https://osf.io/xx2kt/.

Experiment 4

N = 345 clicked on the link, 276 proceeded after the introduction page and 256 finished the experiment. The exclusion of 29 participants due to the exclusion criteria (see Method section) results in a sample size of n = 227 for all following analyses (age: M_{age} = 39.43, SD_{age} = 12.02; gender: 47% female; education: 74% reported an associate's degree or a higher education). Participants of Experiment 4 were rather liberal ($M_{conservatism}$ = 41.30, $SD_{conservatism}$ = 28.10) and highly confident in vaccination in general ($M_{confidence}$ = 71.65, $SD_{confidence}$ = 30.59). They indicated a high positive attitude towards vaccination against dysomeria ($M_{prior\_attitude}$ = 86.60, $SD_{prior\_attitude}$ = 20.16) and a high willingness to get vaccinated ($M_{prior\_intention}$ = 79.75, $SD_{prior\_intention}$ = 27.36) prior to the stimulus material. On average they reached 67.89% ($M_{knowledge}$ = 67.89, $SD_{knowledge}$ = 31.36) of the maximum possible knowledge score. Participants reported a

low relevance of radio ($M_{relevance\_radio}$ = 15.92, $SD_{relevance\_radio}$ = 17.48) and a low relevance of the internet ($M_{relevance\_internet}$ = 30.39, $SD_{relevance\_internet}$ = 18.16) as information sources about vaccination. There was no evidence of differences between conditions in prior attitude towards vaccination ($F(3, 223) = 0.44$, $p = .724$, $\eta^2_p = .006$, [.000, .019]), prior intention to get vaccinated ($F(3, 223) = 0.56$, $p = .641$, $\eta^2_p = .008$, [.000, .026]), relevance of radio ($F(3, 223) = 1.47$, $p = .224$, $\eta^2_p = .019$, [.000, .048]) and knowledge about vaccination ($F(3, 223) = 0.91$, $p = .439$, $\eta^2_p = .012$, [.000, .034]). However, relevance of the internet as an information source differed between conditions ($F(3, 223) = 3.62$, $p = .014$, $\eta^2_p = .047$, [.005, .089]).

Influence of the Denier and Effectiveness of Rebuttal. Again, the discussion with the science denier significantly decreased individuals' attitude towards vaccination ($F(1, 223) = 41.91$, $p < .001$, $\eta^2_p = .158$, [.091, .230]) and individuals' intention to get vaccinated ($F(1, 223) = 35.62$, $p < .001$, $\eta^2_p = .138$, [.074, .207]). Planned contrast analysis reveals that the denier had a stronger effect on individuals' intention when the science advocate was absent compared to conditions where the advocate was present ($F(1, 223) = 9.76$, $p = .002$, $\eta^2_p = .042$, [.009, .092]). This effect was only marginally significant for attitude ($F(1, 223) = 2.86$, $p = .092$, $\eta^2_p = .013$, [.000, .047]).

There was no evidence that the influence of the denier on the audience's attitude was mitigated by topic rebuttal or by technique rebuttal (topic rebuttal: $F(1, 223) = 1.25$, $p = .264$, $\eta^2_p = .006$, [.000, .033]; technique rebuttal: $F(1, 197) = 2.35$, $p = .127$, $\eta^2_p = .010$, [.000, .043]). The influence of the science denier on the audience's intention decreased when the advocate used topic rebuttal compared to no topic rebuttal, ($F(1, 223) = 5.94$, $p = .016$, $\eta^2_p = .026$, [.003, .069]). The effect of technique rebuttal in decreasing the influence of the denier on the audience's intention compared to no technique rebuttal was marginally significant (F(1,

223) = 3.45, p = .064, η^2_p = .015, [.000, .052]). There was no evidence of an interaction effect of topic and technique rebuttal on changes of individuals' intention to get vaccinated (F(1, 223) = 1.43, p = .233, η^2_p = .006, [.000, .035]) or on changes of attitude towards vaccination (F(1, 223) = 0.11, p = .746, η^2_p < .001, [.000, .015]).

Planned contrast analysis revealed no evidence of a benefit of the combination compared to the single strategies (attitude: F(1, 223) = 0.66, p = .418, η^2_p = .003, [.000, .026]; intention: F(1, 223) = 0.59, p = .442, η^2_p = .003, [.000, .025]).

Repetition of all ANOVAs with control variables revealed the same pattern of results (see Supplementary Table 7–9 for ANCOVA results).

Experiment 5

N = 1,149 clicked on the link, 339 proceeded after the introduction page and 217 finished the experiment. The exclusion of 69 participants due to the exclusion criteria (see Methods section in main article) results in a sample size of n = 148 for all following analyses (age: M_{age} = 29.14, SD_{age} = 12.08; gender: 62% female; education: 87% reported a university entrance diploma or a higher education). Participants of Experiment 5 were rather liberal ($M_{conservatism}$ = 37.84, $SD_{conservatism}$ = 20.69), indicated a high positive attitude towards actions against climate change ($M_{prior\_attitude}$ = 92.17, $SD_{prior\_attitude}$ = 16.39) and a high intention to act against climate change ($M_{prior\_intention}$ = 58.16, $SD_{prior\_intention}$ = 14.50) prior to the stimulus material. On average they reached 47.01% ($Mean_{knowledge}$ = 47.01, $SD_{knowledge}$ = 20.36) of the maximum possible knowledge score. Participants reported a low relevance of radio ($M_{relevance\_radio}$ = 30.39, $SD_{relevance\_radio}$ = 19.57) and a low relevance of the internet ($M_{relevance\_internet}$ = 41.43, $SD_{relevance\_internet}$ = 18.03) as an information source about climate change. There was no evidence of differences between

conditions in prior attitude towards taking action ($F(3, 144) = 2.07$, $p = .107$, $\eta^2_p = .041$, [.000, .090]), relevance of radio ($F(3, 144) = 0.85$, $p = .467$, $\eta^2_p = .017$, [.000, .026]), relevance of the internet ($F(3, 144) = 2.50$, $p = .062$, $\eta^2_p = .050$, [.000, .102]) and knowledge about climate change ($F(3, 144) = 0.36$, $p = .783$, $\eta^2_p = .007$, [.000, .024]). However, the a priori intention to act against climate change happened to be different between conditions ($F(3, 144) = 3.88$, $p = .011$, $\eta^2_p = .075$, [.010, .137]). Therefore, as part of a sensitivity analysis (see results of main article), we will complement the analyses on changes in intention and attitude with analyses that assess changes in the a posteriori intention and attitude, controlled for a priori values.

Influence of the Denier and Effectiveness of Rebuttal. In contrast to the discussion about vaccination, there was no evidence that the climate denier decreased the audience's willingness to act against climate change (intention: $F(1, 144) = 0.03$, $p = .854$, $\eta^2_p < .001$, [.000, .009]). There was also no evidence of a difference between topic rebuttal vs. no topic rebuttal; the same was true for technique rebuttal vs. no technique rebuttal (topic rebuttal: $F(1, 144) = 0.06$, $p = .800$, $\eta^2_p < .001$, [.000, .017]; technique rebuttal: $F(1, 144) = 0.68$, $p < .410$, $\eta^2_p = .005$, [.000, .040]). The same absence of evidence regarding the influence of the denier and the effect of rebuttal was observed for the willingness to donate (see Supplementary Table 15). However, participants were not completely unaffected by the discussion. The attitude towards climate change initiatives decreased significantly due to the denier ($F(1, 144) = 7.39$, $p = .007$, $\eta^2_p = .049$, [.007, .116]). The influence of the science denier decreased when the advocate used technique rebuttal compared to no technique rebuttal ($F(1, 144) = 5.95$, $p = .016$, $\eta^2_p = .040$, [.004, .103]). There was no evidence of an effect of topic rebuttal ($F(1, 144) = 0.23$, $p = .631$, $\eta^2_p = .002$, [.000, .029]). In addition, there was no evidence of an interaction effect of topic and

technique rebuttal on changes of individuals' willingness to act ($F(1, 144) = 0.15$, $p = .698$, $\eta^2_p = .001$, [.000, .025]) or on changes of attitude towards actions against climate change ($F(1, 144) = 0.28$, $p = .599$, $\eta^2_p = .002$, [.000, .030]).

Planned contrast analysis revealed no evidence of a benefit of the combination compared to the single strategies (attitude: $F(1, 144) = 1.53$, $p = .219$, $\eta^2_p = .010$, [.000, .054]; intention: $F(1, 144) = 0.58$, $p = .447$, $\eta^2_p = .004$, [.000, .038]).

Repetition of all ANOVAs with control variables revealed the same pattern of results (see Supplementary Tables 7–9 for ANCOVA results).

Indirect Effects of Rebuttal – Mediation Analysis. In the following analyses we explore whether the significant effect of technique rebuttal (vs. no technique rebuttal) on mitigating the influence of the denier on individuals' attitude towards initiatives against climate change could be explained via a decreased perceived argument strength of the denier and/or an increased perceived argument strength of the advocate (see Supplementary Table 6 for items). The perceived argument strength of the denier (Model 1) and the perceived argument strength of the advocate (Model 2) were analysed as mediators in separate models due to different sample sizes of the models (perceived argument strength of the advocate is lacking in the advocate absent condition).

The mediation models revealed no evidence of an influence of the perceived argument strength of the denier (Model 1: $B = -0.10$, [-0.21, 0.01], $p = .063$) or advocate (Model 2: $B = 0.10$, [-0.30, 0.22], $p = .133$) on individuals' changes in attitude towards initiatives against climate change. Furthermore, the analyses showed no evidence of an effect of technique rebuttal on the perceived argument strength of the denier (Model 1: $B = -3.80$, [-9.10, 1.49], $p = .158$) but

evidence of an effect of technique rebuttal on the perceived argument strength of the advocate (Model 2: B = 8.29, [1.40, 15.18], p = *.019*). Bootstrap estimation approaches with 1,000 samples revealed no evidence of indirect effects of technique rebuttal on attitude via perceived argument strength of the denier (Model 1: B = 0.39, [-0.05, 1.65]) or advocate (Model 2: B = 0.80, [-0.23, 3.08]). Repetition of all mediation models with control variables (see Method section) revealed similar pattern of results (see Supplementary Table 16). However, one relevant change occurred. After controlling for the effects of the covariates, Model 1 revealed that increased perceived argument strength of the denier decreases the positive attitude towards initiatives against climate change (Model 1: B = -0.11, [-0.23, -0.00], p = .048). Evidence of the indirect effect of Model 1, however, was absent. Hence, there was no evidence that technique rebuttal mitigated the influence of the denier via decreased perceived argument strength of the denier or increased perceived argument strength of the advocate.

