



International Panel on the Information Environment

Online Supplemental Appendices

Confronting Misinformation Produced with
Generative AI: A Meta-Analysis of Scientific
Evidence

Summary for Policymakers 2026.2

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Generative AI

A Meta-Analysis of Experimental Scientific Evidence

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APPENDIX A: VALIDITY ASSESSMENT

Risk of Bias Analysis

Cochrane Bias Protocol Analysis

We screened the publications included in the meta-analysis for risk of bias using a Cochrane-recommended protocol: the revised Risk of Bias 2 (RoB 2) for individually randomized, parallel-group trials and crossover trials [6]. The same researchers who performed coding exercises assessed each eligible publication and analyzed the evidence related to risk of bias and validity arising from the randomization process, period, and carryover effects (in crossover trials), deviations from the intended interventions (the effect of assignment to an intervention and the effect of adhering to an intervention), missing data, diverse measurements, and selective reporting, as indicated in the RoB 2 protocol.

The results of the RoB 2 assessment showed that a few publications in the sample had a moderate risk of bias, primarily due to issues with the randomization process (Table A1). This is not unusual: a recent systematic review of the social science literature found a risk of bias in almost every RCT analyzed [7]. Overall, the studies in the sample performed relatively well, scoring “low” to “moderate” for bias in most domains. One publication, which raised numerous concerns, mainly related to the random assignment of participants, was removed from the analysis. It is highlighted in Table B1. The scale was “low,” “some concerns,” and “high.”

The RoB 2 protocol is developed in the context of health research and might not always be optimal for social science publications. In addition, this protocol explicitly incorporates assessors’ judgments [8].

Table A1. Risk of Bias (Using RoB 2) in Publications Employing Randomized Controlled Trials.

Author(s) Year of Publication	Risk of bias arising from the randomization process	Risk of bias arising from period and carryover effects, only crossover studies	Risk of bias due to deviations from the intended interventions; effect of <i>assignment</i> to intervention	Risk of bias due to deviations from the intended interventions; effect of <i>adhering</i> to the intervention	Missing outcome data	Risk of bias in the measurement of the outcome	Risk of bias in the selection of the reported result	Overall risk of bias
Barari, Lucas and Munger 2025	low	na	low	low	low	low	low	low
Bray et al. 2023	low	na	low	low	low	low	low	low
Danry, Pataranutaporn, Groh and Epstein 2025	low	na	low	low	low	low	low	low
Doss et al. 2023	low	na	low	low	low	low	low	low
El Mokadem	some concerns	na	some concerns	low	low	some concerns	low	high
Goldstein et al. 2024	low	low	low	low	low	low	low	low
Hameleers, Van Der Meer and Dobber 2022	low	na	low	low	low	low	low	low
Hameleers, Van Der Meer and Dobber 2024	low	na	low	low	low	low	low	low
Hwang and Jeong 2025	low	na	low	low	low	low	low	low
Hwang, Ryu and Jeong 2021	low	na	low	low	low	low	low	low
Iacobucci 2021	some concerns	na	some concerns	some concerns	low	low	low	some concerns
Kreps, McCain and Brundage 2022	low	na	low	low	low	low	low	low
Lee and Hameleers 2024	low	na	low	low	low	low	low	low
Lee and Shin 2022	low	na	low	low	low	low	low	low
Lu and Chu 2023	some concerns	na	low	low	low	low	some concerns	some concerns
Lu and Yuan 2024	low	na	low	low	low	low	low	low
Nightingale and Farid 2022	low	low	low	low	low	low	low	low
Shin and Lee 2022	low	na	low	low	low	low	low	low
Spearing et al. 2025	low	na	low	low	low	low	low	low
Ternovski, Kalla and Aronow 2022	low	na	low	low	low	low	low	low
Vaccari and Chadwick 2020	low	na	low	low	low	low	low	low
Wack, Ehrett, Linvill and Warren 2025	some concerns	na	low	low	low	low	low	some concerns
Weikmann, Egelhofer and Lecheler 2025	low	na	low	low	low	low	low	low
Weikmann, Greber and Nikolaou 2025	low	na	low	low	low	low	low	low
Wittenberg et al. 2025	low	na	low	low	low	low	low	low

