

Appendix D: Heterogeneity analysis

This appendix reports the full results of heterogeneity analyses across three grouping variables: professional role (Q7, 6 categories), educational background (Q5, 4 categories), and organizational type (Q3, 3–5 categories). Groups with ≤ 5 respondents were excluded from subgroup models. Several remaining subgroups are very small (Private For-Profit $n = 7$, Private Non-Profit $n = 6$, Cybersecurity/Technical $n = 6$ in the analyses); means for these groups are reported for completeness but should be interpreted with extreme caution given the wide confidence intervals that small samples entail. For each question block, we estimated one linear mixed-effects model per grouping variable using the formula $\text{response} \sim \text{group} \times \text{item} + (1 \mid \text{respondent})$, where item indexes survey items within the block as a fixed effect and the random intercept accounts for repeated measures. Models were fitted with restricted maximum likelihood (REML) via lme4 (Bates et al., 2015); p-values use the Satterthwaite approximation from lmerTest (Kuznetsova et al., 2017).

Although the outcome variables are ordinal Likert items, we chose linear mixed-effects regression (LMER) over cumulative link mixed models (CLMM) for interpretability: LMER coefficients directly estimate mean differences on the response scale, which are more communicable to the practitioner audience than log-odds ratios. With mostly 5-point scales and approximately symmetric response distributions, linear approximation to ordinal data introduces minimal bias (Norman, 2010).

Note on multiple testing: With 10 question blocks and 3 grouping variables, we fitted 30 LMER models, each yielding two omnibus F-tests (group main effect and group $\times$ item interaction), for a total of 60 tests. All 60 p-values were corrected simultaneously using the Benjamini–Hochberg (BH) procedure at $\alpha = .05$. This 60-test family is corrected separately from the scientist comparison in Appendix C. Only one effect survives correction: Obstacles $\times$ Educational Background ($F(3, 78) = 7.89$, $p_{\text{raw}} < .001$, $p_{\text{adj}} = .007$, $\eta^2_p = .23$, 95% CI [.07, .36]). The remaining effects reported below should be treated as hypothesis-generating rather than confirmatory. All p-values below are uncorrected (p_{raw}).

D.1 Linear mixed-effects models: full results

Significant main effects of group:

Obstacles $\times$ Educational Background: $F(3, 78) = 7.89$, $p < .001$ ***

Research Obstacles $\times$ Professional Role: $F(5, 82) = 3.79$, $p = .004$ **

Research Obstacles $\times$ Educational Background: $F(3, 73) = 4.63$, $p = .005$ **

Research Obstacles $\times$ Organization Type: $F(2, 72) = 5.47$, $p = .006$ **

Mechanisms $\times$ Educational Background: $F(3, 474) = 3.87$, $p = .009$ **

Impact $\times$ Educational Background: $F(3, 85) = 3.78$, $p = .013$ *

Mechanisms $\times$ Professional Role: $F(5, 90) = 2.64$, $p = .028$ *

Use of Research $\times$ Professional Role: $F(5, 85) = 2.47$, $p = .039$ *

Relative Importance $\times$ Organization Type: $F(4, 90) = 3.41$, $p = .012$ *

Note: Denominator degrees of freedom are Satterthwaite approximations. They approach the residual df rather than the number of respondents when the random-intercept variance is estimated near zero, as in the Mechanisms $\times$ Educational Background model ($df_2 = 474$).

Significant interaction effects (group × item):

Threat Perception × Organization Type: $F(28, 637) = 1.90, p = .004^{**}$

Reasons for Belief × Organization Type: $F(27, 765) = 1.96, p = .003^{**}$

Threat Perception × Educational Background: $F(21, 588) = 1.73, p = .023^{*}$

Impact × Educational Background: $F(21, 594) = 1.57, p = .0497^{*}$

Relative Importance × Professional Role: $F(30, 552) = 1.50, p = .044^{*}$

D2. Items with highest between-group disagreement

By organizational type (Q3)—top 5 items ranked by variance of group means:

1. Limited reflection, intuition rather than analysis (variance = 0.33, range = 1.18, $k = 4$ groups)
2. Problem comes mainly from demand (public actively seeks content) (variance = 0.31, range = 1.07)
3. Activists or militants [threat] (variance = 0.31, range = 1.28, $k = 5$)
4. Gray literature or popularization (variance = 0.29, range = 1.16)
5. Foreign governments, politicians or parties [threat] (variance = 0.25, range = 1.15, $k = 5$)

By educational background (Q5)—top 5:

1. Journalists or press organizations [threat] (variance = 0.38, range = 1.40, $k = 4$)
2. Activists or militants [threat] (variance = 0.31, range = 1.30)
3. Applicability perceived as low (variance = 0.30, range = 1.27)
4. Insufficient resources (budgets and staff) (variance = 0.28, range = 1.14)
5. Disinformation played an important role in Trump's 2016 election (variance = 0.27, range = 1.20)

By professional role (Q7)—top 5:

1. Applicability perceived as low (variance = 0.38, range = 1.58, $k = 6$)
2. Language barrier (English, scientific jargon) (variance = 0.26, range = 1.46)
3. Fear of being accused of censorship (variance = 0.24, range = 1.33)
4. People encounter opposing opinions more often offline than online (variance = 0.23, range = 1.23)
5. State-supported or state-controlled media [threat] (variance = 0.23, range = 1.33)

D3. Detailed group means for highest-disagreement items

By organizational type (Q3):

Limited reflection, intuition rather than analysis:

Military/Intelligence: 4.18 ($n = 33$)

Normative/Regulatory: 3.96 ($n = 28$)

High-level civil servants/politicians: 3.19 ($n = 21$)

Private For-Profit: 3.00 ($n = 7$)

Activists or militants [threat]:

Private For-Profit: 5.14 ($n = 7$)

Military/Intelligence: 4.88 ($n = 33$)

Normative/Regulatory: 4.29 ($n = 28$)

Private Non-Profit: 4.00 ($n = 6$)

High-level civil servants/politicians: 3.86 ($n = 22$)

Foreign governments, politicians or parties [threat]:

Private For-Profit: 6.00 ($n = 7$)
Private Non-Profit: 5.83 ($n = 6$)
High-level civil servants/politicians: 5.18 ($n = 22$)
Normative/Regulatory: 5.11 ($n = 28$)
Military/Intelligence: 4.85 ($n = 33$)

By educational background (Q5):

Journalists or press organizations [threat]:

Humanities: 4.54 ($n = 13$)
Information/Communication/Media: 3.72 ($n = 18$)
Social Sciences: 3.35 ($n = 43$)
Computer/Data/Digital: 3.14 ($n = 14$)

Disinformation played an important role in Trump's 2016 election:

Computer/Data/Digital: 4.43 ($n = 14$)
Information/Communication/Media: 4.17 ($n = 18$)
Social Sciences: 4.14 ($n = 44$)
Humanities: 3.23 ($n = 13$)

Applicability perceived as low:

Information/Communication/Media: 2.87 ($n = 15$)
Social Sciences: 2.56 ($n = 39$)
Humanities: 2.50 ($n = 12$)
Computer/Data/Digital: 1.60 ($n = 10$)

By professional role (Q7):

Applicability perceived as low:

Other activity: 2.91 ($n = 23$)
Communication/Counter-Influence: 2.85 ($n = 20$)
Public Protection/Journalism/Education: 2.79 ($n = 14$)
Detection/Monitoring/Analysis: 2.42 ($n = 12$)
Normative/Regulatory/Policy: 2.00 ($n = 12$)
Cybersecurity/Technical: 1.33 ($n = 6$)

Language barrier (English, scientific jargon):

Public Protection/Journalism/Education: 2.71 ($n = 14$)
Communication/Counter-Influence: 2.48 ($n = 21$)
Other activity: 2.41 ($n = 22$)
Detection/Monitoring/Analysis: 2.33 ($n = 12$)
Cybersecurity/Technical: 2.17 ($n = 6$)
Normative/Regulatory/Policy: 1.25 ($n = 12$)

Fear of being accused of censorship:

Normative/Regulatory/Policy: 4.17 ($n = 12$)
Public Protection/Journalism/Education: 4.07 ($n = 15$)

Detection/Monitoring/Analysis: 3.79 ($n = 14$)
Communication/Counter-Influence: 3.57 ($n = 23$)
Other activity: 3.43 ($n = 23$)
Cybersecurity/Technical: 2.83 ($n = 6$)
D4. Summary of heterogeneity patterns

Dimensions with most heterogeneity: Research obstacles (significant across all three grouping variables), obstacles to combating disinformation (strongest single effect, by educational background), threat perception (significant interactions by organization and educational background), and mechanisms of disinformation (by educational background and role).

Dimensions with least heterogeneity: Impact assessment (non-significant by role, $p = .887$, and by organization, $p = .668$), future developments (non-significant by role, $p = .725$), and information-source preferences (non-significant by educational background, $p = .455$, and role, $p = .181$).