Experiment 6

N = 2,105 clicked on the link, 1,416 proceeded after the introduction page and 1,137 finished the experiment. The exclusion of 216 participants due to the exclusion criteria (see main text Methods section) results in a sample size of n = 921 for all following analyses (age: M_{age} = 36.81, SD_{age} = 10.92; gender: 46% female; education: 71% reported an associate's degree or a higher education). Participants of Experiment 6 were rather liberal ($M_{conservatism}$ = 39.22, $SD_{conservatism}$ = 28.40) and highly confident in vaccination in general ($M_{confidence}$ = 71.69, $SD_{confidence}$ = 30.97). They indicated a high positive attitude towards the vaccination against dysomeria ($M_{prior\_attitude}$ = 85.56, $SD_{prior\_attitude}$ = 20.97) and a high willingness to get vaccinated ($M_{prior\_intention}$ = 81.91, $SD_{prior\_intention}$ = 26.87) prior to the stimulus material. On average they

reached 66.34% ($M_{knowledge}$ = 66.34, $SD_{knowledge}$ = 32.46) of the maximum possible knowledge score. Participants reported a low relevance of radio ($M_{relevance\_radio}$ = 16.30, $SD_{relevance\_radio}$ = 19.38) and a low relevance of the internet ($M_{relevance\_internet}$ = 33.16, $SD_{relevance\_internet}$ = 20.36) as an information source about vaccination. There was no evidence of differences between conditions in prior attitude towards vaccination ($F(3, 917) = 1.62$, $p = .184$, $\eta^2_p = .005$, [.000, .013]), relevance of radio ($F(3, 917) = 0.55$, $p = .646$, $\eta^2_p = .002$, [.000, .006]) and relevance of the internet as an information source ($F(3, 917) = 0.15$, $p = .931$, $\eta^2_p < .000$, [.000, .001]). However, prior intention to get vaccinated ($F(3, 917) = 2.62$, $p = .500$, $\eta^2_p = .009$, [.000, .018]) and knowledge about vaccination ($F(3, 917) = 4.113$, $p = .007$, $\eta^2_p = .013$, [.002, .026]) were lower in the advocate absent condition. Therefore, as part of a sensitivity analysis (see results of main article), we will complement the analyses on changes in intention and attitude with analyses that assess changes in the a posteriori intention and attitude, controlled for a priori values. We also repeat analyses controlling for knowledge about vaccination (see Method section for preregistered control variables).

Influence of the Denier and Effectiveness of Rebuttal. The discussion with the science denier significantly decreased individuals' attitude towards vaccination ($F(1, 917) = 172.03$, $p < .001$, $\eta^2_p = .158$, [.124, .193]) and individuals' intention to get vaccinated ($F(1, 917) = 107.55$, $p < .001$, $\eta^2_p = .105$, [.076, .137]). Planned contrast analysis reveals that the denier had a stronger effect on individuals' intention when the science advocate was absent compared to conditions where the advocate was present ($F(1, 917) = 82.26$, $p < .001$, $\eta^2_p = .082$, [.056, .112]). This effect was also significant for attitude ($F(1, 917) = 77.66$, $p < .001$, $\eta^2_p = .078$, [.052, .107]).

The influence of the denier on the audience's attitude was significantly mitigated by topic rebuttal and also by technique rebuttal (topic rebuttal: $F(1, 917) = 18.57$, $p < .001$, $\eta^2_p = .020$, [.008, .037]; technique rebuttal: $F(1, 917) = 29.86$, $p < .001$, $\eta^2_p = .032$, [.016, .052]). The same pattern was observed for mitigating the influence of the denier on the audience's intention (topic rebuttal: $F(1, 917) = 26.78$, $p < .001$, $\eta^2_p = .028$, [.013, .048]; technique rebuttal: $F(1, 917) = 29.00$, $p < .001$, $\eta^2_p = .031$, [.015, .051]). There was a significant interaction effect of topic and technique rebuttal on changes of individuals' intention to get vaccinated ($F(1, 917) = 28.97$, $p < .001$, $\eta^2_p = .031$, [.015, .051]) and on changes of attitude towards vaccination ($F(1, 917) = 32.69$, $p < .001$, $\eta^2_p = .034$, [.018, .056]). Simple main effects analyses showed that topic rebuttal significantly mitigated the influence of the denier when technique rebuttal was absent (intention: $p < .001$; attitude: $p < .001$), but there was no evidence of a difference between topic rebuttal and no topic rebuttal when technique rebuttal was present (intention: $p = .853$; attitude: $p = .212$).

Planned contrast analysis revealed no evidence of a benefit of the combination compared to the single strategies for mitigating the influence on attitude and intention (attitude: $F(1,917) = 0.66$, $p = .418$, $\eta^2_p = .003$, [.000, .007]; intention: $F(1, 917) = 0.57$, $p = .451$, [.000, .006]). Moreover, and contrary to the preregistered hypotheses we find no evidence that the effectiveness of the combination of strategies (vs. single strategies) is a function of individuals' confidence or calculation values (see Supplementary Table 17).

Repetition of all ANOVAs with control variables revealed the same pattern of results (see Supplementary Table S7–S9 for ANCOVA results).

Statistical power for meta-analytic results

Statistical power for meta-analyses were calculated using the R-Script by Tiebel[12] which is based on the formulas of Valentine, Pigott & Rothstein[13] for random effects meta-analyses when alpha .05 (two-tailed; syntax: https://osf.io/xx2kt/). Expected effect sizes for power calculation of the final meta-analyses are based on averaged effect sizes of the first 5 experiments. For the non-significant difference between topic and no-topic rebuttal on attitude we defined $g = 0.20$ as the smallest effect size of interest. Sample size of Experiment 6 was calculated to reach a minimum of .8 statistical power for the individual study results and the overall meta-analytic tests.

Final statistical power of tests based on the expected effect sizes and the actual number of participants (after using preregistered exclusion criteria) are as follows: Technique rebuttal vs. no technique rebuttal (intention: .997 [$g = 0.26$, $N_{studies} = 6$, $n_{experimental} = 158$, $n_{control} = 136$, heterogeneity = 0.33]; attitude: .999 [$g = 0.26$, $N = 5$, $n_e = 179$, $n_c = 153$, heterogeneity = 0]), topic rebuttal vs. no topic rebuttal (intention: .999 [$g = 0.30$, $N = 6$, $n_e = 159$, $n_c = 136$, heterogeneity = 0]; attitude: .817 [$g = 0.20$, $N = 5$, $n_e = 180$, $n_c = 152$, heterogeneity = 1]), combined strategy vs. single strategies (intention: .977 [$g = 0.22$, $N = 6$, $n_e = 93$, $n_c = 131$, heterogeneity = 0]; attitude: .970 [$g = 0.22$, $N = 5$, $n_e = 105$, $n_c = 147$, heterogeneity = 0]).