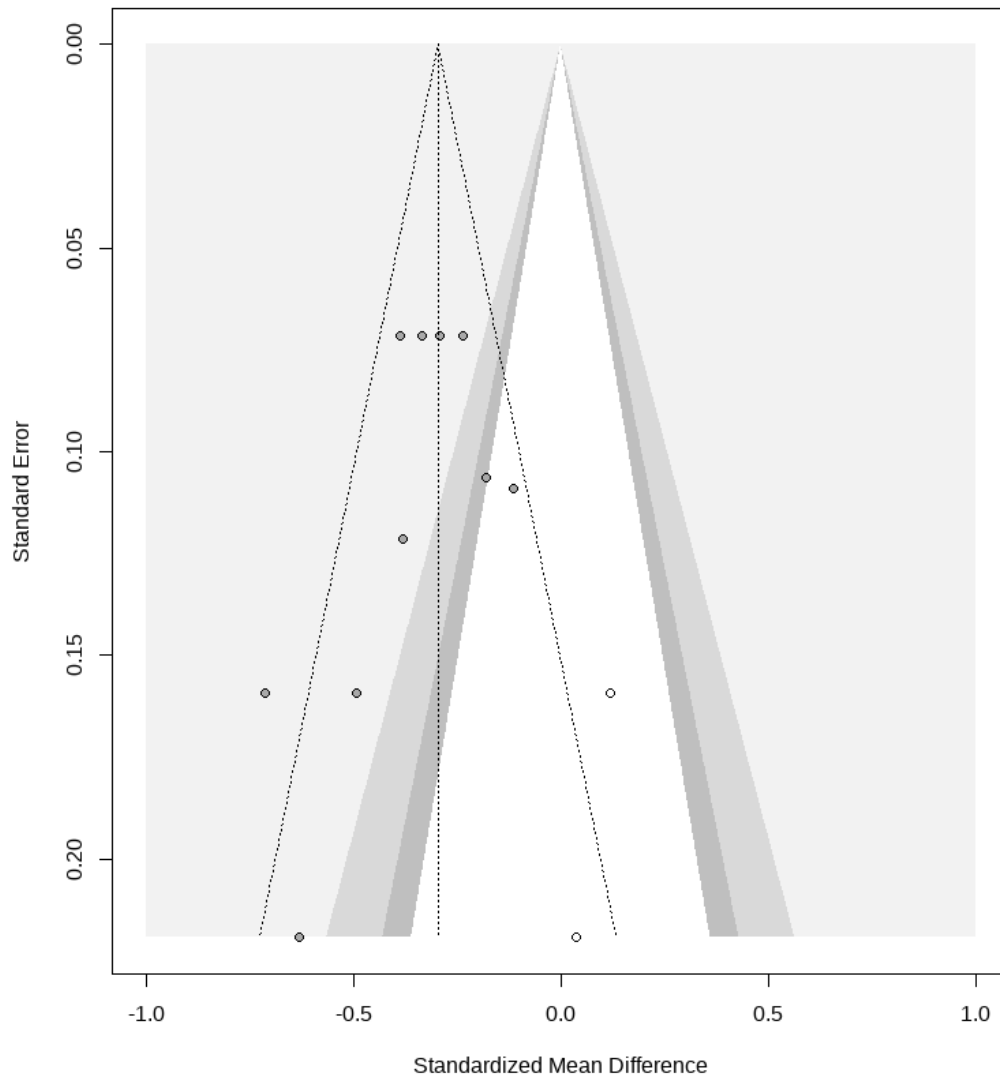
Assessment of Publication Bias

Social sciences publications often treat statistically significant results more favorably. As a result, larger, more significant effects are frequently overrepresented in peer-reviewed literature [9]. Publication selection bias may be reflected in an asymmetrical funnel plot: its shape will differ from the approximate inverted funnel shape.

We investigated our samples for publication selection bias and heterogeneity using the Duval and Tweedie trim-and-fill method and Egger's test for funnel plot asymmetry. These plots illustrate the extent of variation in reported effects, helping to assess publication bias [9]. When the results of these two tests were inconclusive, we also built 3-parameter selection models (3PSMs) to conduct an additional publication bias check [10].

For our post-2021 sample focusing on the perception of visual misinformation (reported in Figure 3), Egger's test returned a non-significant result ($t = -1.52, p = 0.17$), implying that there was no strong statistical evidence of funnel plot asymmetry. However, the Duval and Tweedie trim-and-fill method (Figure A2) imputed two studies, slightly reducing the pooled effect to ($g = -0.30$ (95% CI: [-0.42, -0.17], $p < 0.0001$). This adjustment, along with the imputed studies' positive effect direction, suggests a mild asymmetry in the funnel plot, potentially consistent with small-study bias, in which smaller studies with stronger negative results are more likely to be published. The 3-parameter selection model yielded a bias-adjusted effect of $g = -0.30$, 95% CI: [-0.40, -0.20] that was nearly identical to the unadjusted estimate. The selection parameter for non-significant studies was < 1 but it had a wide confidence interval, indicating that there was no reliable evidence of publication bias.

Figure A2. Funnel Plots Assessing Publication Bias: Perception after Exposure to Visual Misinformation (Post-2021).



Source: IPIE calculations based on data collected.

