How to debunk misinformation? An experimental online study investigating text structures and headline formats

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Data availability statement

All data and materials are available from PsycArchives: https://doi.org/10.23668/psycharchives.5373

Declaration of conflicts of interest

The authors declare no competing interests.

Author contributions

LK, JK and HG designed the study and obtained the funding. LK collected the data. JK analyzed the data under supervision of HG. JK drafted the manuscript with critical revisions from LK and HG.

Abstract

Misinformation is a crucial problem, particularly online, and the success of debunking messages has so far been limited. In this study we experimentally test how debunking text structure (truth sandwich vs. bottom-heavy) and headline format (statement vs. questions) affect the belief in misinformation across topics of the safety of COVID vaccines and GMO foods. A representative German sample of 4906 participants were randomly assigned to reading one of eight debunking messages in the experimentally varied formats and subsequently rated the acceptance of this message and the agreement to misinformation statements about the mentioned topics and an unrefuted control myth. While the debunking messages specifically decreased the belief in the targeted myth, these beliefs and the acceptance of the debunking message were unaffected by the text structures and headline formats. Yet, they were less successful when addressing individuals with strong pre-existing, incongruent attitudes and distrust in science.

Keywords: Debunking, nutrition, health, vaccination, genetically modified organisms, GMO, misinformation, truth sandwich, media, psychology, refutation

Introduction

Overcoming current global challenges including the COVID-19 pandemic and climate change is hindered by the rapid spread of misinformation via social media and other sources (e.g., Imhoff & Lamberty, 2020; Nakov et al., 2021). To counteract this development, high quality science communication addressing these myths in public media is imperative. One way of doing so is to correct misinformation by debunking messages, yet the success of such attempts are mixed and highly dependent on the quality and content of such messages (van der Linden, 2022).

To weaken instead of accidentally strengthening existing agreement to misinformation, debunking refutation messages thus need to be carefully designed and advice to do so is manyfold (Paynter et al., 2019; Pluviano et al., 2019; see also Lewandowski et al., 2012 for a discussion). For instance, refutation messages should include an explanation on why the myth is incorrect (Ecker et al., 2020), provide an alternative causal explanation for a false belief, and make the corrective statement more salient (Paynter et al., 2019). However, there is still a lack of research comparing different debunking strategies on their effect on misperceptions in detail (van der Linden, 2022). Therefore, the present study focuses on the impacts of different text structures and headline formats of such refutation texts on the belief of misinformation.

The impact of text structure

Several guidelines on refuting misinformation (e.g., Lewandowsky et al., 2020; Lewandowsky et al., 2021) recommend the “truth sandwich” text structure, which consists of two blocks with correct information bordering a middle block containing and explicitly debunking the misinformation. This recommendation is based on the theoretical assumption that presenting the misinformation at the beginning or end of a debunking message may

backfire and strengthen the belief in the misinformation due to primacy and recency effects and thus should be avoided (Swire-Thompson et al., 2020; see Kenix & Manickam, 2020, for a summary).

However, it is debated whether a familiarity-based backfire effect of debunking information generally exists (Ecker et al., 2022), and research contrasting the effectiveness of the truth sandwich format is scarce (Swire-Thompson et al., 2020). In practice, the truth sandwich format is not yet widely adopted and "bottom-heavy" texts that present the myth at the beginning followed by one or more blocks of debunking information are more common in public media (Kenix & Manickam, 2020). König (2022) showed that debunking messages in a truth sandwich structure were successful, but did not contrast this structure with other potential set-ups of the format. In a direct comparison, Anderson et al. (2019) did not find differences in effectiveness between "truth sandwich" and "bottom-heavy" structure, but the sample size and lack of representativeness of the sample limits both its generalizability and the ability to infer no effect based on the achieved power. Therefore, the current study aims to test experimentally with a sufficiently-powered and representative sample whether the truth sandwich is a more effective debunking message structure compared to a bottom-heavy one.

The impact of the headline

In addition, the headlines of the debunking messages may also play an important role in refuting misinformation. Information presented in headlines may result in a bias in the readers' memories of and reasoning about information presented in the text of news articles (Ecker et al., 2014; Pennycook & Rand, 2021). Furthermore, perceived credibility and the extent to which the text is considered informative may be influenced by the format of the headline: questions could be considered as less credible and informative than statements (Janét et al., 2022; Scacco & Muddiman, 2016). Finally, the headline may impact acceptance

and sharing of articles and information (Pennycook & Rand, 2021). Thus, their influence on the effectiveness of debunking texts should be further scrutinized.

Individual characteristics influencing the effectiveness of debunking interventions

Furthermore, writers of debunking messages need to be aware of the readership of the message: For instance, people that distrust science (e.g., Agley & Xiao, 2021) or already hold beliefs and attitudes consistent with a misinformation should be particularly susceptible to this misinformation, because these subpopulations are more likely exposed to the misinformation in homophilic social networks (e.g., Del Viccario et al., 2016; Zollo et al. 2017) and more readily accepting it for confirming their prior intuitions (e.g., Giese, Neth, & Gaissmaier, 2021; Schmid & Betsch, 2019) . Accordingly, a successful debunking message should be particularly geared towards convincing these susceptible subgroups and not just the general public, even if this could be particularly difficult as the qualities that increase the impact of the misinformation may also decrease the effects of a potential debunking message (e.g., Walter & Tukachinsky, 2020; Zollo et al. 2017).

Study aims

In this study, we aim to systematically investigate the success of headline format (question vs. statement) and text structure (truth sandwich vs. bottom-heavy) of debunking messages. Because patterns may vary by outcomes (e.g., Pennycook & Rand, 2021), we evaluate the success of the debunking messages on the agreement to misinformation as well as acceptance of the debunking texts and their perceived social impact. Furthermore, we are interested in whether the success of the messages in debunking the myth are mediated by the acceptance of the presented message. Finally, we tested whether trust in science and general attitudes towards the topics moderated the experimental effects. Research questions and hypotheses are detailed in the preregistration (König et al., 2022).

Methods

The study was preregistered and peer-reviewed prior to data collection (König et al., 2022) via the Leibniz Institute for Psychology (ZPID) Lab Track Preregistration in Psychology programme[1]. Materials and data are available from PsycArchives, see König et al. (2022).

Sample

Participants were recruited via the ZPID PsychLab platform. Eligible participants had to be at least 18 years old and be able to read and write German. To reliably detect small effects (Cohen's d = 0.2) in paired comparisons with independent samples t-tests ($\alpha = 0.008$ due to six planned comparisons; $1-\beta = 0.8$), a total sample of $N = 4904$ (determined with G*Power 3.1; Faul et al., 2007) or $n = 613$ participants per group were required.

In total, $N = 10116$ potential participants started the survey. Throughout the survey, $n = 689$ participants withdrew. Quotas (see König et al., 2022) were used to obtain a representative sample for the German population in gender, age (Bund-Länder Demografie Portal, n.d.), level of education (OECD, 2021) and household income (Bundeszentrale für Politische Bildung, 2020). Once the quotas were filled, additional participants fulfilling these criteria were rejected ($n = 4267$). Participants were also ineligible if they indicated to be younger than 18 years of age ($n = 28$), and were excluded if they failed two attention checks ($n = 223$). Finally, three participants took part in the study twice; only their first attempt was taken into account. This yielded a final sample of $N = 4906$.