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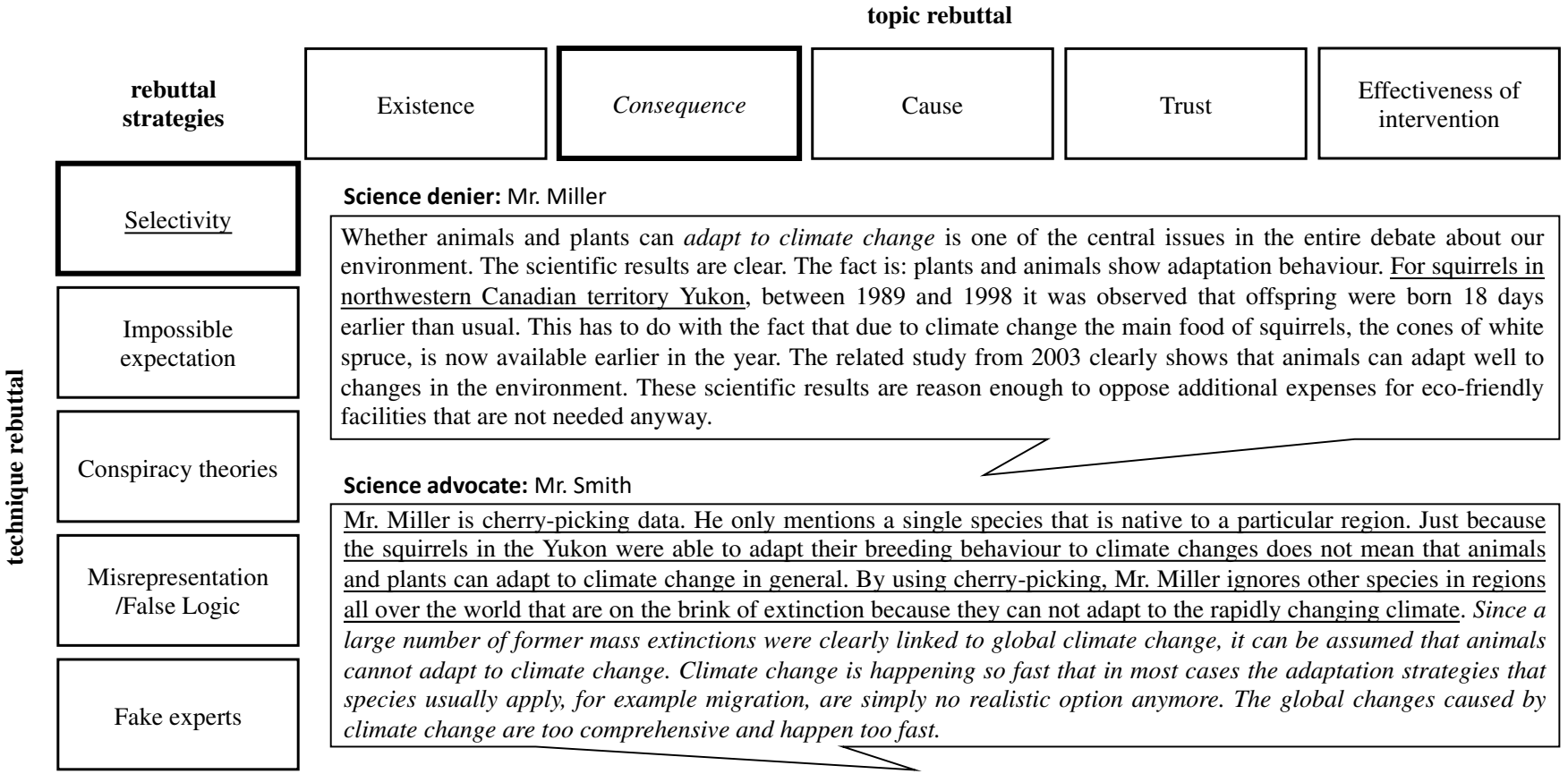
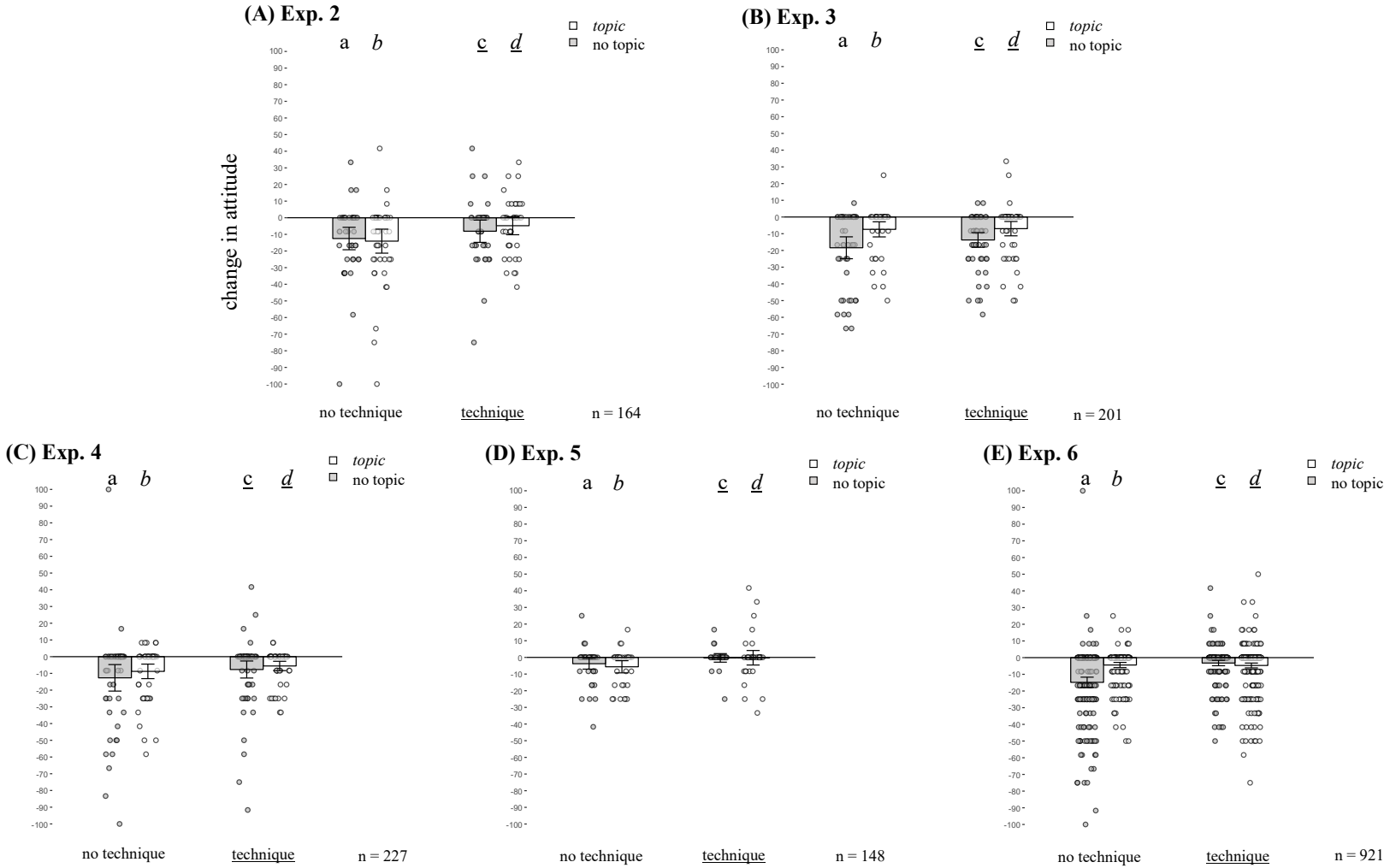
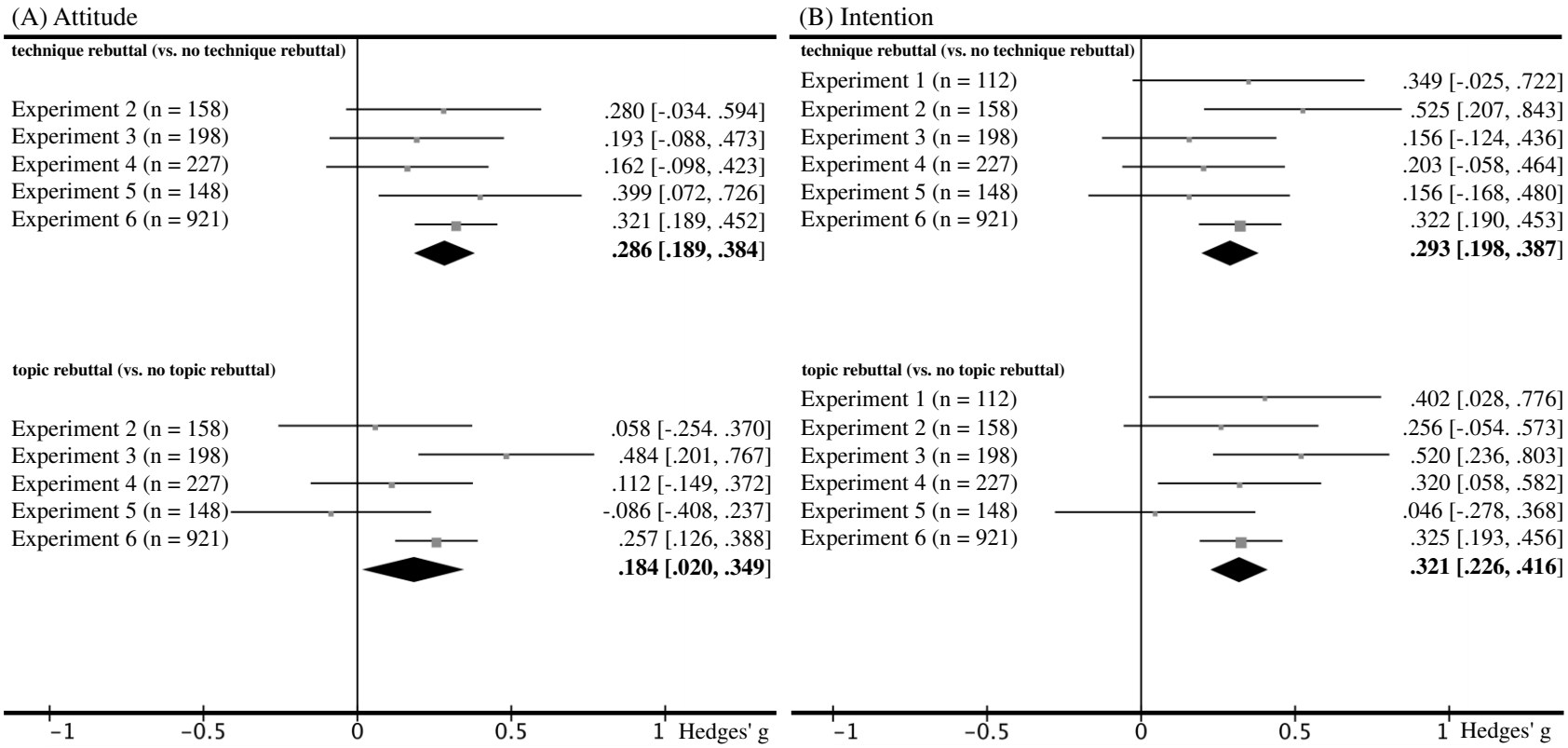
Supplementary Figures



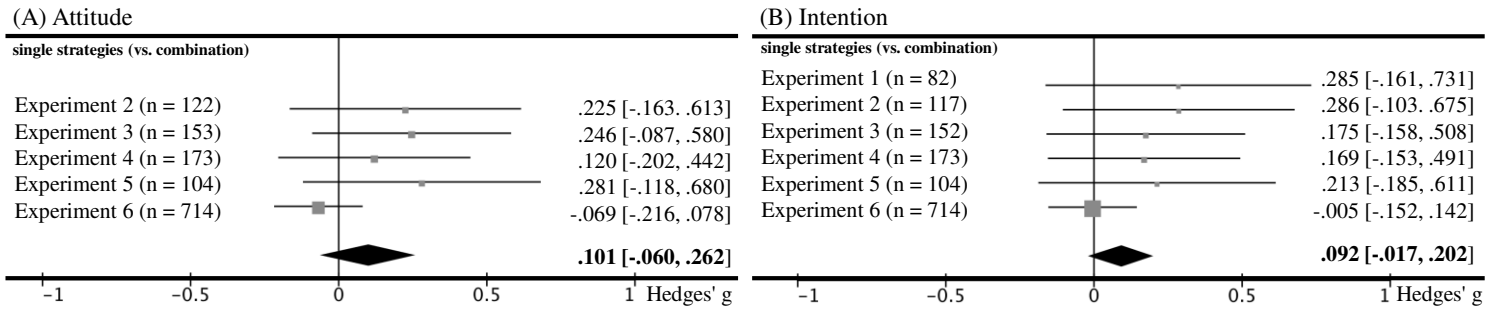
Supplementary Figure 1. 5 × 5 matrix of rebutting science denialism in public discussions about climate change. The dialogue represents an example from the materials used in Experiment 4. Italics indicate the *topic,* and underlined text indicates the technique of science denialism. The techniques are adapted from the previously published matrix in the domain of vaccination[14]. The topics are the result of a review of 197 typical statements collected and debunked by the non-profit science education organization Skeptical Science. The statements are available at: https://www.skepticalscience.com/argument.php. See https://osf.io/xx2kt/ for categorizing of statements to the used topic labels.



Supplementary Figure 2. Effects of denial and rebuttals on audience attitude towards a behaviour favoured by science (Exp. 2-4 & 6: vaccination; Exp. 5: taking action against climate change). The y axes represent mean changes in attitude towards a behaviour favoured by science (POMP values, percent of maximum possible score). The x axes represent experimental conditions. The negative influence of the denier on attitude was weaker when rebuttal was used. Applying topic or technique rebuttal or a combination thereof can decrease the influence of science denialism. Bars are mean changes in attitude towards the behaviour (POMP values, percent of maximum possible score). Error bars are 95% confidence intervals. Dots indicate individual changes in the attitude of individual participants. Colours and groupings of bars indicate the conditions of the experiments, resulting in the four tested conditions: a) advocate absent, b) topic rebuttal, c) technique rebuttal, d) combined strategy.



Supplementary Figure 3. Technique rebuttal and topic rebuttal mitigate the influence of the debate with a science denier after controlling for effects of covariates. Analyses from Fig. 3 controlled for individual knowledge about the behaviours, relevance of radio and internet (Experiment 2-6) as information sources and sociodemographic data. Internal meta-analyses of **(A)** changes in attitude (Exp. 2–6; N = 1,652) and **(B)** changes in intention (Exp. 1–6; N = 1,764) using random effects models. The y axes represent experiments. The x axes represent Hedges' adjusted *g*s. Hedges' adjusted *g*s are derived from estimated means including preregistered control variables (Supplementary Table 7 and Supplementary Table 8) based on the comparisons of means of changes in attitude and intention from topic rebuttal vs. no topic rebuttal (main effect of topic rebuttal) and technique rebuttal vs. no technique rebuttal (main effect of technique rebuttal). Sizes of squares are proportional to the precision of the estimate. Error bars show 95% CIs. Diamonds show summary effects; the lateral points of which indicate 95% CIs for these estimates. Numbers in brackets show values of confidence intervals. Heterogeneity of presented results: (technique rebuttal: **(A)** $I^2 = 0\%$ ($Tau^2 = 0$), **(B)** $I^2 = 0\%$ ($Tau^2 = 0$); topic rebuttal: **(A)** $I^2 = 54\%$ ($Tau^2 = 0.02$), **(B)** $I^2 = 0\%$ ($Tau^2 = 0$)).



Supplementary Figure 4. No evidence that the combination of topic and technique rebuttal is more effective than the single strategies after controlling for effects of covariates. Analyses from Fig. 4 controlled for individual knowledge about the behaviours, relevance of radio and internet (Exp. 2–6) as information sources and sociodemographic data. Internal meta-analyses of **(A)** changes in attitude (Exp. 2–6; N = 1,266) and **(B)** changes in intention (Exp. 1–6; N = 1,342) using random effects models. The y axes represent experiments. The x axes represent Hedges' adjusted *g*s. Hedges' adjusted *g*s are derived from estimated means including preregistered control variables (Supplementary Table 9) based on the comparisons of means of changes in attitude and intention from single strategies vs. combination of strategies. Sizes of squares are proportional to the precision of the estimate. Error bars show 95% CIs. Diamonds show summary effects; the lateral points of which indicate 95% CIs for these estimates. Numbers in brackets show values of confidence intervals. Heterogeneity of presented results: **(A)** I^2 = 34% (Tau^2 = 0.01), **(B)** I^2 = 0% (Tau^2 = 0).