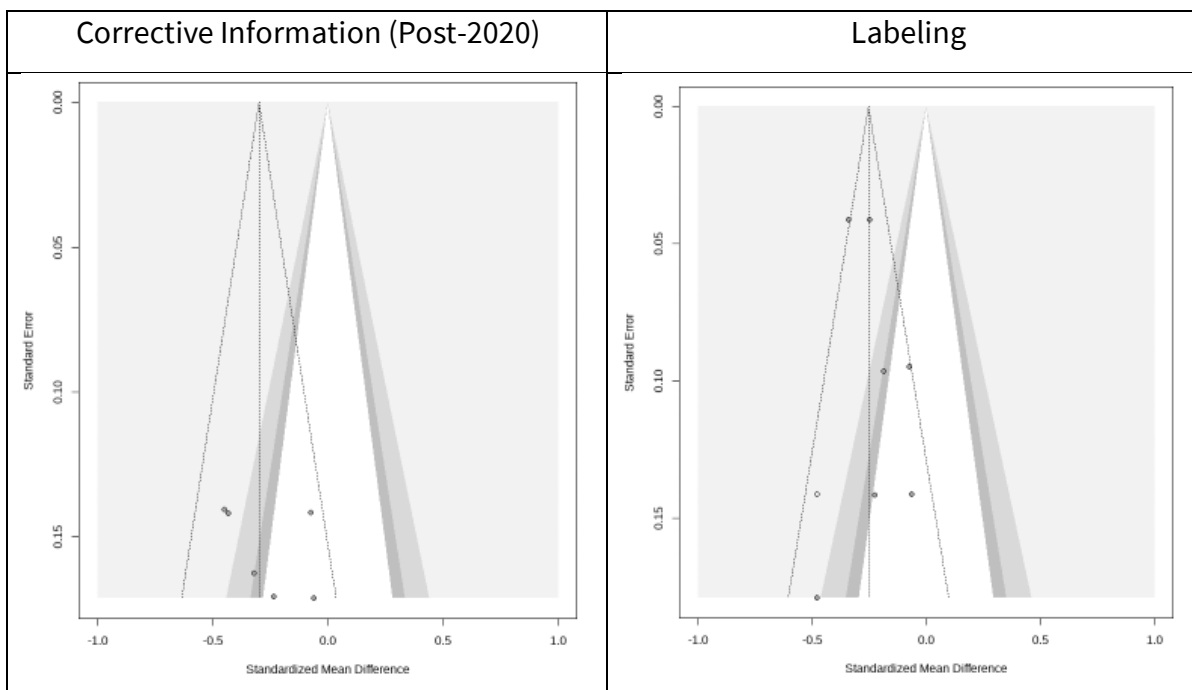
Note: The figures represent Duval and Tweedie's trim-and-fill method funnel plots. In the shaded regions, darker areas represent $p < 0.1$, and lighter areas represent $p < 0.01$.

The Duval and Tweedie trim-and-fill funnel plot for the post-2020 preventive correction information experiments (reported in Figure 4) does not suggest a potential bias (Figure A3). Egger's test for asymmetry ($t = 1.25$, $p = 0.27$) for these studies and the heterogeneity test ($I^2 = 22.8\%$, $p = 0.26$) were not significant. Despite this, the funnel plot visualization shows asymmetry, suggesting that smaller, less precise studies reporting stronger negative effects may be disproportionately represented, consistent with possible publication bias. The 3PSM test did not detect publication bias ($p = 0.85$). Although sensitivity analyses suggest that small-study effects may be present, the adjusted estimates remain

statistically significant, indicating that these biases do not fully explain the observed effect.

In relation to the full sample of content labeling studies (Figure 5), Egger's test for asymmetry indicated no funnel plot asymmetry ($t = 1.01, p = 0.36$), suggesting that there was no significant evidence of small-study effects. However, the trim-and-fill analysis (Figure A3) added one potentially missing study, adjusting the overall effect size to $g = -0.25$ (95% CI: [-0.35; -0.16], $p < 0.001$), a slightly higher level than in the original analysis level with a slightly increased heterogeneity ($I^2 = 49.4\%$ from 48.4%) and with the prediction interval still very close to zero. This implies that while small-study effects may be present, they do not fully account for the observed effect. The 3PSM test confirmed that the effect remained significant, with a bias-adjusted effect size of -0.24, and did not detect meaningful bias.

Figure A3. Funnel Plots to Assess Publication Bias: Corrective Information and Labeling Experiments.