[1] https://prereg-psych.org/index.php/rrp/lab-track

Study design

The current study uses a 2 *Text Structure* (truth sandwich vs. bottom-heavy format) x 2 *Headline Format* (question vs. statement) x 2 *Debunk Topic* (COVID-19 vaccines vs. GMO food) between participant experimental design. Accordingly, participants were assigned randomly to one out of eight groups. The primary outcome, agreement to misinformation, contrasted 3 *Myth Topics* (Vitamin C vs. COVID-19 vaccines vs. GMO food) within participants, while the secondary outcomes, evaluation of the presented information and perceived social impact of the debunk message, varied by the *Debunk Topic* presented to the participants.

Procedure

This study received ethical approval by the Ethics Committee of the University of Bayreuth. Participants were recruited via an agency that distributed the link to the survey. First, participants provided informed consent by ticking a box. They then indicated basic demographic information, followed by trust in science and attitude towards genetically modified crops and vaccinations. Afterwards, participants were randomly assigned to one of the eight experimental groups. They read the debunking text that they were randomly assigned to and then evaluated the information of this message and its perceived social impact. Agreement to misinformation statements was assessed before participants were debriefed and redirected to the recruitment platform for payment. Throughout the survey, we implemented forced responses to ensure that participants give a response for all items and no missing values occur.

Measures

The questionnaires (original German version and translated English version) are available from PsycArchives (see König et al., 2022). The reliabilities of the scales are presented in Table 1.

Primary outcome: agreement to misinformation

Participants indicated the degree of agreement to six statements on a 7-point Likert scale from 1 ("*I do not at all agree*") to 7 ("*I fully agree*"). For each topic we provided one positive item (misinformation statement) and one negative item (correct statement). The negative items were recoded for the analyses.

Secondary outcomes

Evaluation of the text was assessed with three items assessing how comprehensive, trustworthy and convincing the information is on a 7-point scale from 1 ("*very incomprehensible/untrustworthy/unpersuasive*") to 7 ("*very comprehensible/very trustworthy/very persuasive*") (Giese et al., 2021).

Perceived social impact was assessed with two items on a 7-point Likert scale adapted from previous research (Giese et al., 2021). The two items assessed whether participants would share the information in the text when talking to other people and whether they would share them on social media on a scale from 1 ("*no, definitely not*") to 7 ("*yes, definitely*").

Moderators

Trust in science was measured with three items assessing general trust in research, trust in researchers at universities and trust in researchers in the health sector on a 5-point Likert scale from 1 with "*I do not trust at all*" to 5 with "*I trust completely*" (Wissenschaft im Dialog/ Kantar, 2021).

Attitude towards GMOs and vaccinations were each assessed with three items on a semantic differential scale from 1 to 7 with the poles "*harmful-beneficial*", "*unpleasant-pleasant*" and "*bad-good*" based on the attitude construct in the Theory of Planned Behaviour (Conner & Sparks, 2005) and on items used in previous research regarding attitudes towards vaccination (e.g., Giese et al., 2020).

Data analysis

We used R-4.1.3 with packages "afex" (Singmann et al., 2022) for conducting ANOVAs and exploratory GLMs, "emmeans" (Lenth, 2022) to compute paired comparisons, "lavaan" (Rosseel, 2012) to compute path models, and "stats" for linear regression analyses. The researcher conducting the preregistered analyses was blinded to the independent variables to reduce bias. The analysis plan is outlined in detail in (König et al., 2022).

Age was assessed with an open text box and slider (from 0 to 100 years); this led to n = 195 participants (4%) to indicate that they were 100 years old, which is highly unlikely given the distribution of age in the German population (Bund-Länder Demografie Portal, n.d.). We thus present analyses for the full sample (N = 4906) in text as preregistered; in addition, we report results for participants who indicated to be between 18 and 99 years of age (N = 4711) in supplementary data analysis files provided on PsychArchives (https://psycharchives.org/en/item/1fb03503-9c0d-4ac2-ae1e-d9161697836a).

For the sample description, we computed means and standard deviations for all continuous variables as preregistered; we report the proportion of women, men and diverse genders and the median and interquartile range for household income. In addition, we report correlations between the variables; this analysis was not preregistered and is thus exploratory.

To test whether text structure and headline format impacted agreement to misinformation, a mixed 2x2x2x3 ANOVA was conducted. Accordingly, the ANOVA

contained the three between-subjects factors *debunk topic*, *text structure*, and *headline format*, and the within-subject factor *myth topic*. Six planned comparisons were conducted to test the specific hypotheses regarding the effects of text structure and headline format (presented in the supplemental material).

To test whether text structure and headline format impact evaluation of the text and its perceived social impact, 2x2x2 between-subjects ANOVAs were conducted with the same independent between-subjects variables. For the two outcome variables, evaluation of the text and perceived social impact, separate ANOVAs were conducted for the individual items as well as for the mean of all items for the respective construct.

A path analysis was conducted to test whether the evaluation of the article mediated the relationship between text structure and headline format, respectively, and agreement to the targeted misinformation with 10000 bias-corrected bootstrap confidence intervals. In this process, the predictor variables were effect-coded and both the mediator and the outcome were z-standardized to obtain effect size measures.

Linear regressions with the same standardization of variables were implemented to scrutinize how trust in science and attitudes affect the effectiveness of the experimental manipulations *text structure* and *headline format* in reducing the agreement to misinformation, debunking text evaluation and social impact. In addition to the preregistered analyses, we explored the differential effectiveness of the debunking messages by adding standardized a) trust in science or b) both attitudes and all their interactions with the experimental factors to the mixed ANOVA, yielding a GLM.

Results

Sample description

Participants were on average 47.6 (*SD* = 18.3) years old[2]. 2462 participants (50.2 %) indicated to be men, 2435 indicated to be a woman (49.6 %), and 9 indicated their gender to be diverse (0.2 %). The mean years of education were 14.4 (*SD* = 2.8) years and the median household income was from 2600€ to less than 3600 € with an interquartile range of three income categories. Descriptive statistics for the full sample are listed in Table 1. The associations of demographic information and study variables were generally small. Most notably, trust in science was higher for the more educated participants.

Is the agreement to the myths affected by the debunking texts?

Overall, there were general differences in the agreement to the three myth topics (*myth topic:* $F(1.95, 9556.51) = 1139.87$, $\eta_p^2 = .189$, $p = < .001$) and in reaction to the debunk topic (*debunk topic:* $F(1, 4989) = 10.71$, $\eta_p^2 = .002$, $p = .001$). As expected, the debunking messages were successful in specifically addressing the targeted myths (*debunk topic* × *myth topic:* $F(1.95, 9556.51) = 219.70$, $\eta_p^2 = .043$, $p = < .001$): While agreement with the control statements about Vitamin C was not differentially affected by the two debunking messages ($b = 0.01$, $t(4898) = 0.382$, $p = .7026$, $d = 0.01$), agreement to misinformation about the COVID-19 vaccine was decreased by the text about the vaccine compared to the text about GMOs ($b = –0.41$, $t(4898) = –8.673$, $p < .001$, $d = –0.25$), and vice versa ($b = 0.66$, $t(4898) = 17.904$, $p < .001$, $d = 0.51$).

However and unexpectedly, *text structure* did not have any effects on agreement to misinformation (all effects involving text structure: $F \leq 1.96$, $\eta_p^2 < .001$, $p \geq .142$). Similarly,

[2] age without participants who indicated to be 100 years old: $M = 45.5$, $SD = 15.2$

the *headline format* statement only slightly increased effectiveness of the fitting debunking message with an irrelevant effect size (*headline format* × *debunk topic* × *myth topic:* $F(1.95, 9556.51) = 3.19$, $\eta_p^2 < .001$, $p = .043$, see Figure 1). Accordingly, planned contrasts yielded no meaningful differences beyond these effects (see supplementary material).