Supplementary Tables

Supplementary Table 1. Meta-analyses of simple main effects for the interaction effect of *technique rebuttal*topic rebuttal* on intention and attitude. Data presented are Hedges' adjusted *g*s. Summary effects are weighted means of the effect sizes. Test for subgroup differences reveal evidence for significant interaction effects of *technique rebuttal*topic rebuttal* on intention but not on attitude. Simple main effects reveal a significant benefit of using topic rebuttal (vs. no topic rebuttal) when technique rebuttal is absent for both outcomes. In addition, simple main effects reveal a significant benefit of using technique rebuttal (vs. no technique rebuttal) when topic rebuttal is absent for both outcomes. Evidence for the benefit of topic rebuttal is absent when technique rebuttal is present and vice versa. Hence, evidence of a benefit of the combination is absent when analysing interaction effects.

	Intention: Simple main effects in condition *No technique rebuttal* (random effects; Hedges' adjusted *g*s)		Intention: Simple main effects in condition *technique rebuttal* (random effects; Hedges' adjusted *g*s)		Attitude: Simple main effects in condition *No technique rebuttal* (random effects; Hedges' adjusted *g*s)		Attitude: Simple main effects in condition *Technique rebuttal* (random effects; Hedges' adjusted *g*s)	
	g [95% CI]	n	*g* [95% CI]	n	*g* [95% CI]	n	*g* [95% CI]	n
Topic rebuttal (vs. no topic rebuttal)								
Experiment 1	0.58 [0.03, 1.13]	54	0.11 [-0.41, 0.62]	58	--	--	--	--
Experiment 2	0.21 [-0.21, 0.63]	87	0.30 [-0.15, 0.75]	77	-0.07 [-0.49, 0.35]	87	0.18 [-0.27, 0.63]	77
Experiment 3	0.67 [0.25, 1.09]	92	0.35 [-0.03, 0.73]	109	0.57 [0.15, 0.99]	92	0.42 [0.04, 0.80]	109
Experiment 4	0.43 [0.05, 0.81]	109	0.19 [-0.18, 0.55]	118	0.16 [-0.21, 0.54]	109	0.13 [-0.23, 0.49]	118
Experiment 5	-0.02 [-0.46, 0.42]	81	0.12 [-0.37, 0.61]	67	-0.17 [-0.61, 0.27]	81	0.01 [-0.48, 0.49]	67
Experiment 6	0.60 [0.40, 0.80]	397	-0.02 [-0.20, 0.16]	524	0.58 [0.37, 0.78]	397	-0.11 [-0.29, 0.07]	524
Summary effect	0.43 [0.23, 0.64]		0.10 [-0.03, 0.23]		0.24 [-0.08, 0.56]		0.09 [-0.12, 0.30]	
Test for subgroup differences	$\chi^2(1) = 7.30$, $p = .007$, $I^2 = 86.3\%$				$\chi^2(1) = 0.59$, $p = .440$, $I^2 = 0\%$			

	Intention: Simple main effects in condition *No topic rebuttal* (random effects; Hedges' adjusted *g*s)		Intention: Simple main effects in condition *topic rebuttal* (random effects; Hedges' adjusted *g*s)		Attitude: Simple main effects in condition *No topic rebuttal* (random effects; Hedges' adjusted *g*s)		Attitude: Simple main effects in condition *topic rebuttal* (random effects; Hedges' adjusted *g*s)	
	g [95% CI]	n	*g* [95% CI]	n	*g* [95% CI]	n	*g* [95% CI]	n
Technique rebuttal (vs. no technique rebuttal)								
Experiment 1	0.38 [-0.15, 0.91]	56	0.18 [-0.35, 0.71]	56	--	--	--	--
Experiment 2	0.42 [-0.03, 0.86]	79	0.51 [0.08, 0.95]	85	0.21 [-0.24, 0.65]	79	0.44 [0.01, 0.87]	85
Experiment 3	0.23 [-0.16, 0.62]	102	-0.10 [-0.50, 0.30]	99	0.24 [-0.15, 0.63]	102	0.03 [-0.37, 0.42]	99
Experiment 4	0.34 [-0.02, 0.71]	118	0.11 [-0.26, 0.49]	109	0.20 [-0.16, 0.56]	118	0.24 [-0.14, 0.61]	109
Experiment 5	0.07 [-0.40, 0.55]	72	0.20 [-0.25, 0.65]	76	0.37 [-0.11, 0.85]	72	0.44 [-0.02, 0.89]	76
Experiment 6	0.61 [0.40, 0.81]	390	0.00 [-0.18, 0.18]	531	0.64 [0.43, 0.84]	390	-0.02 [-0.20, 0.16]	531
Summary effect	0.40 [0.23, 0.57]		0.10 [-0.06, 0.25]		0.37 [0.16, 0.59]		0.17 [-0.03, 0.37]	
Test for subgroup differences	$\chi^2(1) = 6.98$, $p = .008$, $I^2 = 85.7\%$				$\chi^2(1) = 1.83$, $p = .180$, $I^2 = 45.3\%$			

Supplementary Table 2. Exploratory subgroup analyses of differences between rebuttal and *advocate absent* conditions on changes of attitude and intention stratified by individuals' conservatism. Data presented are absolute mean differences. Summary effects are weighted means of the effect sizes. Figure 6 reveals that in the U.S. samples, rebuttal strategies were more beneficial for conservative participants than for liberal participants (Experiment 4 and Experiment 6). Evidence of these effects is absent when including German samples (Experiment 3 and Experiment 5) in the meta analyses.

	Intention: Topic rebuttal (vs. advocate absent) random effects		Intention: Technique rebuttal (vs. advocate absent) random effects		Attitude: Technique rebuttal (vs. advocate absent) random effects		Attitude: Technique rebuttal (vs. advocate absent) random effects	
	absolute mean difference [95% CI]	n	absolute mean difference [95% CI]	n	absolute mean difference [95% CI]	n	absolute mean difference [95% CI]	n
Low conservatism								
Experiment 3	11.01 [1.52, 20.50]	90	8.43 [-1.77, 18.63]	94	10.86 [0.98, 20.73]	90	9.13 [-0.90, 19.15]	94
Experiment 4	1.40 [-2.25, 5.04]	85	2.01 [-1.54, 5.55]	83	1.18 [-3.61, 5.97]	85	10.42 [1.04, 19.79]	83
Experiment 5	5.94 [-0.64, 12.52]	89	7.63 [1.03, 14.23]	89	1.76 [-9.28, 12.80]	89	4.92 [-6.05, 15.89]	89
Experiment 6	6.14 [2.34, 9.94]	406	6.75 [2.97, 10.53]	403	5.13 [1.17, 9.08]	406	5.25 [1.28, 9.22]	403
Summary effect	4.95 [1.45, 8.46]		5.24 [2.07, 8.40]		4.05 [0.72, 7.38]		6.27 [2.99, 9.54]	
High conservatism								
Experiment 3	13.89 [4.00, 23.77]	57	7.73 [-1.22, 16.67]	63	11.68 [1.03, 22.32]	57	5.93 [-4.24, 16.09]	63
Experiment 4	-1.31 [-7.38, 4.76]	35	-1.98 [-7.99, 4.03]	28	0.32 [-8.54, 9.18]	35	5.04 [-3.21, 13.30]	28
Experiment 5	11.98 [0.95, 23.00]	74	9.21 [-1.89, 20.30]	83	10.71 [-0.98, 22.40]	74	8.79 [-3.23, 20.80]	83
Experiment 6	15.39 [10.23, 20.55]	332	14.75 [9.55, 19.96]	328	15.25 [10.21, 20.29]	332	16.05 [11.01, 21.09]	328
Summary effect	9.75 [0.53, 18.96]		7.37 [-1.39, 16.12]		9.84 [2.65, 17.04]		9.81 [3.46, 16.15]	
Test for subgroup differences:	$\chi^2(1) = 0.91$, $p = .34$, $I^2 = 0\%$		$\chi^2(1) = 0.20$, $p = .65$, $I^2 = 0\%$		$\chi^2(1) = 2.05$, $p = .15$, $I^2 = 51.3\%$		$\chi^2(1) = 0.94$, $p = .33$, $I^2 = 0\%$	

Supplementary Table 3. Exploratory subgroup analyses of differences between conservative and liberal individuals on changes of attitude and intention when advocate absent. Data presented are absolute mean differences. Summary effects are weighted means of the effect sizes. Figure 6 reveals that the influence of the debate is stronger on U.S. conservative (vs. liberal) audiences when the advocate is absent (Experiment 4 and Experiment 6). Evidence of these effects is absent when including German samples (Experiment 3 and Experiment 5) in the meta analyses.

	Intention: Low conservatism (vs. high conservatism) random effects		Attitude: Low conservatism (vs. high conservatism) random effects	
	absolute mean difference [95% CI]	n	absolute mean difference [95% CI]	n
Advocate absent				
Experiment 3	0.13 [-11.82, 12.08]	44	-0.99 [-9.21, 7.23]	44
Experiment 4	1.55 [-4.64, 7.74]	48	-0.69 [-13.58, 12.20]	48
Experiment 5	-9.44 [-21.42, 2.54]	54	-11.41 [-26.62, 3.81]	54
Experiment 6	-9.14 [-15.16, -3.11]	207	-10.93 [-16.95, -4.92]	207
Summary effect	-4.12 [-10.58, 2.33]		-6.28 [-12.44, -0.13]	

Supplementary Table 4. Sensitivity analyses for all confirmatory analyses on attitude. Data presented are Hedges' adjusted *g*s (Model 6: Absolute mean differences). Summary effects are weighted means of the effect sizes. Results differ from results reported in the manuscript due to the following changes of the model: Including all participants instead of excluding some according to the pre-specified criteria (Models A); using estimated means of attitude and intention at T2 controlled for values at T1 rather than difference scores (Models B); excluding statistical outliers from pre- and post-values based on median absolute deviation (Models C); dropping Experiment 5, which differed from all others with respect to domain (climate change; Models D); changing models from random models to fixed models (Models E) and changing outcome from standardized mean differences to mean differences (Models F).