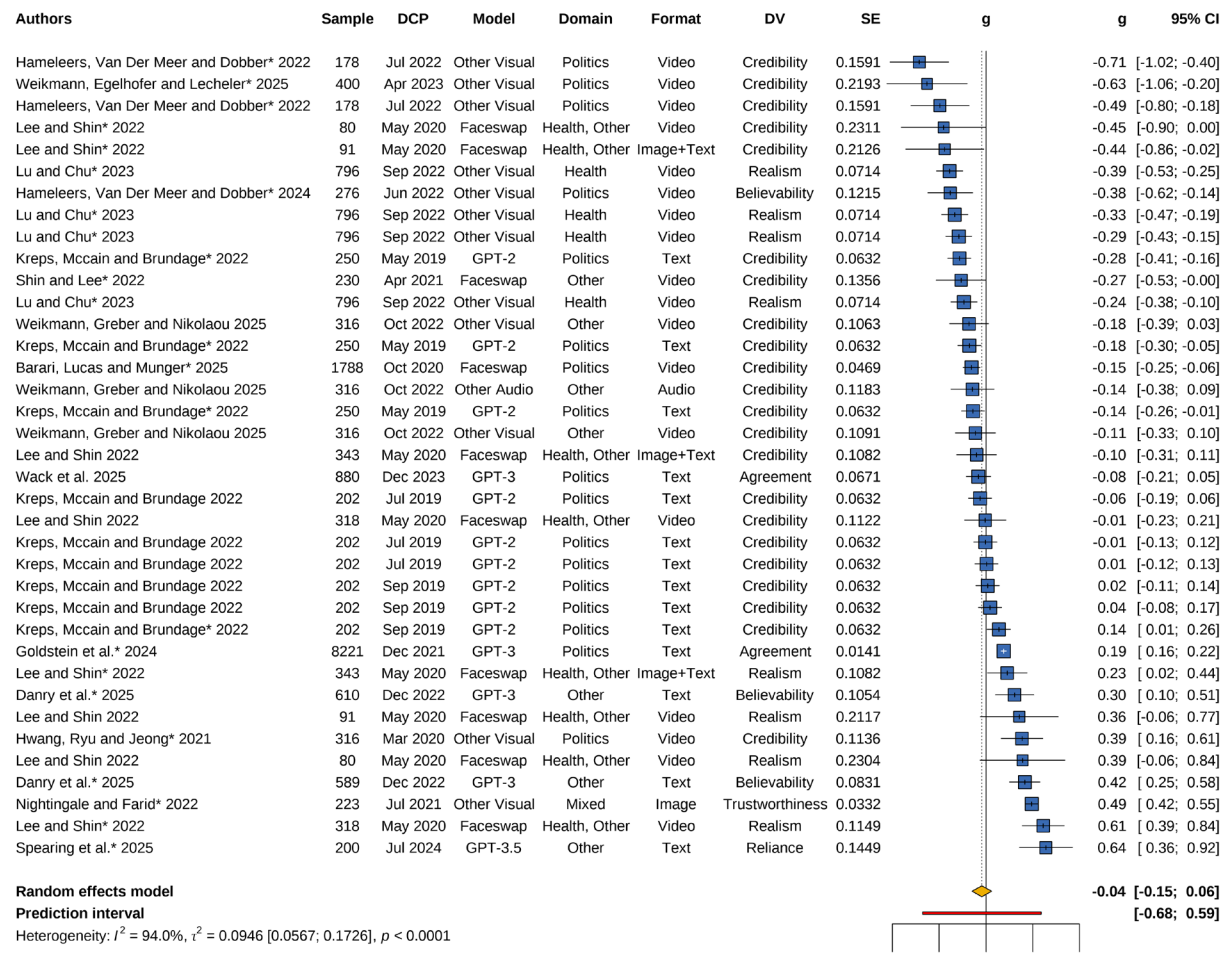


Source: IPIE calculations based on data collected.

Note: The figures represent Duval and Tweedie's trim-and-fill method funnel plots. In the shaded regions, darker areas represent $p < 0.1$, and lighter areas represent $p < 0.01$.

APPENDIX B: SUPPLEMENTARY FIGURES

Figure B1. The Effect of Exposure to GenAI Misinformation on its Perception. Full Sample.

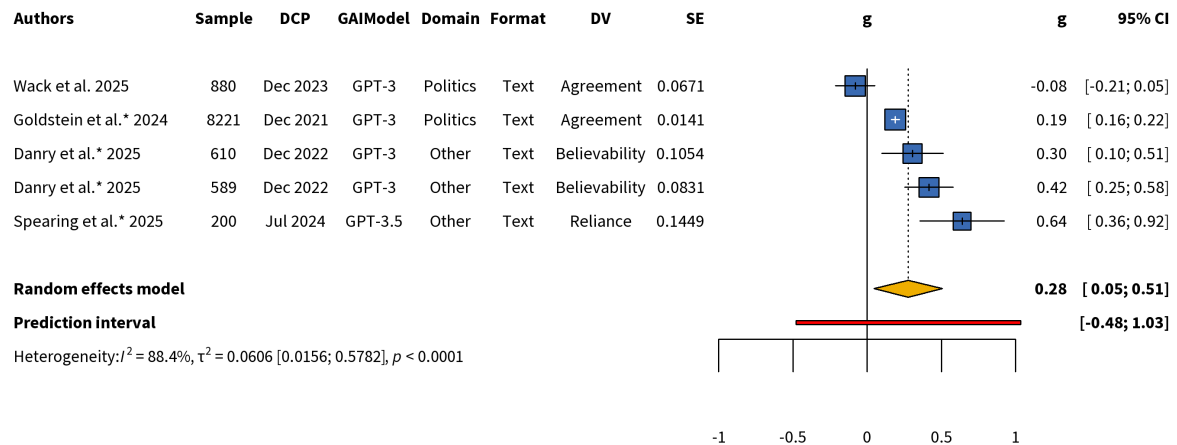


Source: IPIE calculations based on data collected.