To what an extent are the two debunking texts differentially perceived based on text structure and headline format?

Regarding the general evaluation of the debunking texts, the texts addressing the COVID-19 vaccine ($M = 5.28$, $SD = 1.36$) was generally more accepted than the text addressing GMOs ($M = 5.04$, $SD = 1.26$; *debunk topic:* $F(1, 4989) = 43.99$, $\eta_p^2 = .009$, $p < .001$) with no other statistically significant effects (all $F(1, 4989) \leq 2.36$, all $\eta_p^2 > .001$, $p \geq .124$). This effect of the *debunk topic* was also present for the specific items trustworthiness ($F(1, 4989) = 73.27$, $\eta_p^2 = .015$, $p < .001$), persuasiveness ($F(1, 4989) = 53.50$, $\eta_p^2 = .011$, $p < .001$), but not for comprehensiveness ($F(1, 4989) = 0.59$,, $\eta_p^2 < .001$, $p = .443$) of the texts. No other effects emerged on the item level (all $F(1, 4989) \leq 3.51$, all $\eta_p^2 < .001$, $p \geq .061$).

Similarly, the willingness to share the text about the COVID-19 vaccine ($M = 3.77$, $SD = 1.65$) was higher than that of the text about GMOs ($M = 3.34$, $SD = 1.54$) for the aggregate measure ($F(1, 4989) = 88.50$, $\eta_p^2 = .018$, $p < .001$), as well as for the specific items (personal communication: $F(1, 4989) = 90.77$, $\eta_p^2 = .018$, $p < .001$, social media: $F(1, 4989) = 47.62$, $\eta_p^2 = .010$, $p < .001$). For the willingness to share the debunk in personal communication, there was some indication that the question headline format was more successful in a truth sandwich text structure ($F(1, 4989) = 4.13$, $\eta_p^2 < .001$, $p = .042$). However, the effect was negligible small, and no other effects were found in any of the willingness to share outcomes (all $F(1, 4989) \leq 2.74$, all $\eta_p^2 < .001$, $p \geq .098$).

Table 1. Descriptive statistics of study variables for the full sample ($N = 4906$).

Variable	M	SD	4	5	6	7	8	9	10	11	12	13
1. Age	47.64	18.28	-.04**	-.03*	.10**	-.07**	.04*	-.08**	.01	.00	.14**	-.14**
2. Proportion of female participants	0.50		.07**	.05**	.02	.01	-.04	-.03	-.06**	-.04**	-.08**	-.06**
3. Years of education	14.43	2.77	.02	-.17**	-.09**	.11**	.14**	.04	.09**	.27**	.13**	.06**
4. Agreement with misinformation (Vitamin C)	4.51	1.2	.31**	.12**	-.01	.07**	-.08**	.06**	-.05*	.00	-.07**	-.01
5. Agreement with misinformation (COVID)	3.3	1.66		.58**	.32**	-.28**	-.62**	-.14**	-.43**	-.47**	-.52**	-.20**
6. Agreement with misinformation (GMO)	3.76	1.32			.53**	-.59**	-.28**	-.39**	-.22**	-.31**	-.27**	-.55**
7. Evaluation of the text (GMO)	5.04	1.26				.81	-[a]	.54**	-[a]	.40**	.33**	.44**
8. Evaluation of the text (COVID)	5.28	1.36					.84	-[a]	.56**	.52**	.54**	.23**
9. Perceived social impact (GMO)	3.34	1.54						.51**	-[a]	.26**	.19**	.38**
10. Perceived social impact (COVID)	3.77	1.65							.52**	.39**	.39**	.21**
11. Trust in science	3.78	0.80								.90	.48**	.17**
12. Attitude towards vaccination	5.43	1.31									.85	.22**
13. Attitude towards GMOs	3.5	1.67										.95

Note. [a] Evaluations and perceived social impact were assessed between conditions, thus no correlation can be reported.

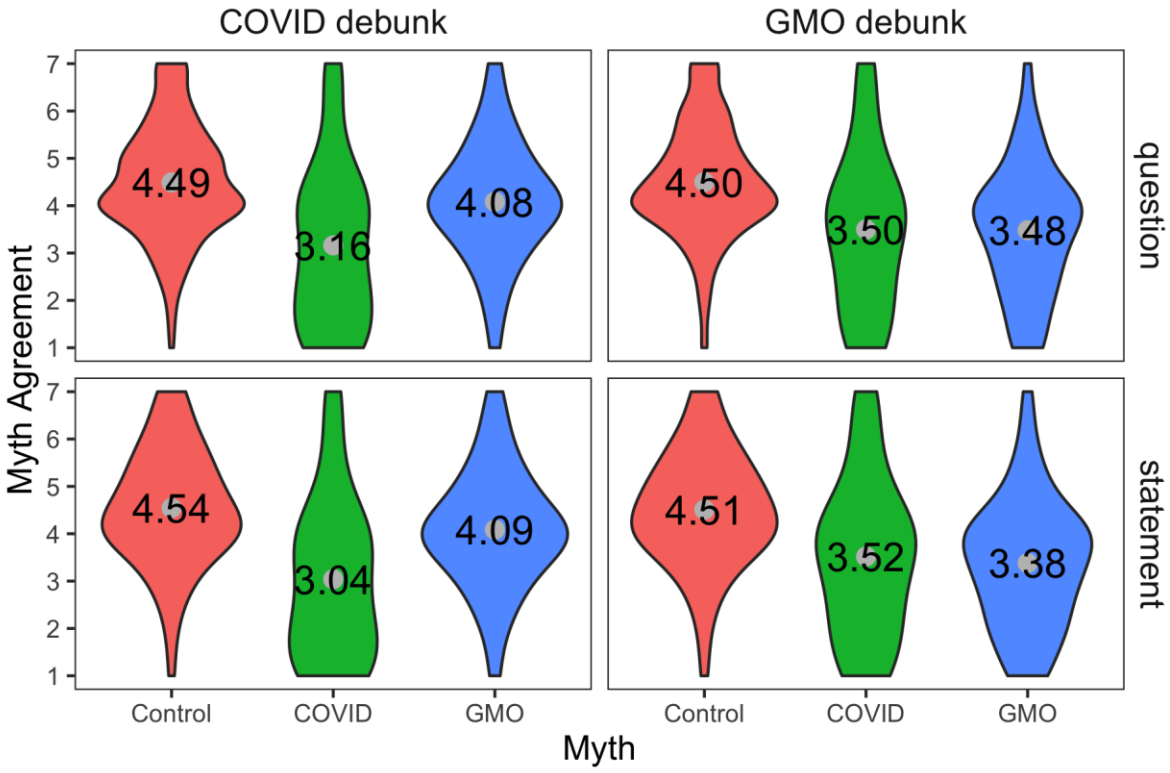

Figure 1. Agreement to myths depending on the presented debunking text and headline format. Grey dots indicate means; outlines depict the distribution of the data.

How are the outcomes related to each other and do the texts differentially mitigate confirmation bias effects?