Dependent variable: Attitude	Sensitivity Models A (no exclusion criteria; random effects; Hedges' adjusted *g*s)		Sensitivity Models B (post- controlled for pre-values; random effects; Hedges' adjusted *g*s)		Sensitivity Models C (outliers excluded; random effects; Hedges' adjusted *g*s)		Sensitivity Models D (Experiment 5 excluded; random effects; Hedges' adjusted *g*s)		Sensitivity Models E (fixed effects; Hedges' adjusted *g*s)		Sensitivity Models F (random effects; absolute mean difference)	
	g [95% CI]	n	*g* [95% CI]	n	*g* [95% CI]	n	*g* [95% CI]	n	*g* [95% CI]	n	*g* [95% CI]	n
Topic (vs. no topic rebuttal)												
Experiment 1	--	--	--	--	--	--	--	--	--	--	--	--
Experiment 2	0.09 [-0.18, 0.37]	206	0.04 [-0.26, 0.35]	164	0.10 [-0.21, 0.41]	160	0.09 [-0.18, 0.37]	164	0.03 [-0.27, 0.34]	164	0.74 [-5.74, 7.21]	164
Experiment 3	0.40 [0.16, 0.65]	261	0.51 [0.23, 0.79]	201	0.55 [0.26, 0.83]	198	0.40 [0.16, 0.65]	201	0.50 [0.22, 0.78]	201	8.78 [3.94, 13.61]	201
Experiment 4	0.14 [-0.10, 0.38]	267	0.16 [-0.10, 0.42]	227	0.08 [-0.29, 0.45]	115	0.14 [-0.10, 0.38]	227	0.14 [-0.12, 0.40]	227	2.77 [-2.36, 7.91]	227
Experiment 5	-0.08 [-0.34, 0.19]	217	-0.11 [-0.44, 0.21]	148	0.31 [-0.11, 0.74]	86	--		-0.04 [-0.36, 0.28]	148	-0.04 [-0.36, 0.28]	148
Experiment 6	0.27 [0.15, 0.39]	1137	0.29 [0.16, 0.42]	921	0.29 [0.14, 0.43]	770	0.27 [0.15, 0.39]	921	0.30 [0.17, 0.44]	921	4.78 [2.61, 6.96]	921
Summary effect	0.18 [0.04, 0.33]		0.20 [0.02, 0.38]		0.28 [0.13, 0.43]		0.26 [0.09, 0.42]		0.26 [0.09, 0.42]		4.68 [2.02, 7.35]	
Technique (vs. no technique rebuttal)												
Experiment 1	--	--	--	--	--	--	--	--	--	--	--	--
Experiment 2	0.24 [-0.04, 0.51]	206	0.32 [0.01, 0.63]	164	0.33 [0.02, 0.64]	160	0.24 [-0.04, 0.51]	164	0.33 [0.02, 0.64]	164	6.93 [0.61, 13.25]	164
Experiment 3	0.14 [-0.11, 0.38]	261	0.13 [-0.14, 0.41]	201	0.14 [-0.14, 0.42]	198	0.14 [-0.11, 0.38]	201	0.16 [-0.12, 0.43]	201	2.81 [-2.28, 7.90]	201
Experiment 4	0.15 [-0.09, 0.39]	267	0.21 [-0.05, 0.47]	227	0.21 [-0.16, 0.58]	115	0.15 [-0.09, 0.39]	227	0.20 [-0.06, 0.46]	227	3.99 [-1.31, 9.30]	227
Experiment 5	0.38 [0.11, 0.65]	217	0.42 [0.09, 0.75]	148	0.31 [-0.11, 0.74]	86	--		0.40 [0.07, 0.73]	148	0.40 [0.07, 0.73]	148
Experiment 6	0.28 [0.16, 0.40]	1137	0.36 [0.23, 0.50]	921	0.44 [0.30, 0.58]	770	0.28 [0.16, 0.40]	921	0.36 [0.23, 0.49]	921	5.66 [3.52, 7.80]	921
Summary effect	0.25 [0.16, 0.34]		0.31 [0.22, 0.41]		0.34 [0.22, 0.46]		0.31 [0.20, 0.41]		0.31 [0.20, 0.41]		5.23 [3.45, 7.00]	
Combination (vs.single)												
Experiment 1	--	--	--	--	--	--	--	--	--	--	--	--
Experiment 2	0.18 [-0.16, 0.53]	152	0.29 [-0.09, 0.67]	122	0.35 [-0.04, 0.73]	119	0.18 [-0.16, 0.53]	122	0.32 [-0.07, 0.70]	122	6.59 [-0.56, 13.74]	122
Experiment 3	0.27 [-0.02, 0.57]	196	0.24 [-0.09, 0.58]	153	0.28 [-0.06, 0.61]	150	0.27 [-0.02, 0.57]	153	0.25 [-0.09, 0.58]	153	3.91 [-1.32, 9.14]	153
Experiment 4	0.06 [-0.24, 0.35]	200	0.17 [-0.15, 0.49]	173	0.18 [-0.29, 0.64]	86	0.06 [-0.24, 0.35]	173	0.16 [-0.16, 0.48]	173	2.64 [-1.66, 6.93]	173
Experiment 5	0.15 [-0.17, 0.48]	161	0.30 [-0.10, 0.70]	104	0.28 [-0.25, 0.81]	59	--		0.28 [-0.12, 0.68]	104	0.28 [-0.12, 0.68]	104
Experiment 6	-0.10 [-0.23, 0.03]	891	-0.07 [-0.22, 0.08]	714	-0.03 [-0.19, 0.14]	588	-0.10 [-0.23, 0.03]	714	-0.07 [-0.22, 0.08]	714	-0.85 [-2.67, 0.97]	714
Summary effect	0.08 [-0.08, 0.23]		0.14 [-0.04, 0.32]		0.14 [-0.03, 0.32]		0.12 [-0.08, 0.32]		0.12 [-0.08, 0.32]		2.12 [-1.20, 5.43]	

Supplementary Table 5. Sensitivity analyses for all confirmatory analyses on intention. Data presented are Hedges' adjusted *g*s (Model 6: Absolute mean differences). Summary effects are weighted means of the effect sizes. Results differ from results reported in the manuscript due to the following changes of the models: Including all participants instead of excluding some according to the pre-specified criteria (Models G); using estimated means of attitude and intention at T2 controlled for values at T1 rather than difference scores (Models H); excluding statistical outliers from pre- and post-values based on median absolute deviation (Models I); dropping Experiment 5, which differed from all others with respect to domain (climate change; Models J); changing models from random models to fixed models (Models K) and changing outcome from standardized mean differences to mean differences (Models L).

Dependent variable: Attitude	Sensitivity Models G (No exclusion criteria;random effects; Hedges' adjusted *g*s)		Sensitivity Models H (post- controlled for pre-values; random effects; Hedges' adjusted *g*s)		Sensitivity Models I (Model 2 with outliers excluded; random effects; Hedges' adjusted *g*s)		Sensitivity Models J (Experiment 5 excluded; random effects; Hedges' adjusted *g*s)		Sensitivity Models K (fixed effects; Hedges' adjusted *g*s)		Sensitivity Model L (random effects; absolute mean difference)	
	g [95% CI]	n	*g* [95% CI]	n	*g* [95% CI]	n	*g* [95% CI]	n	*g* [95% CI]	n	*g* [95% CI]	n
Topic (vs. no topic rebuttal)												
Experiment 1	0.40 [0.05, 0.75]	125	0.33 [-0.04, 0.71]	112	0.27 [-0.10, 0.64]	112	0.40 [0.05, 0.75]	112	0.37 [0.00, 0.75]	112	7.14 [0.12, 14.17]	112
Experiment 2	0.28 [0.00, 0.55]	206	0.23 [-0.08, 0.54]	164	0.23 [-0.08, 0.54]	164	0.28 [0.00, 0.55]	164	0.25 [-0.06, 0.55]	164	5.69 [-1.37, 12.76]	164
Experiment 3	0.46 [0.21, 0.70]	261	0.51 [0.23, 0.79]	201	0.51 [0.22, 0.79]	197	0.46 [0.21, 0.70]	201	0.50 [0.22, 0.78]	201	9.32 [4.25, 14.40]	201
Experiment 4	0.25 [0.01, 0.49]	267	0.32 [0.06, 0.58]	227	0.08 [-0.21, 0.37]	180	0.25 [0.01, 0.49]	227	0.30 [0.04, 0.57]	227	4.87 [0.78, 8.96]	227
Experiment 5	0.10 [-0.16, 0.37]	217	0.02 [-0.31, 0.34]	148	0.55 [0.13, 0.96]	105	--		0.05 [-0.27, 0.38]	148	0.39 [-1.99, 2.77]	148
Experiment 6	0.29 [0.17, 0.41]	1137	0.35 [0.22, 0.48]	921	0.46 [0.30, 0.61]	641	0.29 [0.17, 0.41]	921	0.36 [0.23, 0.50]	921	5.60 [3.46, 7.73]	921
Summary effect	0.29 [0.21, 0.38]		0.32 [0.21, 0.42]		0.36 [0.22, 0.50]		0.36 [0.26, 0.46]		0.33 [0.24, 0.43]		4.13 [2.76, 5.50]	
Technique (vs. no technique rebuttal)												
Experiment 1	0.37 [0.02, 0.73]	125	0.39 [0.02, 0.77]	112	0.43 [0.05, 0.80]	112	0.37 [0.02, 0.73]	112	0.45 [0.08, 0.83]	112	8.56 [1.58, 15.54]	112
Experiment 2	0.39 [0.11, 0.66]	206	0.44 [0.13, 0.75]	164	0.44 [0.13, 0.75]	164	0.39 [0.11, 0.66]	164	0.47 [0.16, 0.78]	164	10.58 [3.71, 17.44]	164
Experiment 3	0.15 [-0.10, 0.39]	261	0.09 [-0.18, 0.37]	201	0.10 [-0.18, 0.38]	197	0.15 [-0.10, 0.39]	201	0.11 [-0.17, 0.39]	201	2.06 [-3.25, 7.37]	201
Experiment 4	0.24 [0.00, 0.48]	267	0.25 [-0.02, 0.51]	227	0.25 [-0.05, 0.54]	180	0.24 [0.00, 0.48]	227	0.23 [-0.03, 0.50]	227	3.78 [-0.44, 8.00]	227
Experiment 5	0.20 [-0.07, 0.47]	217	0.16 [-0.17, 0.48]	148	0.63 [0.23, 1.03]	105	--		0.15 [-0.18, 0.47]	148	1.08 [-1.26, 3.41]	148
Experiment 6	0.30 [0.18, 0.42]	1137	0.36 [0.23, 0.49]	921	0.45 [0.29, 0.60]	641	0.30 [0.18, 0.42]	921	0.37 [0.24, 0.50]	921	5.67 [3.56, 7.78]	921
Summary effect	0.28 [0.19, 0.36]		0.31 [0.21, 0.40]		0.37 [0.24, 0.51]		0.33 [0.22, 0.44]		0.32 [0.22, 0.41]		3.99 [2.63, 5.35]	
Combination (vs.single)												
Experiment 1	0.09 [-0.33, 0.51]	92	0.12 [-0.32, 0.56]	82	0.05 [-0.41, 0.50]	77	0.09 [-0.33, 0.51]	82	0.16 [-0.29, 0.60]	82	2.70 [-5.50, 10.89]	82
Experiment 2	0.38 [0.03, 0.72]	152	0.38 [-0.00, 0.76]	122	0.38 [-0.00, 0.76]	122	0.38 [0.03, 0.72]	122	0.40 [0.02, 0.79]	122	8.94 [1.28, 16.59]	122
Experiment 3	0.14 [-0.15, 0.44]	196	0.17 [-0.17, 0.50]	153	0.19 [-0.15, 0.53]	149	0.14 [-0.15, 0.44]	153	0.16 [-0.17, 0.49]	153	2.84 [-2.39, 8.08]	153
Experiment 4	0.10 [-0.20, 0.39]	200	0.15 [-0.17, 0.48]	173	0.09 [-0.27, 0.45]	139	0.10 [-0.20, 0.39]	173	0.15 [-0.17, 0.47]	173	2.05 [-1.85, 5.96]	173
Experiment 5	0.21 [-0.11, 0.54]	161	0.24 [-0.16, 0.64]	104	0.39 [-0.02, 0.81]	98	--		0.18 [-0.22, 0.58]	104	0.18 [-0.22, 0.58]	104
Experiment 6	-0.05 [-0.18, 0.08]	891	-0.01 [-0.16, 0.13]	714	0.08 [-0.09, 0.26]	504	-0.05 [-0.18, 0.08]	714	-0.01 [-0.16, 0.14]	714	-0.10 [-1.87, 1.66]	714
Summary effect	0.10 [-0.04, 0.23]		0.09 [-0.02, 0.20]		0.15 [0.03, 0.28]		0.10 [-0.03, 0.24]		0.10 [-0.03, 0.24]		1.93 [-0.59, 4.46]	