Note: An effect size (g) indicates individuals' evaluation of GenAI-produced misinformation as "accurate," "credible," or similar compared to reliable information. Data Collection Period (DCP) and Dependent Variable (DV) are provided. Effect sizes were calculated from random-effects meta-analysis using Hedges' g. τ and corresponding p were calculated using the Paule-Mandel estimator. 37 effects extracted from 15 publications.

*Statistically significant effect estimate.

Figure B2. The Effect of Exposure to Textual GenAI Misinformation on its Perception in Studies Utilizing GPT-3 LLM or Later Models.

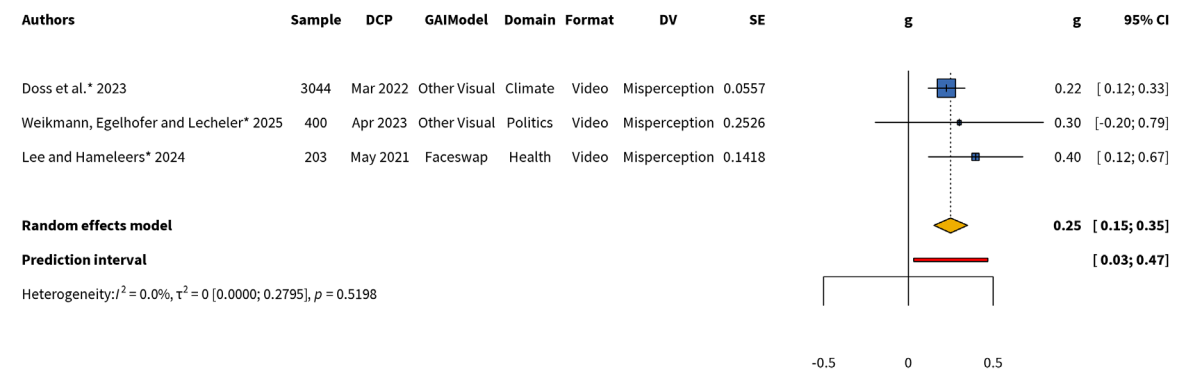


Source: IPIE calculations based on data collected.

Note: An effect size (g) indicates individuals' evaluation of GenAI-produced misinformation as "accurate," "credible," or similar compared to reliable information. Data Collection Period (DCP) and Dependent Variable (DV). Effect sizes were calculated from random-effects meta-analysis using Hedges' g. τ and corresponding p were calculated using the Paule-Mandel estimator. 5 effects extracted from 4 publications.

*Statistically significant effect estimate.

Figure B3. The Effect of Exposure to Visual GenAI Misinformation on its Misperception.

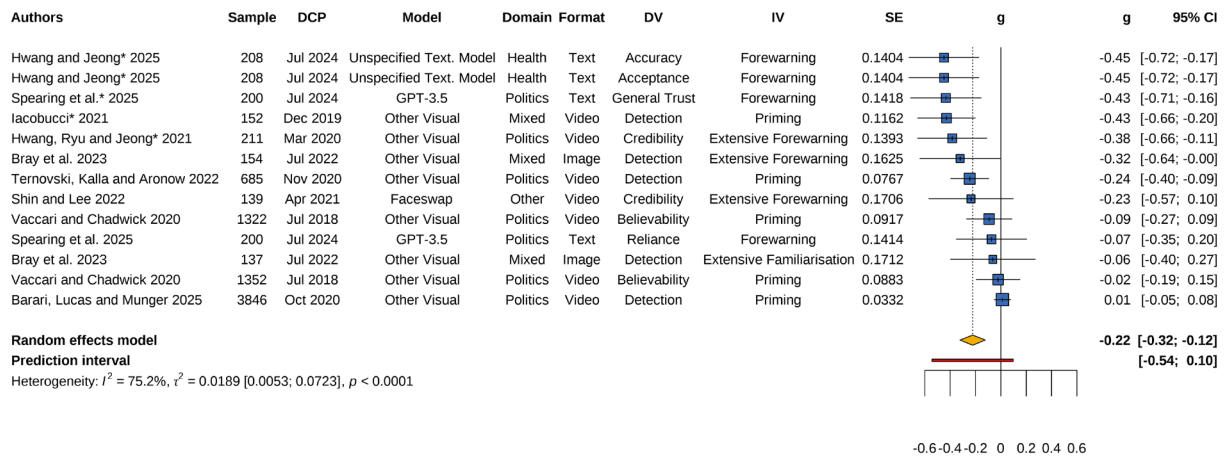


Source: IPIE calculations based on data collected.

Note: An effect size (g) indicates individuals' evaluation of GenAI-produced misinformation as not "accurate," "credible," or similar compared to reliable information. Data Collection Period (DCP) and Dependent Variable (DV). Effect sizes were calculated from random-effects meta-analysis using Hedges' g. τ and corresponding p were calculated using the Paule-Mandel estimator. Based on 3 effects extracted from 3 publications.

*Statistically significant effect estimate.

Figure B4. The Effect of Corrective Information on Misinformation Perception. Full Sample.