Overall, topic-specific message acceptance, willingness to share, disagreement with myth, attitude, and trust in science were all positively associated with each other with medium to large effect sizes (see Table 1). Further in line with the confirmation bias literature, additional exploratory analyses on the agreement to myths by text format revealed that both debunking texts were slightly less effective in people with low trust in science (*debunk topic* × *myth topic* × *trust:* $F(1.99, 9710.46) = 18.96$, $\eta_p^2 = .004$, $p < .001$) and incongruent vaccination attitudes (*debunk topic* × *myth topic* × *COVID attitude:* $F(1.96, 9483.53) = 8.93$, $\eta_p^2 = .002$, $p < .001$. Regarding GMO attitudes, the debunking message

was slightly more effective in individuals with lower GMO attitudes (*debunk topic* × *myth topic* × *GMO attitude:* $F(1.96, 9483.53) = 6.09$, $\eta_p^2 = .001$, $p = .003$).

Given that the text structures and headlines had no relevant effects on outcomes, it is unsurprising that message acceptance did also not mediate any of these effects on agreement to the myth (all $|\beta_y| \leq 0.01$, all $p \geq .137$; for full mediation models including negligible direct headline effects, see the supplementary files provided on PsycArchives, see König et al., 2022). Likewise, they did only mitigate effects of trust in science and attitudes on very select outcomes and in a negligible small size (all $|\beta| = 0.05$, all $p = .0082$, see supplementary files provided on PsycArchives, see König et al., 2022, also for negligible small headline effects when controlling for covariates).

Discussion

This study experimentally tested the effectiveness of different text structures and headline formats of debunking texts in a representative sample. There were no meaningful differences in text structure or headline format conditions regarding agreement to misinformation statements, evaluation of the text, or perceived social impact. Since there is no experimental effect of text structure and headline format, a mediation by the evaluation of the text could also not be found in exploratory analyses. Still, participants agreed less with the misinformation for which they were presented with a text compared to the other two topics, indicating that all interventions were successful. The results thus support the notion that presenting correcting information in an intelligible way might be most important when debunking misinformation, while structural aspects of the presentation are of relatively little importance (Swire-Thompson et al., 2021).

Still, while both implemented structures were equally effective, both text structures ended with the debunking information and other structures ending with the myth may still suffer from backfire effects: Previous study that compared the effectiveness of truth sandwich and bottom-heavy texts to “top-loaded” texts, which ended by presenting the myth, showed that. structures were indeed less successful in refuting misinformation than truth sandwiches or bottom-heavy texts (Anderson et al., 2019; see also Dai et al., 2021 for similar results). Accordingly, recency effects might have contributed to the factual information being remembered more easily in both text structures applied in the current study (Baddeley & Hitch, 1993). Therefore, we concur that debunking texts should not end with misinformation to avoid strengthening, instead of reducing, belief in myths.

In comparison to the structure of the text, its perceived acceptance and social impact of the study were much more relevant for the success of the debunking message. This indicates that the content of the message needs to be carefully crafted and the quality of the information has more impact than formal structure (van der Linden, 2022).

Furthermore, participants’ personal characteristics were related to agreement to misinformation and the debunking message: participants with lower trust in science or more negative attitudes towards the targeted topic showed stronger agreement to the misinformation and lower acceptance of the debunking message. These findings are in line with previous studies indicating that, for instance, perceptions of messages about such sensitive topics like vaccination are very strongly linked to pre-existing attitudes and reluctant to change by information that is contradicting these attitudes (Giese et al., 2021; Giese et al., 2020). Furthermore, trust in science was an important predictor for accepting and adopting protective measures and health messages during the COVID-19 pandemic (Dohle et al., 2020).

Similarly, and in line with previous research (Walter & Tukachinsky, 2020), the debunking message was less successful in reducing beliefs in misinformation if participants' trust in science was low or attitudes towards vaccinations were negative. Nevertheless, it is important to note that the debunking information did not backfire and cause reactance even in these groups holding beliefs consistent with the misinformation, but just reduced agreement to the misinformation to a lesser degree (Swire-Thompson et al., 2020). Conversely, the effect that the GMO debunking message was more successful in people with low GMO attitudes—while dependent on controlling for vaccination attitudes—may be regarded as an indication that losses in debunk effectiveness may be situational (Schmid & Betsch, 2019), or alternatively that debunking messages can only affect people that initially believed the misinformation to some extent.

Other effects were comparable between topics of the debunking message. However, agreement to misinformation about GMOs was stronger than agreement to misinformation about the COVID-19 vaccination. Genetically modified crops are discussed as an important factor for reducing greenhouse gas emissions and combating world hunger by increasing yield per acre. A debate is ongoing whether organic farming should employ GMOs (e.g., in breeding) to achieve the United Nations' Sustainable development goals rather than prohibiting them as it is currently practiced (Purnhagen et al., 2021). This study supports previous research indicating that public perception of GMOs is distorted and GMOs are seen as unnatural even though research underlines that GMOs bear no additional risks to human health (Siegrist et al., 2016) and highlights the need for more targeted communication regarding GMO foods being safe to eat.

The results of this study are based on a large, nationally representative sample for Germany. The study procedure and data analysis plan were preregistered prior to data collection, and the data analyst was blinded to the conditions. Nonetheless, some limitations

need to be acknowledged. Most importantly, the study was cross-sectional and thus cannot provide insights into changes over time. A meta-analysis suggests that even after being exposed to the correction of misinformation, the misinformation has continued impact (Lewandowsky et al., 2012). Furthermore, influence on actual behavior was not assessed; previous research suggests that people tend to make judgements based on false beliefs even after they have been exposed to debunking messages (Walter & Tukachinsky, 2020).

To conclude, both truth sandwich and bottom-heavy texts are suited to debunk misinformation, as are texts with both statement and question headlines. This experimental study indicates that the risk of strengthening, rather than weakening, belief in misinformation due to repeating myths in refutation attempts is low, at least as long as an explanation for why the claim is false is included (Swire-Thompson et al., 2020). Instead of focusing on the text structure of headline format, writers may need to pay attention to the text being comprehensive, trustworthy, and persuasive to the reader for maximum effectiveness.

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Supplement 1: Contrasts for Research Question 1

Supplement 1.1

Planned paired comparisons for Agreement with Misinformation about GMO Foods with the Conditions of a Refutation Message about GMO Foods

Contrast	Estimate	SE	df	t-ratio	p-value
Truth sandwich & Question vs. Truth sandwich & Statement	0.12235	0.0732	4898	1.671	0.0948
Bottom-heavy text & Question vs. Bottom-heavy text & Statement	0.08029	0.0732	4898	1.098	0.2725
Truth sandwich & Question vs. Bottom-heavy text & Question	0.08157	0.0732	4898	1.114	0.2653
Truth sandwich & Statement vs. Bottom-heavy text & Statement	0.03951	0.0732	4898	0.540	0.5892
Truth sandwich & Question vs. Bottom-heavy & Statement	0.16186	0.0732	4898	2.213	0.0270
Truth sandwich & Statement vs. Bottom-heavy & Question	-0.04078	0.0732	4898	-0.557	0.5775

Note. This table shows the six contrasts for the agreement with misinformation about GMO foods between the conditions of the independent variables headline format and text structure in the preregistered combinations with the conditions that read a refutation message about GMO foods. Data is shown with the estimated difference between the groups, standard error, degrees of freedom, t-ration and p-value. $N = 2454$ participants in the condition with a refutation message about GMO foods.