Supplementary Table 6. Overview of measures used in Experiments 1–6. Reliability of multiple item scales is indicated by Cronbach's alpha; numbers behind alphas relate to the respective experiments. * indicates variables included in preregistrations for explorative purposes. Results of additional explorative analysis are not further reported. All variables are available in the datasets: https://osf.io/xx2kt/.

concept	included in:	scale type and reliability*	wording	source of adapted items
primary outcomes				
intention to get vaccinated	Experiments 1–4,6	visual analogue scale	If you had the opportunity to get vaccinated against dysomeria next week, what would you do? (1 = I will definitely not get vaccinated, 100 = I will definitely get vaccinated)	15
attitude towards vaccination	Experiments 2–4,6	mean score of 5-point rating scales ($\alpha 2_{pre}$ = .90; $\alpha 2_{post}$ = .94; $\alpha 3_{pre}$ = .89; $\alpha 3_{post}$ = .93; $\alpha 4_{pre}$ = .92; $\alpha 4_{post}$ = .94; $\alpha 6_{pre}$ = .92; $\alpha 6_{post}$ = .95)	Please indicate how much you agree with the following statement. 1.Vaccinating against dysomeria is necessary. 2.Vaccinating against dysomeria is a good idea. 3.Vaccinating against dysomeria is beneficial. (1 = I strongly disagree, 5 = I strongly agree)	10
intention to act against climate change	Experiment 5	mean score of 6-point rating scales ($\alpha 5_{pre}$ = .83; $\alpha 5_{post}$ = .85)	Are you ready to learn about ways to protect the natural environment or to pay money? I am ready to 1. pay money for the installation of environmentally friendly equipment (eg installation of a temperature controller on the heating, use of solar energy, etc.). 2. spend more money on products from a specific company if they are made more environmentally friendly than comparable products. 3. read journal articles and books on ways to protect the environment. 4. actively seek newer scientific insights into the extent and potential solutions to environmental problems. 5. obtain information about environmental problems (eg pollution of air, soil, water, climatic hazards). 6. buy drinks in returnable bottles only despite the extra costs. 7. seek information from environmental authorities and other official bodies about what citizens can do to protect the environment. (1 = I strongly disagree, 6 = I strongly agree)	11
attitude towards climate change	Experiment 5	mean score of 5-point rating scales	Please indicate how much you agree with the following statement. 1.Acting against climate change is necessary.	10

Supplementary Table 6. (continued)

		($\alpha 5_{pre}$ = .89; $\alpha 5_{post}$ = .93)	2.Acting against climate change is a good idea. 3.Acting against climate change is beneficial. (1 = I strongly disagree, 5 = I strongly agree)	
control variables				
knowledge about vaccination	Experiments 1–4,6	mean score of correct/incorrect answers	Example item: Diseases like autism, multiple sclerosis, and diabetes might be triggered through vaccinations. (1 = yes, 2 = no, 3 = I do not know)	16
knowledge about climate change	Experiment 5	mean score of correct/incorrect answers	Example item: The greenhouse effect refers to the protective ozone layer of the earth. (1 = yes, 2 = no, 3 = I do not know)	17
trust in information source	Experiments 1–6	7-point rating scales	How much do you trust the following sources of health information? example item: radio example item: internet (1 = do not trust at all, 7 = trust completely)	18
frequency of using information source	Experiments 1–6	7-point rating scales	How often do you use the following sources to get health information? example item: radio example item: internet (1 = never, 7 = daily)	18
relevance of information source	Experiments 1–6	product score of trust in information source and frequency of using information source		18
mediator variables				
perceived persuasiveness	Experiment 1	7-point rating scale	How convincing do you judge the preceding argument to be? (1 = not convincing at all, 7 = very convincing)	5
perceived argument strength	Experiments 2,5	mean score of a 5-point rating scale ($\alpha 2_{denier\ argument\ 1}$ = .93; $\alpha 2_{denier\ argument\ 2}$ = .94; $\alpha 2_{advocate\ argument\ 1}$ = .88; $\alpha 2_{advocate\ argument\ 2}$ = .86)	Example item: The preceding argument of *name denier/name advocate* is a convincing reason *against/for* the dysomeria vaccination. (1 = strongly disagree, 5 =strongly agree)	6

Supplementary Table 6. (continued)

persuasion knowledge	Experiment 3	mean score of a 5-point rating scale ($\alpha 3_{pre}$ = .75)	Example item: The aim of *name denier* was to influence my opinion. (1 = strongly disagree, 5 =strongly agree)	[8]
additional measures				
psychological antecedents of vaccination (incl. confidence in vaccination)*	Experiments 2–4,6	5-point rating scales	Please evaluate how much you disagree or agree with the following statements. (Confidence) I am completely confident that vaccines are safe. (Collective responsibility) When everyone is vaccinated, I don't have to get vaccinated, too. (Constrains) Everyday stress prevents me from getting vaccinated. (Complacency) Vaccination is unnecessary because vaccine-preventable diseases are not common anymore. (Calculation) When I think about getting vaccinated, I weigh benefits and risks to make the best decision possible. (1 = I strongly disagree, 5 = I strongly agree)	[19]
need for cognition*	Experiment 4	mean score of 5-point rating scales ($\alpha 4$ = .95)	Describe the extent to which you agree with each of the following statements. Example item: I would prefer complex to simple problems. (1 = I strongly disagree, 5 = I strongly agree)	[20]
conservatism*	Experiments 4,6 (first item was also used in German sample of Experiments 3,5)	mean score of 5-point rating scales ($\alpha 4$ = .89; $\alpha 6$ = .87)	If you think about your own political views, where would you classify your views on this scale? (Exp 4,6: 1 = very conservative, 5 = very liberal) If you think about your own political identity, where would you classify your views on this scale? (Exp 4,6: 1 = Republican, 5 = Democrat)	[21,22]
	Experiments 4,6	5-point rating scales	If you think about your own political identity, where would you classify your views on this scale? (Exp 4: 1 = Republican, 5 = Democrat)	
personality*	Experiment 4	mean scores of 5-point rating scales: agreeableness ($\alpha 4$ = .38);	Here are a number of personality traits that may or may not apply to you. Please evaluate the extent to which you agree or disagree with that statement. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other. I see myself as:	[23]

Supplementary Table 6. (continued)

		extraversion (α4 = .72); conscientiousness (α4 = .47); emotional stability (α4 = .75); openness (α4 = .45)	Example item: Extraverted, enthusiastic. (1 = I strongly disagree, 5 = I strongly agree)	
conspiracy mentality*	Experiments 4,6	mean score of 5-point rating scales (α4 = .82, α6 = .86)	For each of the statements below, please indicate how likely it is in your opinion that the statement is true. Example item: Events which superficially seem to lack a connection are often the result of secret activities. (1 = certainly not, 5 = certain)	[24]
general attitude towards vaccination*	Experiment 2	mean score of 5-point rating scales (α2 = .93)	Please indicate how much you agree with the following statement. 1.Getting vaccinated is necessary. 2.Getting vaccinated is a good idea. 3.Getting vaccinated is beneficial. (1 = I strongly disagree, 5 = I strongly agree)	[10]
attention	Experiments 4,6	mean score of correct/incorrect answers (α4 = .71; α6 = .47)	Example: People are very busy these days and many do not have time to follow what goes on in the government. Some do pay attention to politics but do not read questions carefully. To show that you have read this much, please ignore the question below and just press continue. That is right, just press continue and ignore the choices below.	[9]
scepticism*	Experiment 5	mean score of 5-point rating scales (α5 = .84)	Please indicate how much you agree with the following statement. Example: I often reject statements until I have the evidence that they are true. (1 = I strongly disagree, 5 = I strongly agree)	[25]
speaker evaluation*	Experiments 1–6	mean score of 7-point semantic differential: competence (α1denier = .88; α1advocate= .89; α2denier = .94; α2advocate= .94; α3denier = .92;	Please rate name denier/name advocate. Example item competence: 1. qualified 7. unqualified Example item character: 1. selfish 7. unselfish Example item sociability: 1. friendly 7. unfriendly	[26]

Supplementary Table 6. (continued)

α3advocate= .91;
α4denier = .94;
α4advocate= .91;
α5denier = .90;
α5advocate= .93;
α6denier = .95;
α6advocate= .93)

character (α1denier =
.64; α1advocate= .68;
α2denier = .83;
α2advocate= .87;
α3denier = .76;
α3advocate= .74;
α4denier = .86;
α4advocate= .81;
α5denier = .69;
α5advocate= .75;
α6denier = .83;
α6advocate= .86)

sociability (α1denier =
.78; α1advocate= .71;
α2denier = .81;
α2advocate= .86;
α3denier = .72;
α3advocate= .81;
α4denier = .88;
α4advocate= .89;
α4denier = .61;
α4advocate= .74;
α6denier = .90;
α6advocate= .90)

Supplementary Table 6. (continued)

persuasion appropriateness*	Experiment 3	5-point rating scales	The way name denier argued against the dysomeria vaccine is appropriate.	[27]
persuasion knowledge explorative*	Experiment 3	mean score of correct/incorrect answers	Which technique has name denier used in his argument? (1 = conspiracy theory, 2 = fake expert, 3 = misrepresentation, 4 = subjective probability, 5 = I do not know)	n.a.
content filter	Experiments 1–6	single item selection	For Exp. 1–4 and 6: What was the radio interview about? About the vaccination against dysomeria; About the vaccination against verococci; About the vaccination record of Steve Miller; About the effectiveness of the vaccination against dysomeria compared to the vaccination against verococci.	n.a.

Supplementary Table 7. Effects of topic rebuttal and technique rebuttal on changes in intentions after controlling for effects of covariates. Significant effects are shown in boldface for the significance level of 0.05. The effects are controlled for age, gender, education, relevance of internet (Experiments 2–6), relevance of radio, knowledge about vaccination (Experiments 1–4,6), knowledge about climate change (Experiment 5). Numbers in brackets denote degrees of freedom for the ANCOVA models (df_1,df_2).