Respondents converge on the diagnosis (what causes disinformation, what its consequences are) but diverge on operational constraints (which obstacles matter, how accessible research is, what role censorship fear plays). This pattern is consistent with the diagnosis-capacity mismatch described in the main text: the shared upstream model does not translate into uniform experience of institutional constraints. Educational background is associated with how severe practitioners judge obstacles to action, the only effect that survives correction; perceived barriers to using research varied with professional role, educational background, and organizational type before correction ($p = .004-.006$), but not after (adjusted $p = .058-.061$).

D5. Heatmaps: deviations from item means

The following heatmaps display each group's deviation from the item mean, disaggregated by the three grouping variables (organizational type, educational background, and professional role). The item-level role heatmaps (D6–D33) show the five specific roles; respondents in the “other activity” category are not shown.

Cross-tabulations of grouping variables

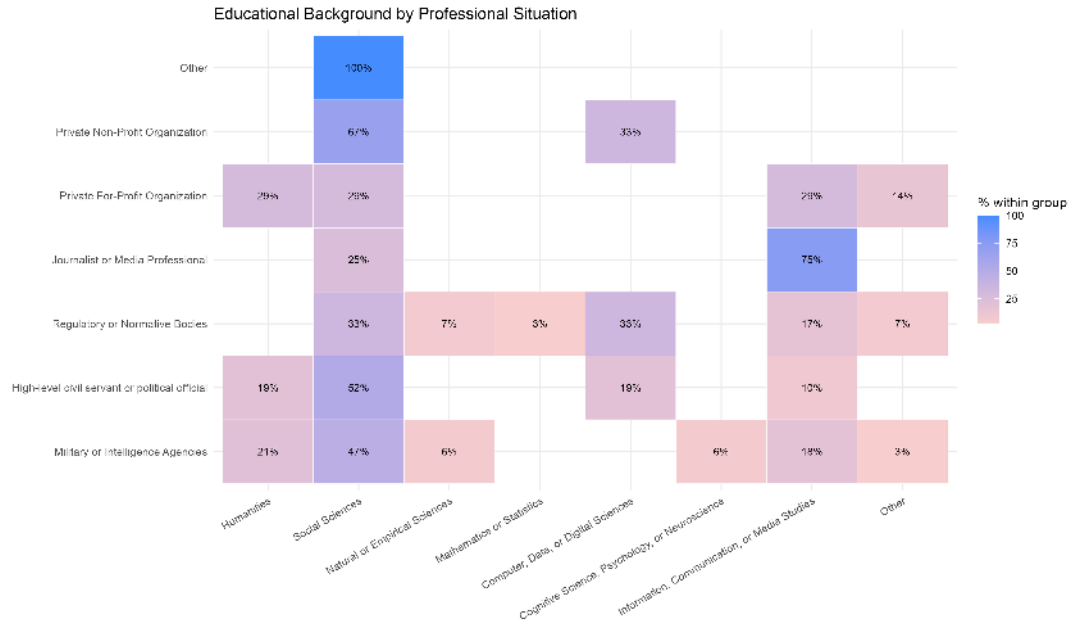


Figure D1. Cross-tabulations of grouping variables: organization type by educational background (N = 103). Cells show row percentages (% within each organization type).