*$p < .008$, **$p < .001$, ***$p < .0001$

Analyses as preregistered:
König, L. M., Kotz, J., & Giese, H. (2022). *How to debunk health-related misinformation? An experimental online study of text structures and headline formats*. PsychArchives.
https://doi.org/10.23668/psycharchives.5373

Supplement 1.2

Planned paired comparisons for Agreement with Misinformation about COVID-19 Vaccines with the Conditions of a Refutation Message about COVID-19 Vaccines

Contrast	Estimate	SE	df	t-ratio	p-value
Truth sandwich & Question vs. Truth sandwich & Statement	0.02529	0.0940	4898	0.269	0.7880
Bottom-heavy text & Question vs. Bottom-heavy text & Statement	0.21941	0.0940	4898	2.334	0.0196
Truth sandwich & Question vs. Bottom-heavy text & Question	-0.05546	0.0940	4898	-0.590	0.5553
Truth sandwich & Statement vs. Bottom-heavy text & Statement	0.13866	0.0940	4898	1.475	0.1403
Truth sandwich & Question vs. Bottom-heavy & Statement	0.16395	0.0940	4898	1.744	0.0813
Truth sandwich & Statement vs. Bottom-heavy text & Question	-0.08075	0.0940	4898	-0.859	0.3904

Note. This table shows the six contrasts for the agreement with misinformation about COVID-19 vaccines between the conditions of the independent variables headline format and text structure in the preregistered combinations with the conditions that read a refutation message about COVID-19 vaccines. Data is shown with the estimated difference between the groups, standard error, degrees of freedom, t-ration and p-value. $N = 2452$ participants in the condition with a refutation message about COVID-19 vaccines.

*$p < .008$, **$p < .001$, ***$p < .0001$

Supplement 1.3

Planned paired comparisons for Agreement with Misinformation about Vitamin C with the Conditions of a Refutation Message about COVID-19 Vaccines

Contrast	Estimate	SE	df	t-ratio	p-value
Truth sandwich & Question vs. Truth sandwich & Statement	-0.04894	0.0686	4898	-0.713	0.4757
Bottom-heavy text & Question vs. Bottom-heavy text & Statement	-0.05546	0.0686	4898	-0.808	0.4189
Truth sandwich & Question vs. Bottom-heavy text & Question	0.02039	0.0686	4898	0.297	0.7663
Truth sandwich & Statement vs. Bottom-heavy text & Statement	0.01387	0.0686	4898	0.202	0.8399
Truth sandwich & Question vs. Bottom-heavy & Statement	-0.03507	0.0686	4898	-0.511	0.6093
Truth sandwich & Statement vs. Bottom-heavy & Question	0.06933	0.0686	4898	1.010	0.3124

Note. This table shows the six contrasts for the agreement with misinformation about Vitamin C between the conditions of the independent variables headline format and text structure in the preregistered combinations with the conditions that read a refutation message about COVID-19 vaccines. Data is shown with the estimated difference between the groups, standard error, degrees of freedom, t-ration and p-value. $N = 2452$ participants in the condition with a refutation message about COVID-19 vaccines.

*$p < .008$, **$p < .001$, ***$p < .0001$

Supplement 1.4

Planned paired comparisons for Agreement with Misinformation about Vitamin C with the Conditions of a Refutation Message about GMO Foods

Contrast	Estimate	SE	df	t-ratio	p-value
Truth sandwich & Question vs. Truth sandwich & Statement	0.00653	0.0686	4898	0.095	0.9242
Bottom-heavy text & Question vs. Bottom-heavy text & Statement	-0.02428	0.0686	4898	-0.354	0.7232
Truth sandwich & Question vs. Bottom-heavy text & Question	-0.06688	0.0686	4898	-0.975	0.3297
Truth sandwich & Statement vs. Bottom-heavy text & Statement	-0.09769	0.0686	4898	-1.425	0.1543
Truth sandwich & Question vs. Bottom-heavy & Statement	-0.09117	0.0686	4898	-1.330	0.1837
Truth sandwich & Statement vs. Bottom-heavy & Question	-0.07341	0.0686	4898	-1.070	0.2848

Note. This table shows the six contrasts for the agreement with misinformation about Vitamin C between the conditions of the independent variables headline format and text structure in the preregistered combinations with the conditions that read a refutation message about GMO foods. Data is shown with the estimated difference between the groups, standard error, degrees of freedom, t-ration and p-value. $N = 2454$ participants in the condition with a refutation message about GMO foods.

*$p < .008$, **$p < .001$, ***$p < .0001$

Supplement 1.5

Paired Comparisons for Agreement with Misinformation about COVID-19 Vaccines between the Conditions of Topic always tested in the Order of COVID-19 Vaccine Text vs. GMO Food Text

Contrast	Estimate	SE	df	t-ratio	p-value
Truth sandwich & Question vs. Truth sandwich & Question	-0.42333	0.0940	4898	-4.503	<.0001***
Truth sandwich & Question vs. Truth sandwich & Statement	-0.38744	0.0940	4898	-4.121	<.0001***
Truth sandwich & Question vs. Bottom-heavy text & Question	-0.30506	0.0940	4898	-3.245	0.0012*
Truth sandwich & Question vs. Bottom-heavy text & Statement	-0.38087	0.0939	4898	-4.054	0.0001**
Truth sandwich & Statement vs. Truth sandwich & Question	-0.44861	0.0940	4898	-4.772	<.0001***
Truth sandwich & Statement vs. Truth sandwich & Statement	-0.41272	0.0940	4898	-4.390	<.0001***
Truth sandwich & Statement vs. Bottom-heavy & Question	-0.33034	0.0940	4898	-3.514	0.0004**
Truth sandwich & Statement vs. Bottom-heavy & Statement	-0.40615	0.0939	4898	-4.323	<.0001***
Bottom-heavy & Question vs. Truth sandwich & Question	-0.36786	0.0940	4898	-3.913	.0001**
Bottom-heavy & Question vs. Truth sandwich & Statement	-0.33197	0.0940	4898	-3.531	0.0004**
Bottom-heavy & Question vs. Bottom-heavy & Question	-0.24959	0.0940	4898	-2.655	0.0080
Bottom-heavy & Question vs. Bottom-heavy & Statement	-0.32540	0.0939	4898	-3.464	0.0005**
Bottom-heavy & Statement vs. Truth sandwich & Question	-0.58728	0.0940	4898	-6.246	<.0001***
Bottom-heavy & Statement vs. Truth sandwich & Statement	-0.55139	0.0940	4898	-5.865	<.0001***
Bottom-heavy & Statement vs. Bottom-heavy & Question	-0.46900	0.0940	4898	-4.988	<.0001***
Bottom-heavy & Statement vs. Bottom-heavy & Statement	-0.54481	0.0939	4898	-5.800	<.0001***

Note. This table shows the contrasts for the agreement with misinformation about COVID-19 vaccines between the conditions of the topic COVID-19 vaccines vs. GMO foods in all combinations of the other two independent variables headline format and text structure. Data is shown with estimated group differences, standard deviation, degrees of freedom, t-ratio and p-value. N = 4906 participants

*p < .00325 **p < .001 ***p < .0001

Supplement 1.6

Paired Comparisons for Agreement with Misinformation about GMO Foods between the Conditions of Topic always tested in the Order of COVID-19 Vaccine Text vs. GMO Food Text