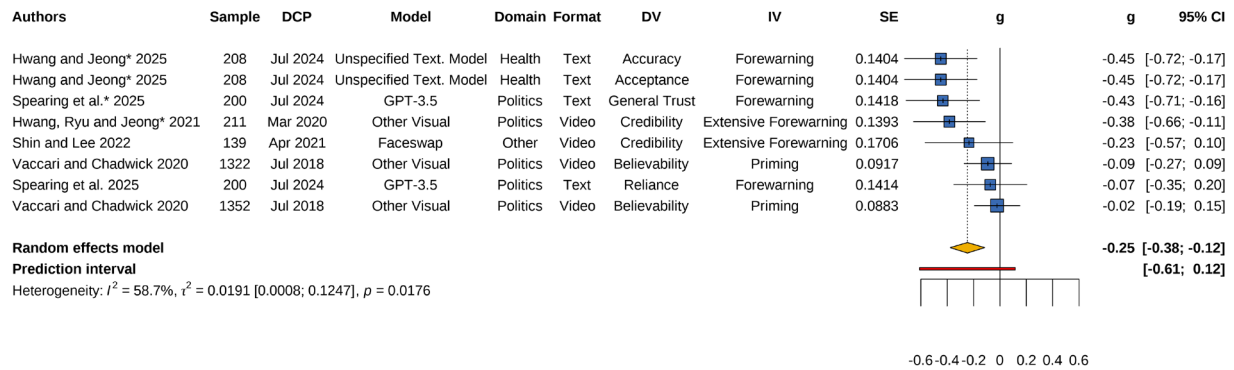


Source: IPIE calculations based on data collected.

Note: An effect size (g) indicates individuals' evaluation of GenAI-produced misinformation as "accurate," "credible," or similar after exposure to a countermeasure. Data Collection Period (DCP), Dependent Variable (DV), and the main Independent Variable (IV) are provided. Effect sizes were calculated from random-effects meta-analysis using Hedges' g. τ and corresponding p were calculated using the Paule-Mandel estimator. Based on 13 effects extracted from 9 publications.

*Statistically significant effect estimate.

Figure B5. The Effect of Corrective Information on Misinformation Perception without Studies Focusing on Detection.

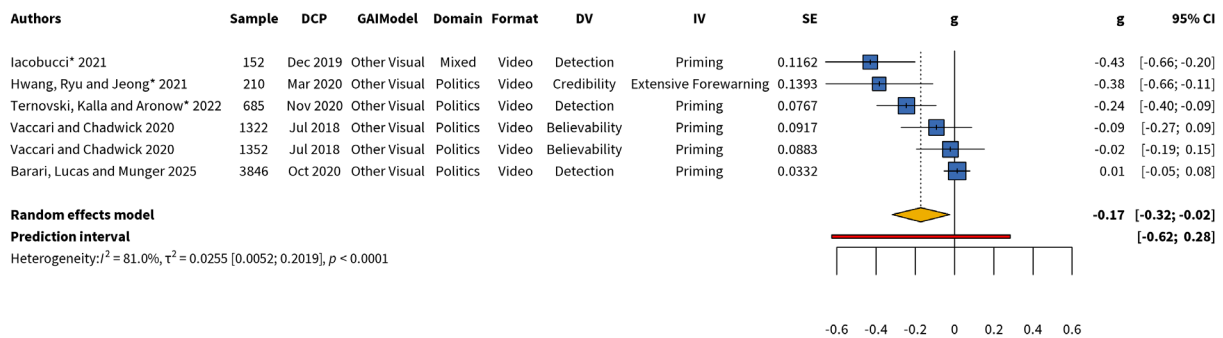


Source: IPIE calculations based on data collected.

Note: An effect size (g) indicates individuals' evaluation of GenAI-produced misinformation as "accurate," "credible," or similar after exposure to a countermeasure. Data Collection Period (DCP), Dependent Variable (DV), and the main Independent Variable (IV) are provided. Effect sizes were calculated from random-effects meta-analysis using Hedges' g. τ and corresponding p were calculated using the Paule-Mandel estimator. Based on 8 effects from 5 publications.

*Statistically significant effect estimate.

Figure B6. The Effect of Corrective Information on Misinformation Perception in Pre-2021 Experiments.

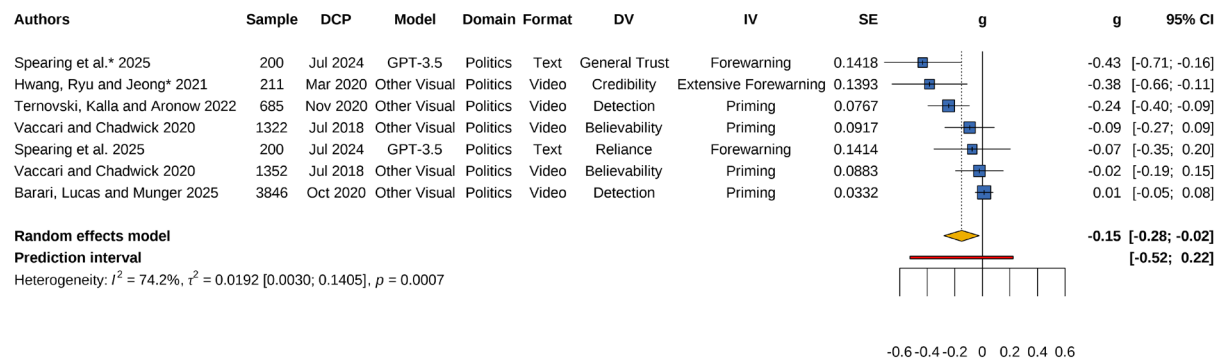


Source: IPIE calculations based on data collected.