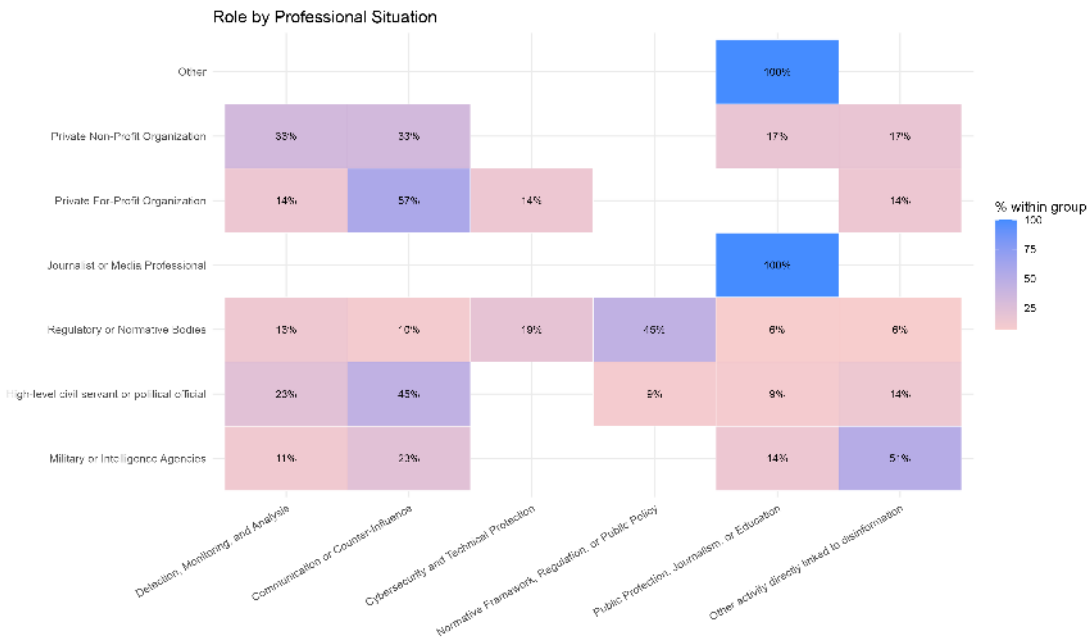


Figure D2. Cross-tabulations of grouping variables: organization type by professional role (N = 106). Cells show row percentages (% within each organization type).

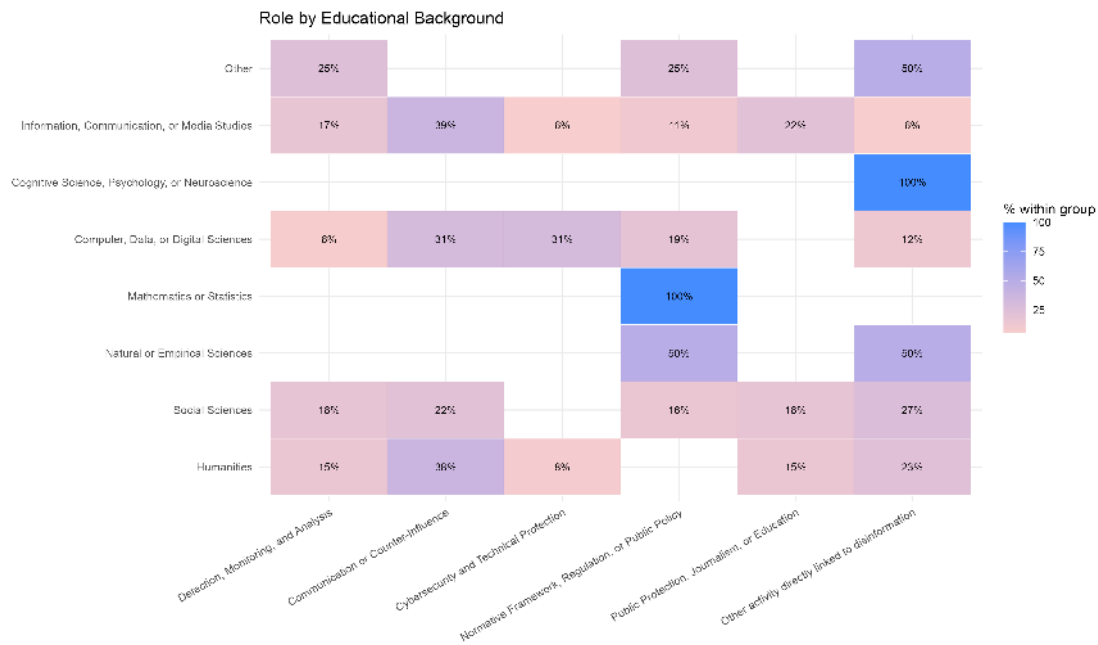


Figure D3. Cross-tabulations of grouping variables: educational background by professional role (N = 103). Cells show row percentages (% within each educational background).