Contrast	Estimate	SE	df	t-ratio	p-value
Truth sandwich & Question vs. Truth sandwich & Question	0.57830	0.0732	4898	7.899	<.0001***
Truth sandwich & Question vs. Truth sandwich & Statement	0.70065	0.0732	4898	9.570	<.0001***
Truth sandwich & Question vs. Bottom-heavy text & Question	0.65987	0.0732	4898	9.013	<.0001***
Truth sandwich & Question vs. Bottom-heavy text & Statement	0.74016	0.0732	4898	10.118	<.0001***
Truth sandwich & Statement vs. Truth sandwich & Question	0.60440	0.0732	4898	8.255	<.0001***
Truth sandwich & Statement vs. Truth sandwich & Statement	0.72675	0.0732	4898	9.926	<.0001***
Truth sandwich & Statement vs. Bottom-heavy & Question	0.68597	0.0732	4898	9.369	<.0001***
Truth sandwich & Statement vs. Bottom-heavy & Statement	0.76626	0.0732	4898	10.475	<.0001***
Bottom-heavy & Question vs. Truth sandwich & Question	0.54486	0.0732	4898	7.442	<.0001***
Bottom-heavy & Question vs. Truth sandwich & Statement	0.66721	0.0732	4898	9.113	<.0001***
Bottom-heavy & Question vs. Bottom-heavy & Question	0.62643	0.0732	4898	8.556	<.0001***
Bottom-heavy & Question vs. Bottom-heavy & Statement	0.70672	0.0732	4898	9.661	<.0001***
Bottom-heavy & Statement vs. Truth sandwich & Question	0.52773	0.0732	4898	7.208	<.0001***
Bottom-heavy & Statement vs. Truth sandwich & Statement	0.65008	0.0732	4898	8.879	<.0001***
Bottom-heavy & Statement vs. Bottom-heavy & Question	0.60930	0.0732	4898	8.322	<.0001***
Bottom-heavy & Statement vs. Bottom-heavy & Statement	0.68959	0.0732	4898	9.426	<.0001***

Note. This table shows the contrasts for the agreement with misinformation about GMO foods between the conditions of the topic COVID-19 vaccines vs. GMO foods in all combinations of the other two independent variables headline format and text structure. Data is shown with estimated group differences, standard deviation, degrees of freedom, t-ratio and p-value. $N = 4906$ participants

*$p < .00325$ **$p < .001$ ***$p < .0001$

Supplement 1.7

Paired Comparisons for Agreement with Misinformation about Vitamin C between the Conditions of Topic always tested in the Order of COVID-19 Vaccine Text vs. GMO Food Text

Contrast	Estimate	SE	df	t-ratio	p-value
Truth sandwich & Question vs. Truth sandwich & Question	0.03507	0.0686	4898	0.511	0.6093
Truth sandwich & Question vs. Truth sandwich & Statement	0.04160	0.0686	4898	0.606	0.5444
Truth sandwich & Question vs. Bottom-heavy text & Question	-0.03181	0.0686	4898	-0.464	0.6430
Truth sandwich & Question vs. Bottom-heavy text & Statement	-0.05609	0.0686	4898	-0.818	0.4133
Truth sandwich & Statement vs. Truth sandwich & Question	0.08401	0.0686	4898	1.224	0.2209
Truth sandwich & Statement vs. Truth sandwich & Statement	0.09054	0.0686	4898	1.319	0.1871
Truth sandwich & Statement vs. Bottom-heavy & Question	0.01713	0.0686	4898	0.250	0.8029
Truth sandwich & Statement vs. Bottom-heavy & Statement	-0.00715	0.0686	4898	-0.104	0.9169
Bottom-heavy & Question vs. Truth sandwich & Question	0.01468	0.0686	4898	0.214	0.8306
Bottom-heavy & Question vs. Truth sandwich & Statement	0.02121	0.0686	4898	0.309	0.7573
Bottom-heavy & Question vs. Bottom-heavy & Question	-0.05220	0.0686	4898	-0.761	0.4468
Bottom-heavy & Question vs. Bottom-heavy & Statement	-0.07648	0.0686	4898	-1.116	0.2647
Bottom-heavy & Statement vs. Truth sandwich & Question	0.07015	0.0686	4898	1.022	0.3067
Bottom-heavy & Statement vs. Truth sandwich & Statement	0.07667	0.0686	4898	1.117	0.2639
Bottom-heavy & Statement vs. Bottom-heavy & Question	0.00326	0.0686	4898	0.048	0.9621
Bottom-heavy & Statement vs. Bottom-heavy & Statement	-0.02102	0.0686	4898	-0.307	0.7592

Note. This table shows the contrasts for the agreement with misinformation about Vitamin C between the conditions of the topic COVID-19 vaccines vs. GMO foods in all combinations of the other two independent variables headline format and text structure. Data is shown with estimated group differences, standard error (SE), degrees of freedom (df), *t*-ratio and *p*-value. $N = 4906$ participants

$^{*}p < .00325$ $^{**}p < .001$ $^{***}p < .0001$

Supplement 2: Contrasts for Research Question 2

Supplement 2.1

Paired Comparisons for Mean Evaluation of the Text between the Conditions of Topic always tested in the Order of COVID-19 Vaccine Text vs. GMO Food Text

Contrast	Estimate	SE	df	t-ratio	p-value
Truth sandwich & Question vs. Truth sandwich & Question	0.3404	0.0748	4898	4.553	<.0001***
Truth sandwich & Question vs. Truth sandwich & Statement	0.3797	0.0768	4898	4.941	<.0001***
Truth sandwich & Question vs. Bottom-heavy text & Question	0.3747	0.0748	4898	5.011	<.0001***
Truth sandwich & Question vs. Bottom-heavy text & Statement	0.2938	0.0747	4898	3.934	0.0001**
Truth sandwich & Statement vs. Truth sandwich & Question	0.2360	0.0748	4898	3.157	0.0016*
Truth sandwich & Statement vs. Truth sandwich & Statement	0.2703	0.0748	4898	3.615	0.0003**
Truth sandwich & Statement vs. Bottom-heavy & Question	0.1718	0.0748	4898	2.298	0.0216
Truth sandwich & Statement vs. Bottom-heavy & Statement	0.1894	0.0747	4898	2.536	0.0112
Bottom-heavy & Question vs. Truth sandwich & Question	0.2164	0.0748	4898	2.895	0.0038
Bottom-heavy & Question vs. Truth sandwich & Statement	0.2507	0.0748	4898	3.353	0.0008**
Bottom-heavy & Question vs. Bottom-heavy & Question	0.1523	0.0748	4898	2.037	0.0417
Bottom-heavy & Question vs. Bottom-heavy & Statement	0.1699	0.0747	4898	2.274	0.0230
Bottom-heavy & Statement vs. Truth sandwich & Question	0.2751	0.0748	4898	3.680	0.0002**
Bottom-heavy & Statement vs. Truth sandwich & Statement	0.3094	0.0748	4898	4.139	<.0001***
Bottom-heavy & Statement vs. Bottom-heavy & Question	0.2110	0.0748	4898	2.822	0.0048
Bottom-heavy & Statement vs. Bottom-heavy & Statement	0.2286	0.0747	4898	3.060	0.0022*

Note. This table shows the contrasts for the mean evaluation of the text between the conditions of the topic COVID-19 vaccines vs. GMO foods in all combinations of the other two independent variables headline format and text structure. Data is shown with estimated group differences, standard error (*SE*), degrees of freedom (*df*), *t*-ratio and *p*-value. $N = 4906$ participants

$^{*}p < .00325$ $^{**}p < .001$ $^{***}p < .0001$

Supplement 2.2

Paired Comparisons for Comprehensiveness of the Text between the Conditions of Topic always tested in the Order of COVID-19 Vaccine Text vs. GMO Food Text