Note: An effect size (g) indicates individuals' evaluation of GenAI-produced misinformation as "accurate," "credible," or similar after exposure to a countermeasure. Data Collection Period (DCP), Dependent Variable (DV), and the main Independent Variable (IV) are provided. Effect sizes were calculated from random-effects meta-analysis using Hedges' g. τ and corresponding p were calculated using the Paule-Mandel estimator. Based on 6 effects from 5 publications.

*Statistically significant effect estimate.

Figure B7. The Effect of Corrective Information on Misinformation Perception in the Politics Domain.



Source: IPIE calculations based on data collected.

Note: An effect size (g) indicates individuals' evaluation of GenAI-produced misinformation as "accurate," "credible," or similar after exposure to a countermeasure. Data Collection Period (DCP), Dependent Variable (DV), and the main Independent Variable (IV) are provided. Effect sizes were calculated from random-effects meta-analysis using Hedges' g. τ and corresponding p were calculated using the Paule-Mandel estimator. Based on 7 effects from 5 publications.

*Statistically significant effect estimate.

APPENDIX C: SESSIONINFO() INFORMATION

```
> sessionInfo()
```

```
R version 4.4.3 (2025-02-28 ucrt)
```

```
Platform: x86_64-w64-mingw32/x64
```

```
Running under: Windows 10 x64 (build 19045)
```

```
Matrix products: default
```

```
locale:
```

```
[1] LC_COLLATE=English_United Kingdom.utf8 LC_CTYPE=English_United  
Kingdom.utf8 LC_MONETARY=English_United Kingdom.utf8 LC_NUMERIC=C  
LC_TIME=English_United Kingdom.utf8
```

```
time zone: Europe/London
```

```
tzcode source: internal
```

```
attached base packages:
```

```
[1] stats graphics grDevices utils datasets methods base
```

```
other attached packages:
```

```
[1] dmetar_0.1.0      remotes_2.5.0      PerformanceAnalytics_2.0.8  
xts_0.14.1        zoo_1.8-14         ggrepel_0.9.6      scales_1.3.0  
writexl_1.5.4
```

```
[9] snakecase_0.11.1  showtext_0.9-7     showtextdb_3.0  
quanteda.textstats_0.97.2 quanteda_4.2.0     hrbrthemes_0.8.7  
viridis_0.6.5     viridisLite_0.4.2
```

```
[17] plotly_4.10.4     sysfonts_0.8.9     bibliometrix_4.3.3  
reshape2_1.4.4     revtools_0.4.1     metafor_4.8-0      numDeriv_2016.8-  
1.1 Matrix_1.7-2
```

```
[25] meta_8.0-2        metadat_1.4-0      esc_0.5.1          psych_2.5.3  
formattable_0.2.1 lubridate_1.9.4    forcats_1.0.0     dplyr_1.1.4
```

[33] purrr_1.0.4 tibble_3.2.1 tidyverse_2.0.0 stringr_1.5.1
data.table_1.17.0 tidyr_1.3.1 stringi_1.8.7 igraph_2.1.4

[41] readr_2.1.5 ggraph_2.2.1 readxl_1.4.5 rlang_1.1.6
ggplot2_3.5.2

loaded via a namespace (and not attached):

[1] splines_4.4.3 later_1.4.2 cellranger_1.1.0 polyclip_1.10-7
XML_3.99-0.18 lifecycle_1.0.4 Rdpack_2.6.4 prabclus_2.3-4

[9] processx_3.8.6 NLP_0.3-2 lattice_0.22-6 MASS_7.3-64
SnowballC_0.7.1 magrittr_2.0.3 openxlsx_4.2.8 rmarkdown_2.29

[17] httpuv_1.6.15 flexmix_2.3-20 zip_2.3.2 pkgbuild_1.4.8
topicmodels_0.2-17 minqa_1.2.8 ade4_1.7-23 abind_1.4-8

[25] quadprog_1.5-8 nnet_7.3-20 tweenr_2.0.3 gdtools_0.4.2
tm_0.7-16 tokenizers_0.3.0 rentrez_1.2.3 MuMIn_1.48.11

[33] DT_0.33 xml2_1.3.8 ggforce_0.4.2 tidymodels_1.2.1
netmeta_3.2-0 rscopus_0.8.1 farver_2.1.2 lme4_1.1-37