	Experiment 1 n = 112; (1,102)			Experiment 2 n = 158; (1,147)			Experiment 3 n = 198; (1,187)			Experiment 4 n = 227; (1,216)			Experiment 5 n = 148; (1,137)			Experiment 6 n = 921; (1,910)		
Effects	*F*	*p*	η^2_p	*F*	*p*	η^2_p	*F*	*p*	η^2_p	*F*	*p*	η^2_p	*F*	*p*	η^2_p	*F*	*p*	η^2_p
Time	**5.48**	**.021**	**.051**	0.02	.878	<.001	**11.74**	**.001**	**.059**	0.36	.549	.002	0.39	.536	.003	0.45	.500	<.001
Topic rebuttal*Time	3.34	.071	.032	2.74	.100	.018	**13.21**	**<.001**	**.066**	**5.76**	**.017**	**.026**	0.08	.782	.001	**23.93**	**<.001**	**.026**
Technique rebuttal*Time	**4.40**	**.038**	**.041**	**10.96**	**.001**	**.069**	1.21	.274	.006	2.32	.129	.011	0.89	.347	.006	**23.50**	**<.001**	**.025**
Technique rebuttal*Topic rebuttal*Time	0.64	.425	.006	0.47	.492	.003	1.62	.205	.009	0.80	.372	.004	0.25	.618	.002	**23.28**	**<.001**	**.025**
Knowledge*Time	**7.63**	**.007**	**.070**	**10.41**	**.002**	**.066**	**15.39**	**<.001**	**.076**	**21.25**	**<.001**	**.090**	1.74	.190	.013	**70.57**	**<.001**	**.072**
Source Relevance Radio*Time	0.26	.612	.003	1.23	.270	.008	0.07	.787	<.001	0.04	.847	<.001	<0.01	.933	<.001	**7.38**	**.007**	**.008**
Source Relevance Internet*Time	--	--	--	<0.01	.987	<.001	0.03	.861	<.001	0.03	.873	<.001	0.02	.894	<.001	<0.01	.967	<.001
Education low*Time	Ref.	--	--	Ref.	--	--	Ref.	--	--	Ref.	--	--	Ref.	--	--	Ref.	--	--
Education middle*Time	0.25	.619	.002	0.19	.660	.001	0.41	.521	.002	0.15	.698	.001	0.02	.883	<.001	0.68	.409	.001
Education high*Time	0.60	.439	.006	0.54	.464	.004	1.84	.177	.010	0.42	.520	.002	0.11	.741	.001	0.56	.454	.001
Gender*Time	2.39	.126	.023	1.06	.100	.018	1.42	.235	.008	0.42	.520	.002	0.20	.657	.001	0.10	.752	<.001
Age*Time	1.53	.219	015	**8.27**	**.005**	**.053**	0.01	.922	<.001	0.84	.361	.004	0.50	.479	.004	0.01	.972	<.001

Supplementary Table 8. Effects of topic rebuttal and technique rebuttal on changes in attitudes after controlling for effects of covariates. Significant effects are shown in boldface for the significance level of 0.05. The effects are controlled for age, gender, education, relevance of internet, relevance of radio, knowledge about vaccination (Experiments 2–4,6), knowledge about climate change (Experiment 5). Numbers in brackets denote degrees of freedom for the ANCOVA models (df_1,df_2).

	Experiment 2 n = 158; (1,147)			Experiment 3 n = 198; (1,187)			Experiment 4 n = 227; (1,216)			Experiment 5 n = 148; (1,137)			Experiment 6 n = 921; (1,910)		
Effects	*F*	*p*	η^2_p	*F*	*p*	η^2_p	*F*	*p*	η^2_p	*F*	*p*	η^2_p	*F*	*p*	η^2_p
Time	**4.05**	**.046**	**.027**	**11.88**	**.001**	**.060**	1.60	.207	.007	0.19	.660	.001	0.428	.513	<.001
Topic rebuttal*Time	0.14	.711	.001	**11.46**	**.001**	**.058**	0.70	.403	.003	0.27	.603	.002	**14.98**	**<.001**	**.016**
Technique rebuttal*Time	3.12	.079	.021	1.81	.180	.010	1.49	.224	.007	**5.82**	**.017**	**.041**	**23.37**	**<.001**	**.025**
Technique rebuttal*Topic rebuttal*Time	0.01	.912	.000	1.22	.270	.006	0.12	.727	.001	0.26	.615	.002	**27.09**	**<.001**	**.029**
Knowledge*Time	**11.83**	**.001**	**.074**	**24.59**	**<.001**	**.116**	**21.11**	**<.001**	**.089**	0.13	.719	.001	**91.38**	**<.001**	**.091**
Source Relevance Radio*Time	**5.91**	**.016**	**.039**	1.46	.228	.008	0.03	.859	<.001	0.27	.606	.002	**13.48**	**<.001**	**.015**
Source Relevance Internet*Time	**5.07**	**.026**	**.033**	0.30	.585	.002	1.64	.201	.008	0.62	.434	.004	2.25	.134	.002
Education low*Time	Ref.	--	--	Ref.	--	--	Ref.	--	--	Ref.	--	--	Ref.	--	--
Education middle*Time	0.03	.854	<.001	1.58	.210	.008	0.03	.859	<.001	0.05	.768	.001	0.26	.608	<.001
Education high*Time	0.18	.676	.001	0.51	.476	.003	0.02	.877	<.001	0.18	.671	.001	0.34	.559	<.001
Gender*Time	0.26	.607	.002	2.85	.093	.015	0.28	.601	.001	0.38	.537	.003	0.15	699	<.001
Age*Time	1.12	.292	.008	0.10	.758	<.001	0.14	.711	.001	0.19	.662	.001	**5.43**	**.020**	**.006**

Supplementary Table 9. Planned contrast effects of *advocate absent versus rebuttal strategies* (-3 1 1 1) and *single strategies vs. combination* (0 -1 -1 2) on changes in intentions and attitude after controlling for effects of covariates. Significant effects are shown in boldface for the significance level of 0.05. The effects are controlled for age, gender, education, relevance of internet (Experiments 2–6), relevance of radio, knowledge about vaccination (Experiments 1–4,6), knowledge about climate change (Experiment 5). Numbers in brackets denote degrees of freedom for the ANCOVA models (df1,df2).

	Experiment 1 n = 112; (1,102)			Experiment 2 n = 158; (1,147)			Experiment 3 n = 198; (1,187)			Experiment 4 n = 227; (1,216)			Experiment 5 n = 148; (1,137)			Experiment 6 n = 921; (1,910)		
	F	p	η^2_p	F	p	η^2_p	F	p	η^2_p	F	p	η^2_p	F	p	η^2_p	F	p	η^2_p
Advocate absent vs. rebuttal																		
Attitude	--	--	--	1.41	.237	.009	**10.91**	**.001**	**.055**	1.82	.179	.008	0.68	.410	.005	**62.33**	**<.001**	**.064**
Intention	**6.92**	**.010**	**.064**	**10.91**	**.001**	**.069**	**11.55**	**.001**	**.058**	**7.28**	**.008**	**.033**	0.18	.673	.001	**68.32**	**<.001**	**.070**
Single strategies vs. combination																		
Attitude	--	--	--	0.93	.337	.006	1.08	.299	.006	0.23	.591	.001	1.37	.243	.010	0.60	.440	.001
Intention	0.97	.327	.009	2.12	.147	.014	0.82	.367	.004	0.70	.404	.003	0.81	.370	.006	<0.01	.966	<.001

Supplementary Table 10. Descriptive data for overall change in intention and stratified by conditions and contrasts. Smaller numbers indicate a stronger influence of the science denier.

	Experiment 1			Experiment 2			Experiment 3			Experiment 4			Experiment 5			Experiment 6		
	Mean	*SD*	n	*Mean*	*SD*	n	*Mean*	*SD*	n	*Mean*	*SD*	n	*Mean*	*SD*	*n*	*Mean*	*SD*	*n*
Overall	-10.62	19.22	112	-9.34	23.10	164	-8.29	18.99	201	-6.27	16.13	227	-0.13	7.36	148	-5.01	15.59	921
Conditions																		
Advocate absent	-19.90	22.38	30	-16.96	23.95	42	-15.51	20.89	48	-12.10	21.35	54	-0.54	8.94	44	-13.38	22.50	207
Topic rebuttal only	-9.01	11.65	24	-11.83	23.79	45	-2.75	16.31	44	-4.42	13.30	55	-0.71	6.89	37	-2.43	10.75	183
Technique rebuttal only	-7.61	15.58	26	-7.00	23.23	37	-10.55	22.23	54	-5.65	16.14	64	0.00	4.40	28	-2.64	10.42	190
Combination	-5.59	20.94	32	-0.71	18.44	40	-4.21	12.88	55	-3.03	10.68	54	0.79	7.67	39	-2.64	13.19	341
Main effects																		
Topic rebuttal	-7.05	17.52	56	-6.60	22.04	85	-3.56	14.45	99	-3.73	12.04	109	0.06	7.29	76	-2.64	12.26	531
No topic rebuttal	-14.20	20.32	56	-12.29	23.99	79	-12.88	21.65	102	-8.60	18.90	118	-0.33	7.47	72	-8.24	18.77	390
Technique rebuttal	-6.50	18.60	58	-3.73	20.98	77	-7.35	18.32	109	-4.45	13.92	118	0.46	6.48	67	-2.57	12.38	524
No technique rebuttal	-15.06	19.05	54	-14.30	23.87	87	-9.41	-19.80	92	-8.23	18.08	109	-0.62	8.02	81	-8.24	18.55	397
Planned contrast																		
Single strategies	-8.28	13.72	50	-9.65	23.52	82	-7.05	20.08	98	-5.08	14.84	119	-0.40	5.92	65	-2.54	10.57	373
Combination	-5.59	20.94	32	-0.71	18.44	40	-4.21	12.88	55	-3.03	10.68	54	0.79	7.67	39	-2.64	13.19	341

Supplementary Table 11. Descriptive data for overall change in attitude and stratified by conditions and contrasts. Smaller numbers indicate a stronger influence of the science denier.

	Experiment 2			Experiment 3			Experiment 4			Experiment 5			Experiment 6		
	Mean	*SD*	n	*Mean*	*SD*	n	*Mean*	*SD*	n	*Mean*	*SD*	*n*	*Mean*	*SD*	*n*
Overall	-10.06	21.10	164	-11.61	18.05	201	-8.63	20.15	227	-2.65	11.08	148	-6.62	15.85	921
Conditions															
Advocate absent	-12.50	21.64	42	-18.40	22.54	48	-12.65	29.04	54	-3.79	10.70	44	-14.81	22.66	207
Topic rebuttal only	-14.07	24.02	45	-7.39	14.84	44	-8.79	16.07	55	-5.63	10.95	37	-4.43	10.83	190
Technique rebuttal only	-8.11	20.08	37	-13.73	16.12	54	-7.68	20.37	64	-0.30	6.61	28	-3.23	11.07	183
Combination	-4.79	16.97	40	-6.97	15.86	55	-5.56	10.24	54	-0.21	13.45	39	-4.69	13.56	341
Main effects															
Topic rebuttal	-9.71	21.40	85	-7.15	15.34	99	-7.19	.13.54	109	-2.85	12.15	76	-4.60	12.64	531
No topic rebuttal	-10.44	20.91	79	-15.93	19.45	102	-9.96	24.73	118	-2.43	9.43	72	-9.38	19.05	390
Technique rebuttal	-6.39	18.48	77	-10.32	16.27	109	-6.71	16.50	118	-0.25	11.04	67	-4,18	12.75	524
No technique rebuttal	-13.31	22.78	87	-13.13	19.93	92	-10.70	23.38	109	-4.63	10.79	81	-9.84	18.71	397
Planned contrast															
Single strategies	-11.38	22.40	82	-10.88	15.80	98	-8.19	18.44	119	-3.33	9.64	65	-3.84	10.95	373
Combination	-4.79	16.97	40	-6.97	15.86	55	-5.56	10.24	54	-0.21	13.45	39	-4.69	13.56	341

Supplementary Table 12. Mediations of technique rebuttal on intention by perceived persuasiveness (of the denier Model 1a; of the advocate Model 2a) in Experiment 1. Significant effects are shown in boldface for the significance level of 0.05. Regression coefficients *B* are unstandardized and adjusted for age, gender, education, relevance of radio and knowledge about vaccination.