Contrast	Estimate	SE	df	t-ratio	p-value
Truth sandwich & Question vs. Truth sandwich & Question	0.19086	0.0896	4898	2.130	0.0332
Truth sandwich & Question vs. Truth sandwich & Statement	0.07830	0.0896	4898	0.874	0.3823
Truth sandwich & Question vs. Bottom-heavy text & Question	0.07993	0.0896	4898	0.892	0.3725
Truth sandwich & Question vs. Bottom-heavy text & Statement	0.07394	0.0895	4898	0.826	0.4090
Truth sandwich & Statement vs. Truth sandwich & Question	0.15824	0.0896	4898	1.766	0.0775
Truth sandwich & Statement vs. Truth sandwich & Statement	0.04568	0.0896	4898	0.510	0.6103
Truth sandwich & Statement vs. Bottom-heavy & Question	0.04731	0.0896	4898	0.528	0.5976
Truth sandwich & Statement vs. Bottom-heavy & Statement	0.04132	0.0895	4898	0.461	0.6445
Bottom-heavy & Question vs. Truth sandwich & Question	0.06688	0.0896	4898	0.746	0.4555
Bottom-heavy & Question vs. Truth sandwich & Statement	-0.04568	0.0896	4898	-0.510	0.6103
Bottom-heavy & Question vs. Bottom-heavy & Question	-0.04405	0.0896	4898	-0.491	0.6231
Bottom-heavy & Question vs. Bottom-heavy & Statement	-0.05004	0.0895	4898	-0.559	0.5763
Bottom-heavy & Statement vs. Truth sandwich & Question	0.06199	0.0896	4898	0.692	0.4891
Bottom-heavy & Statement vs. Truth sandwich & Statement	-0.05057	0.0896	4898	-0.564	0.5726
Bottom-heavy & Statement vs. Bottom-heavy & Question	-0.04894	0.0896	4898	-0.546	0.5850
Bottom-heavy & Statement vs. Bottom-heavy & Statement	-0.05493	0.0895	4898	-0.613	0.5396

Note. This table shows the contrasts for the comprehensiveness of the text between the conditions of the topic COVID-19 vaccines vs. GMO foods in all combinations of the other two independent variables headline format and text structure. Data is shown with estimated group differences, standard error (*SE*), degrees of freedom (*df*), *t*-ratio and *p*-value. $N = 4906$ participants

$^{*}p < .00325$ $^{**}p < .001$ $^{***}p < .0001$

Supplement 2.3

Paired Comparisons for Trustworthiness of the Text between the Conditions of Topic always tested in the Order of COVID-19 Vaccine Text vs. GMO Food Text

Contrast	Estimate	SE	df	t-ratio	p-value
Truth sandwich & Question vs. Truth sandwich & Question	0.4568	0.0866	4898	5.275	<.0001***
Truth sandwich & Question vs. Truth sandwich & Statement	0.5139	0.0866	4898	5.934	<.0001***
Truth sandwich & Question vs. Bottom-heavy text & Question	0.4013	0.0866	4898	4.634	<.0001***
Truth sandwich & Question vs. Bottom-heavy text & Statement	0.4674	0.0865	4898	5.402	<.0001***
Truth sandwich & Statement vs. Truth sandwich & Question	0.2594	0.0866	4898	2.995	0.0028*
Truth sandwich & Statement vs. Truth sandwich & Statement	0.3165	0.0866	4898	3.655	0.0003**
Truth sandwich & Statement vs. Bottom-heavy & Question	0.2039	0.0866	4898	2.355	0.0186
Truth sandwich & Statement vs. Bottom-heavy & Statement	0.2700	0.0865	4898	3.121	0.0018**
Bottom-heavy & Question vs. Truth sandwich & Question	0.3328	0.0866	4898	3.843	0.0001**
Bottom-heavy & Question vs. Truth sandwich & Statement	0.3899	0.0866	4898	4.503	<.0001***
Bottom-heavy & Question vs. Bottom-heavy & Question	0.2773	0.0866	4898	3.203	0.0014*
Bottom-heavy & Question vs. Bottom-heavy & Statement	0.3434	0.0865	4898	3.969	0.0001**
Bottom-heavy & Statement vs. Truth sandwich & Question	0.4209	0.0866	4898	4.861	<.0001***
Bottom-heavy & Statement vs. Truth sandwich & Statement	0.4780	0.0866	4898	5.520	<.0001***
Bottom-heavy & Statement vs. Bottom-heavy & Question	0.3654	0.0866	4898	4.220	<.0001***
Bottom-heavy & Statement vs. Bottom-heavy & Statement	0.4315	0.0865	4898	4.987	<.0001***

Note. This table shows the contrasts for the trustworthiness of the text between the conditions of the topic COVID-19 vaccines vs. GMO foods in all combinations of the other two independent variables headline format and text structure. Data is shown with estimated group differences, standard error (*SE*), degrees of freedom (*df*), *t*-ratio and *p*-value. $N = 4906$ participants

$^{*}p < .00325$ $^{**}p < .001$ $^{***}p < .0001$

Supplement 2.4

Paired Comparisons for Persuasiveness of the Text between the Conditions of Topic always tested in the Order of COVID-19 Vaccine Text vs. GMO Food Text

Contrast	Estimate	SE	df	t-ratio	p-value
Truth sandwich & Question vs. Truth sandwich & Question	0.37357	0.0926	4898	4.033	0.0001**
Truth sandwich & Question vs. Truth sandwich & Statement	0.53181	0.0926	4898	5.741	<.0001***
Truth sandwich & Question vs. Bottom-heavy text & Question	0.34747	0.0926	4898	3.751	0.0002**
Truth sandwich & Question vs. Bottom-heavy text & Statement	0.34020	0.0926	4898	3.675	0.0002**
Truth sandwich & Statement vs. Truth sandwich & Question	0.29038	0.0926	4898	3.135	0.0017*
Truth sandwich & Statement vs. Truth sandwich & Statement	0.44861	0.0926	4898	4.843	<.0001***
Truth sandwich & Statement vs. Bottom-heavy & Question	0.26427	0.0926	4898	2.853	0.0044
Truth sandwich & Statement vs. Bottom-heavy & Statement	0.25701	0.0926	4898	2.777	0.0055*
Bottom-heavy & Question vs. Truth sandwich & Question	0.24959	0.0926	4898	2.694	0.0071
Bottom-heavy & Question vs. Truth sandwich & Statement	0.40783	0.0926	4898	4.402	<.0001***
Bottom-heavy & Question vs. Bottom-heavy & Question	0.22349	0.0926	4898	2.413	0.0159
Bottom-heavy & Question vs. Bottom-heavy & Statement	0.21622	0.0926	4898	2.336	0.0195
Bottom-heavy & Statement vs. Truth sandwich & Question	0.34258	0.0926	4898	3.698	0.0002**
Bottom-heavy & Statement vs. Truth sandwich & Statement	0.50082	0.0926	4898	5.406	<.0001***
Bottom-heavy & Statement vs. Bottom-heavy & Question	0.31648	0.0926	4898	3.416	0.0006**
Bottom-heavy & Statement vs. Bottom-heavy & Statement	0.30921	0.0926	4898	3.341	0.0008**

Note. This table shows the contrasts for the persuasiveness of the text between the conditions of the topic COVID-19 vaccines vs. GMO foods in all combinations of the other two independent variables headline format and text structure. Data is shown with estimated group differences, standard error (*SE*), degrees of freedom (*df*), *t*-ratio and *p*-value. $N = 4906$ participants

$^{*}p < .00325$ $^{**}p < .001$ $^{***}p < .0001$

Supplement 3: Contrasts for Research Question 3

Supplement 3.1

Paired Comparisons for Mean Perceived Social Impact of the Text between the Conditions of Topic always tested in the Order of COVID-19 Vaccine Text vs. GMO Food Text