[41] stats4_4.4.3 mathjaxr_1.6-0 jsonlite_2.0.0 tidygraph_1.3.1
systemfonts_1.2.3 tools_4.4.3 stringdist_0.9.15 Rcpp_1.0.14

[49] glue_1.8.0 mnormt_2.1.1 gridExtra_2.3 Rttf2pt1_1.3.12
xfun_0.52 mgcv_1.9-1 ca_0.71.1 shinydashboard_0.7.2

[57] withr_3.0.2 fastmap_1.2.0 boot_1.3-31 callr_3.7.6
digest_0.6.37 timechange_0.3.0 R6_2.6.1 mime_0.13

[65] colorspace_2.1-1 diptest_0.77-2 generics_0.1.4
fontLiberation_0.1.0 robustbase_0.99-6 class_7.3-23 graphlayouts_1.2.2
stopwords_2.3

[73] httr_1.4.7 htmlwidgets_1.6.4 pkgconfig_2.0.3 gtable_0.3.6
modeltools_0.2-23 janeaustenr_1.0.0 htmltools_0.5.8.1
fontBitstreamVera_0.1.1

[81] poibin_1.6 reformulas_0.4.1 knitr_1.50 rstudioapi_0.17.1
tzdb_0.5.0 magic_1.6-1 visNetwork_2.1.2 nlme_3.1-167

[89] curl_6.2.2 nloptr_2.2.1 cachem_1.1.0 parallel_4.4.3
pubmedR_0.0.3 extrafont_0.19 desc_1.4.3 pillar_1.10.2

[97] grid_4.4.3 vctrs_0.6.5 slam_0.1-55 promises_1.3.2
cluster_2.1.8 xtable_1.8-4 extrafontdb_1.0 evaluate_1.0.3

[105] mvtnorm_1.3-3 cli_3.6.4 compiler_4.4.3 crayon_1.5.3
tidytext_0.4.2 labeling_0.4.3 mclust_6.1.2 ps_1.9.1

[113] dimensionsR_0.0.3 plyr_1.8.9 munsell_0.5.1 lazyeval_0.2.2
CompQuadForm_1.4.3 fontquiver_0.2.1 bibliometrixData_0.3.0 hms_1.1.3

APPENDIX D: APPENDICES REFERENCES

- [1] M. Wack, C. Ehrett, D. Linvill, and P. Warren, 'Generative propaganda: Evidence of AI's impact from a state-backed disinformation campaign', *PNAS Nexus*, vol. 4, no. 4, p. pgaf083, Apr. 2025, doi: 10.1093/pnasnexus/pgaf083.
- [2] J. P. T. Higgins and S. G. Thompson, 'Quantifying Heterogeneity in a Meta-Analysis', *Statistics in Medicine*, vol. 21, no. 11, pp. 1539–1558, 2002, doi: 10.1002/sim.1186.
- [3] M. Harrer, P. Cuijpers, T. Furukawa, and D. Ebert, *Doing Meta-Analysis with R: A Hands-On Guide*. New York: Chapman and Hall/CRC, 2021. doi: 10.1201/9781003107347.
- [4] A. H. Linden and J. Hönekopp, 'Heterogeneity of Research Results: A New Perspective From Which to Assess and Promote Progress in Psychological Science', *Perspect Psychol Sci*, vol. 16, no. 2, pp. 358–376, Mar. 2021, doi: 10.1177/1745691620964193.
- [5] K. Bryanov and V. Vziatyshva, 'Determinants of Individuals' Belief in Fake News: A Scoping Review Determinants of Belief in Fake News', *PLoS One*, vol. 16, no. 6, p. e0253717, Jun. 2021, doi: 10.1371/journal.pone.0253717.
- [6] J. A. C. Sterne et al., 'RoB 2: a revised tool for assessing risk of bias in randomised trials', *BMJ*, p. l4898, Aug. 2019, doi: 10.1136/bmj.l4898.
- [7] L. G. Smithers, A. C. P. Sawyer, C. R. Chittleborough, N. M. Davies, G. Davey Smith, and J. W. Lynch, 'A systematic review and meta-analysis of effects of early life non-cognitive skills on academic, psychosocial, cognitive and health outcomes', *Nat Hum Behav*, vol. 2, no. 11, Art. no. 11, Nov. 2018, doi: 10.1038/s41562-018-0461-x.
- [8] J. P. T. Higgins et al., 'The Cochrane Collaboration's Tool for Assessing Risk of Bias in Randomised Trials', *BMJ*, vol. 343, p. d5928, Oct. 2011, doi: 10.1136/bmj.d5928.
- [9] T. d. Stanley and H. Doucouliagos, 'Picture This: A Simple Graph That Reveals Much Ado About Research', *Journal of Economic Surveys*, vol. 24, no. 1, pp. 170–191, 2010, doi: 10.1111/j.1467-6419.2009.00593.x.
- [10] W. Viechtbauer, 'Selection Models — selmodel', Github. Accessed: Dec. 05, 2025. [Online]. Available: <https://wwiechtb.github.io/metafor/reference/selmodel.html#details-1>



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