	Model 1a (n = 112)			Model 2a (n = 82)		
Experiment 1	Dependent variable: Perceived persuasiveness (denier) **R^2 = .209; F(8, 103) = 3.41, p = .002**			Dependent variable: Perceived persuasiveness (advocate) **R^2 = .324; F(8, 73) = 4.37, p < .001**		
	B [95%CI]	*SE*	*p*	*B* [95%CI]	*SE*	*p*
Direct effects						
Constant	**63.23 [37.03, 89.44]**	**13.21**	**< .001**	**41.19 [21.34, 61.05]**	**9.96**	**< .001**
Technique rebuttal (vs. no technique rebuttal)	-4.79 [-13.11, 3.54]	4.20	.257	0.22 [-6.95, 7.40]	3.60	.951
	Dependent variable: Intention **R^2 = .470; F(9, 102) = 10.07, p < .001**			Dependent variable: Intention **R^2 = .370; F(9, 72) = 4.69, p < .001**		
Direct effects						
Constant	-0.48 [-20.26, 19.31]	9.97	.962	**-37.34 [-59.30, -15.39]**	**11.01**	**.001**
Technique rebuttal (vs. no technique rebuttal)	**5.81 [0.09, 11.53]**	**2.89**	**.047**	2.76 [-4.38, 9.91]	3.58	.444
Perceived persuasiveness (denier)	**-0.48 [-0.61, -0.35]**	**0.07**	**< .001**	---	---	---
Perceived persuasiveness (advocate)	---	---	---	**0.38 [0.15, 0.61]**	**0.12**	**.002**
Indirect effects						
Technique rebuttal (vs. no technique rebuttal)	2.30 [-1.47, 6.83]	2.15	---	.086 [-1.96, 3.00]	1.25	---

Supplementary Table 13. Mediations of technique rebuttal on intention (Model 1a, Model 2a) and attitude (Model 3a, Model 4a) by perceived argument strength (of the denier Model 1a, Model 3a; of the advocate Model 2a, Model 4a) in Experiment 2. Significant effects are shown in boldface for the significance level of 0.05. Regression coefficients *B* are unstandardized and adjusted for age, gender, education, relevance of radio, relevance of internet and knowledge about vaccination.

Experiment 2	Model 1a (n = 158)			Model 2a (n = 117)		
	Dependent variable: Perceived argument strength (denier) **R^2 = .213; F(8, 149) = 5.04, p < .001**			Dependent variable: Perceived argument strength (advocate) **R^2 = .213; F(8, 149) = 5.04, p < .001**		
	B [95%CI]	*SE*	*p*	*B* [95%CI]	*SE*	*p*
Direct effects						
Constant	**51.41 [38.02, 64.79]**	**6.77**	**< .001**	**52.16 [38.54, 65.77]**	**6.87**	**< .001**
Technique rebuttal (vs. no technique rebuttal)	-1.86 [-7.64, 3.92]	2.92	.526	-2.23 [-8.34, 3.88]	3.08	.471
	Dependent variable: Intention **R^2 = .342; F(9, 148) = 8.53, p < .001**			Dependent variable: Intention **R^2 = .251; F(9, 107) = 3.98, p < .001**		
Direct effects						
Constant	**25.20 [7.83, 42.57]**	**8.79**	**.005**	**-30.08 [-52.56, -7.60]**	**11.34**	**.009**
Technique rebuttal (vs. no technique rebuttal)	**10.89 [4.51, 17.26]**	**3.23**	**.001**	**8.02 [-0.15, 16.19]**	**4.12**	**.001**
Perceived argument strength (denier)	**-0.56 [-0.74, -0.38]**	**0.09**	**< .001**	**0.49 [0.24, 0.75]**	**0.13**	**< .001**
Perceived argument strength (advocate)	---	---	---	---	---	---
Indirect effects						
Technique rebuttal (vs. no technique rebuttal)	1.04 [-2.27, 5.25]	1.88	---	-1.10 [-4.71, 1.43]	1.49	---
Experiment 2	Model 3a (n = 158)			Model 4a (n = 117)		
	Dependent variable: Attitude **R^2 = .234; F(9, 148) = 5.03, p < .001**			Dependent variable: Attitude **R^2 = .258; F(9, 107) = 4.14, p < .001**		
Direct effects						
Constant	1.45 [-15.55, 18.45]	8.60	.867	**-48.23 [-69.04, -27.42]**	**10.50**	**< .001**
Technique rebuttal (vs. no technique rebuttal)	5.26 [-0.98, 11.50]	3.16	.098	6.86 [-0.70, 14.42]	3.82	.075
Perceived argument strength (denier)	**-0.39 [-0.56, -0.21]**	**0.09**	**< .001**	---	---	---
Perceived argument strength (advocate)	---	---	---	**0.49 [0.25, 0.72]**	**0.12**	**< .001**
Indirect effects						
Technique rebuttal (vs. no technique rebuttal)	0.72 [-1.28, 3.90]	1.27	---	-1.10 [-4.56, 1.46]	1.47	---

Supplementary Table 14. Mediations of technique rebuttal on intention (Model 1a) and attitude (Model 2a) by persuasion knowledge in Experiment 3. Significant effects are shown in boldface for the significance level of 0.05. Regression coefficients *B* are unstandardized and adjusted for age, gender, education, relevance of radio, relevance of internet and knowledge about vaccination.

Experiment 3	Model 1a (n = 198)			Model 2a (n = 198)		
	Dependent variable: Persuasion knowledge **R^2 = .287; F(8, 189) = 2.11, p = .036**			Dependent variable: Persuasion knowledge **R^2 = .287; F(8, 189) = 2.11, p = .036**		
	B [95%CI]	*SE*	*p*	*B* [95%CI]	*SE*	*p*
Direct effects						
Constant	**57.59 [40.82, 74.37]**	**8.50**	**< .001**	**57.59 [40.82, 74.37]**	**8.50**	**< .001**
Technique rebuttal (vs. no technique rebuttal)	-4.71 [-11.63, 2.21]	3.51	.181	-4.71 [-11.63, 2.21]	3.51	.181
	Dependent variable: Intention **R^2 = .082; F(8, 189) = 2.11, p = .036**			Dependent variable: Attitude **R^2 = .132; F(9, 188) = 3.17, p < .001**		
Direct effects						
Constant	**-23.32 [-37.33, -9.31]**	**7.10**	**.001**	**-19.13 [-32.36, -5.90]**	**6.71**	**.005**
Technique rebuttal (vs. no technique rebuttal)	3.06 [-2.15, 8.27]	2.64	.248	3.26 [-1.69, 8.14]	2.49	.197
Persuasion knowledge	0.06 [-0.05, 0.17]	0.05	.260	0.00 [-0.10, 0.11]	0.05	.952
Indirect effect						
Technique rebuttal (vs. no technique rebuttal)	-0.29 [-2.09, .151]	.474	---	-0.01 [-0.90, 0.59]	0.33	---

Supplementary Table 15. Repeated measures binary logistic model for willingness to donate. The model is analysed using Generalized Estimating Equations (GEE). An unstructured covariance matrix was used for the model. Regression coefficients *B* are unstandardized. *OR* values are odds ratios.

Experiment 5	Model 3 (n = 148) Dependent variable: Willingness to donate			
	B [95%CI]	*SE*	*p*	*OR* [95%CI]
Intercept	0.57 [-0.13, 1.27]	0.35	.108	1.77 [0.88, 3.55]
Time	0.04 [-0.24, 0.32]	0.14	.773	1.04 [0.79, 1.38]
Topic rebuttal	0.19 [-0.64, 1.03]	0.43	.650	1.21 [0.53, 2.80]
Technique rebuttal	0.17 [-0.66, 1.01]	0.43	.682	1.19 [0.52, 2.74]
Topic rebuttal*Time	-0.10 [-0.42, 0.23]	0.17	.548	0.91 [0.65, 1.25]
Technique rebuttal*Time	-0.20 [-0.48, 0.24]	0.17	.236	0.82 [0.59, 1.14]

Supplementary Table 16. Mediations of technique rebuttal on attitude by perceived argument strength (of the denier Model 1a; of the advocate Model 2a) in Experiment 5.
Significant effects are shown in boldface for the significance level of 0.05. Regression coefficients *B* are unstandardized and adjusted for age, gender, education, relevance of radio, relevance of internet and knowledge about climate change.

Experiment 5	Model 1a (n = 148)			Model 2a (n = 104)		
	Dependent variable: Perceived argument strength (denier) R^2 = .064; $F(8, 139)$ = 1.18, p = .314			Dependent variable: Perceived argument strength (advocate) **R^2 = .211; $F(8, 95)$ = 3.17, p = .003**		
	B [95%CI]	*SE*	*p*	*B* [95%CI]	*SE*	*p*
Direct effects						
Constant	**44.21 [28.32, 60.09]**	**8.03**	**< .001**	**44.01 [23.02, 64.99]**	**10.57**	**< .001**
Technique rebuttal (vs. no technique rebuttal)	-3.78 [-9.14, 1.58]	2.71	.166	6.31 [-.392, 13.02]	3.38	.065
	Dependent variable: Attitude R^2 = .076; $F(9, 138)$ = 1.26, p = .266			Dependent variable: Attitude **R^2 = .163; $F(9, 94)$ = 2.03, p = .044**		
Direct effects						
Constant	5.14 [-6.76, 17.03]	6.02	.394	1.53 [-13.82, 16.88]	7.73	.844
Technique rebuttal (vs. no technique rebuttal)	**4.02 [0.36, 7.69]**	**1.85**	**.032**	.119 [-.018, .256]	.069	.088
Perceived argument strength (denier)	**-0.11 [-0.23, -0.00]**	**1.85**	**.032**	---	---	---
Perceived argument strength (advocate)	---	---	---	**0.12 [-0.02, 0.26]**	**0.07**	**0.09**
Indirect effects						
Technique rebuttal (vs. no technique rebuttal)	0.43 [-0.14, 1.64]	0.45	---	0.75 [-0.10, 2.80]	0.72	---

Supplementary Table 17. The effectiveness of the Combination as a function of the individuals' confidence in vaccination (Model 1 and Model 2) and the individuals' calculation values (Model 3 and Model 4). Significant effects are shown in boldface for the significance level of 0.05. Regression coefficients *B* are unstandardized.

Experiment 6	Model 1 (n = 714)			Model 2 (n = 714)		
	Dependent variable: Intention **R^2 = .043; $F(3, 710) = 10.75$, $p < .001$**			Dependent variable: Attitude **R^2 = .087; $F(3, 710) = 22.71$, $p < .001$**		
	B [95%CI]	*SE*	*p*	*B* [95%CI]	*SE*	*p*
Constant	**-9.18 [-16.22, -2.13]**	**3.59**	**.011**	**-11.63 [-18.73, -4.53]**	**3.62**	**.001**
Combination (vs.single strategies)	0.44 [-4.00, 4.88]	2.26	.844	-0.84 [-5.31, 3.64]	2.28	.714
Confidence	**0.09 [0.00, 0.18]**	**0.05**	**.046**	**0.16 [0.03, 0.21]**	**0.05**	**.016**
Confidence*Combination	-0.01 [-0.06, 0.05]	0.03	.826	0.00 [-0.05, 0.06]	0.03	.956
	Model 3 (n = 714)			Model 4 (n = 714)		
	Dependent variable: Intention R^2 = .001; $F(3, 710) = 0.12$, $p = .948$			Dependent variable: Attitude R^2 = .005; $F(3, 710) = 1.14$, $p = .333$		
Constant	-3.42 [-10.54, 3.70]	3.63	.346	-4.14 [-11.47, 3.19]	3.73	.268
Combination (vs.single strategies)	0.86 [-3.74, 5.45]	2.34	.714	0.97 [-3.76, 5.71]	2.41	.686
Calculation	0.01 [-0.08, 0.11]	0.05	.769	0.02 [-0.08, 0.11]	0.05	.740
Calculation*Combination	-0.01 [-0.07, 0.05]	0.03	.658	-0.03 [-0.09, 0.04]	0.03	.414