Contrast	Estimate	SE	df	t-ratio	p-value
Truth sandwich & Question vs. Truth sandwich & Question	0.4951	0.0913	4898	5.420	<.0001***
Truth sandwich & Question vs. Truth sandwich & Statement	0.6085	0.0913	4898	6.662	<.0001***
Truth sandwich & Question vs. Bottom-heavy text & Question	0.4388	0.0913	4898	4.804	<.0001***
Truth sandwich & Question vs. Bottom-heavy text & Statement	0.4670	0.0913	4898	5.117	<.0001***
Truth sandwich & Statement vs. Truth sandwich & Question	0.4013	0.0913	4898	4.394	<.0001***
Truth sandwich & Statement vs. Truth sandwich & Statement	0.5147	0.0913	4898	5.635	<.0001***
Truth sandwich & Statement vs. Bottom-heavy & Question	0.3450	0.0913	4898	3.777	0.0002**
Truth sandwich & Statement vs. Bottom-heavy & Statement	0.3732	0.0913	4898	4.089	<.0001***
Bottom-heavy & Question vs. Truth sandwich & Question	0.3532	0.0913	4898	3.867	0.0001**
Bottom-heavy & Question vs. Truth sandwich & Statement	0.4666	0.0913	4898	5.108	<.0001***
Bottom-heavy & Question vs. Bottom-heavy & Question	0.2969	0.0913	4898	3.250	0.0012*
Bottom-heavy & Question vs. Bottom-heavy & Statement	0.3250	0.0913	4898	3.562	0.0004**
Bottom-heavy & Statement vs. Truth sandwich & Question	0.4396	0.0913	4898	4.813	<.0001***
Bottom-heavy & Statement vs. Truth sandwich & Statement	0.5530	0.0913	4898	6.054	<.0001***
Bottom-heavy & Statement vs. Bottom-heavy & Question	0.3834	0.0913	4898	4.197	<.0001***
Bottom-heavy & Statement vs. Bottom-heavy & Statement	0.4115	0.0913	4898	4.509	<.0001***

Note. This table shows the contrasts for the mean perceived social impact of the text between the conditions of the topic COVID-19 vaccines vs. GMO foods in all combinations of the other two independent variables headline format and text structure. Data is shown with estimated group differences, standard error (*SE*), degrees of freedom (*df*), *t*-ratio and *p*-value. $N = 4906$ participants

$^{*}p < .00325$ $^{**}p < .001$ $^{***}p < .0001$

Supplement 3.2

Paired Comparisons for Willingness to Share the Information in Personal Communication between the Conditions of Topic always tested in the Order of COVID-19 Vaccine Text vs. GMO Food Text

Contrast	Estimate	SE	df	t-ratio	p-value
Truth sandwich & Question vs. Truth sandwich & Question	0.59543	0.103	4898	5.779	<.0001***
Truth sandwich & Question vs. Truth sandwich & Statement	0.65579	0.103	4898	6.364	<.0001***
Truth sandwich & Question vs. Bottom-heavy text & Question	0.53344	0.103	4898	5.177	<.0001***
Truth sandwich & Question vs. Bottom-heavy text & Statement	0.45732	0.103	4898	4.442	<.0001***
Truth sandwich & Statement vs. Truth sandwich & Question	0.45024	0.103	4898	4.370	<.0001***
Truth sandwich & Statement vs. Truth sandwich & Statement	0.51060	0.103	4898	4.955	<.0001***
Truth sandwich & Statement vs. Bottom-heavy & Question	0.38825	0.103	4898	3.768	0.0002**
Truth sandwich & Statement vs. Bottom-heavy & Statement	0.31213	0.103	4898	3.032	0.0024*
Bottom-heavy & Question vs. Truth sandwich & Question	0.46003	0.103	4898	4.465	<.0001***
Bottom-heavy & Question vs. Truth sandwich & Statement	0.52039	0.103	4898	5.050	<.0001***
Bottom-heavy & Question vs. Bottom-heavy & Question	0.39804	0.103	4898	3.863	0.0001**
Bottom-heavy & Question vs. Bottom-heavy & Statement	0.32192	0.103	4898	3.127	0.0018*
Bottom-heavy & Statement vs. Truth sandwich & Question	0.59706	0.103	4898	5.795	<.0001***
Bottom-heavy & Statement vs. Truth sandwich & Statement	0.65742	0.103	4898	6.380	<.0001***
Bottom-heavy & Statement vs. Bottom-heavy & Question	0.53507	0.103	4898	5.193	<.0001***
Bottom-heavy & Statement vs. Bottom-heavy & Statement	0.45895	0.103	4898	4.458	<.0001***

Note. This table shows the contrasts for the willingness to share the information in personal communication between the conditions of the topic COVID-19 vaccines vs. GMO foods in all combinations of the other two independent variables headline format and text structure. Data is shown with estimated group differences, standard error (*SE*), degrees of freedom (*df*), *t*-ratio and *p*-value. $N = 4906$ participants

$^{*}p < .00325$ $^{**}p < .001$ $^{***}p < .0001$

Supplement 3.3

Paired Comparisons for Willingness to Share the Information on Social Media between the Conditions of Topic always tested in the Order of COVID-19 Vaccine Text vs. GMO Food Text

Contrast	Estimate	SE	df	t-ratio	p-value
Truth sandwich & Question vs. Truth sandwich & Question	0.3948	0.107	4898	3.697	0.0002**
Truth sandwich & Question vs. Truth sandwich & Statement	0.5612	0.107	4898	5.255	<.0001***
Truth sandwich & Question vs. Bottom-heavy text & Question	0.3442	0.107	4898	3.224	0.0013
Truth sandwich & Question vs. Bottom-heavy text & Statement	0.4766	0.107	4898	4.467	<.0001***
Truth sandwich & Statement vs. Truth sandwich & Question	0.3524	0.107	4898	3.300	0.0010*
Truth sandwich & Statement vs. Truth sandwich & Statement	0.5188	0.107	4898	4.858	<.0001***
Truth sandwich & Statement vs. Bottom-heavy & Question	0.3018	0.107	4898	2.826	0.0047
Truth sandwich & Statement vs. Bottom-heavy & Statement	0.4342	0.107	4898	4.070	<.0001***
Bottom-heavy & Question vs. Truth sandwich & Question	0.2463	0.107	4898	2.307	0.0211
Bottom-heavy & Question vs. Truth sandwich & Statement	0.4127	0.107	4898	3.865	0.0001**
Bottom-heavy & Question vs. Bottom-heavy & Question	0.1958	0.107	4898	1.833	0.0668
Bottom-heavy & Question vs. Bottom-heavy & Statement	0.3282	0.107	4898	3.076	0.0021*
Bottom-heavy & Statement vs. Truth sandwich & Question	0.2822	0.107	4898	2.643	0.0082
Bottom-heavy & Statement vs. Truth sandwich & Statement	0.4486	0.107	4898	4.201	<.0001***
Bottom-heavy & Statement vs. Bottom-heavy & Question	0.2316	0.107	4898	2.169	0.0301
Bottom-heavy & Statement vs. Bottom-heavy & Statement	0.3641	0.107	4898	3.412	0.0006**

Note. This table shows the contrasts for the willingness to share the information on social media between the conditions of the topic COVID-19 vaccines vs. GMO foods in all combinations of the other two independent variables headline format and text structure. Data is shown with estimated group differences, standard error (*SE*), degrees of freedom (*df*), *t*-ratio and *p*-value. $N = 4906$ participants

$^{*}p < .00325$ $^{**}p < .001$ $^{***}p < .0001$