Perceived threats

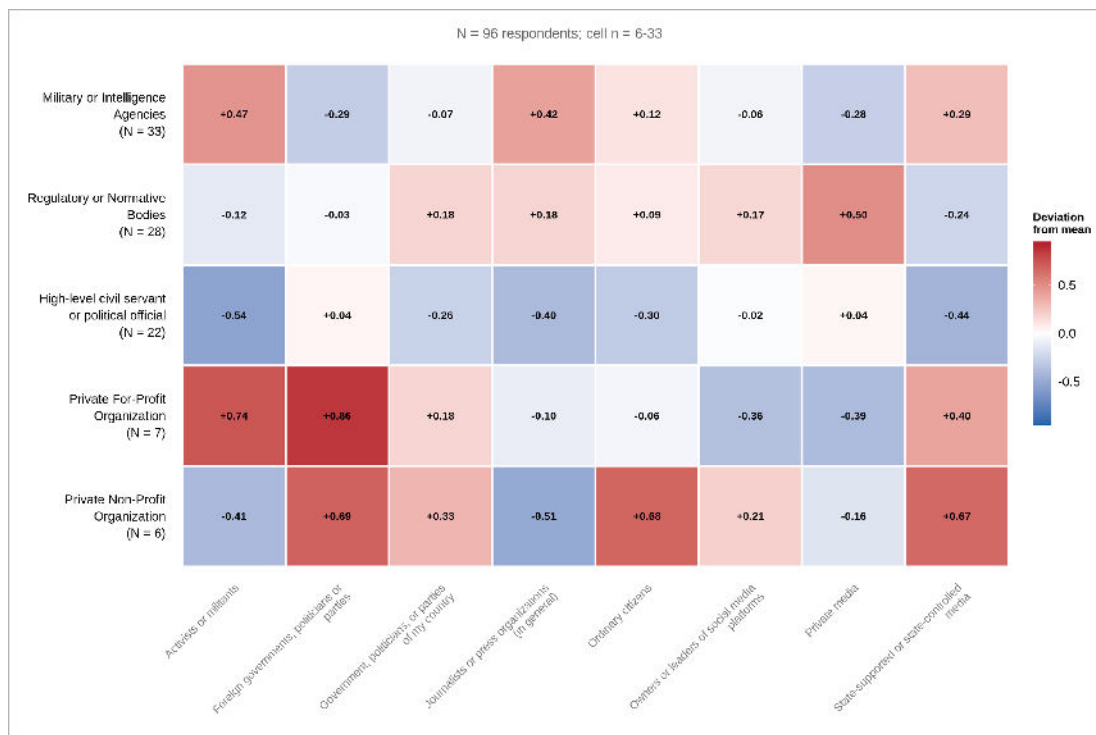


Figure D4. Perceived threats by organization type (N = 96). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

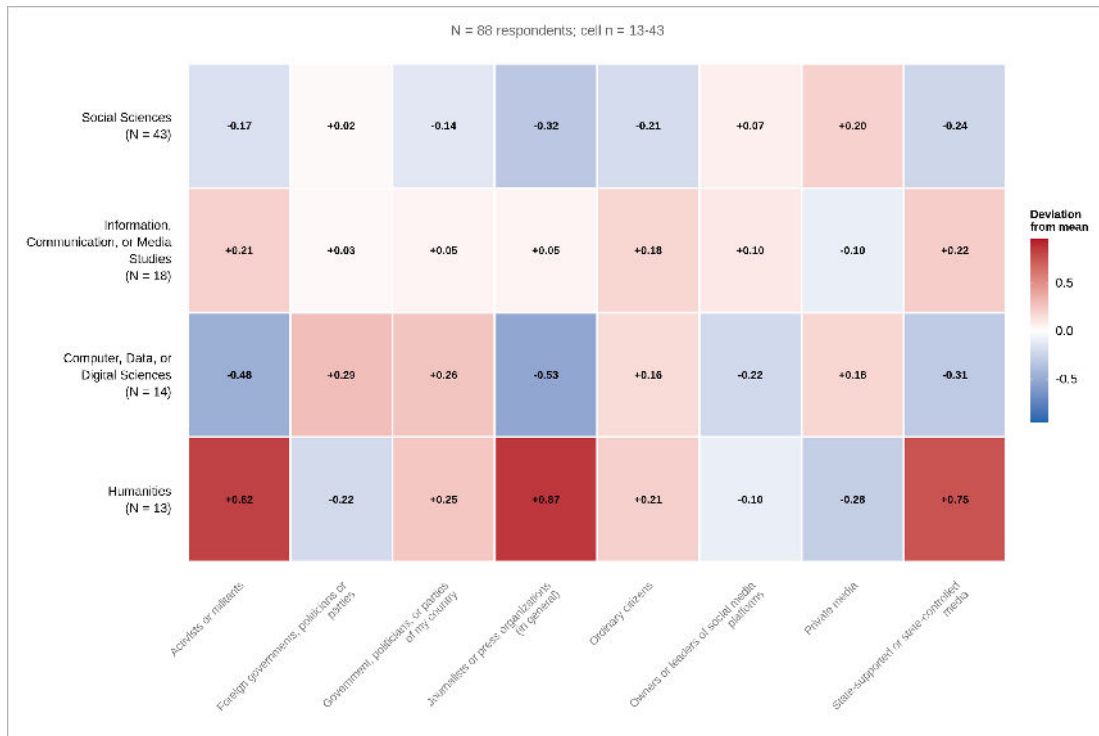


Figure D5. Perceived threats by educational background (N = 88). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.



Figure D6. Perceived threats by professional role (N = 77). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

Perceived impact

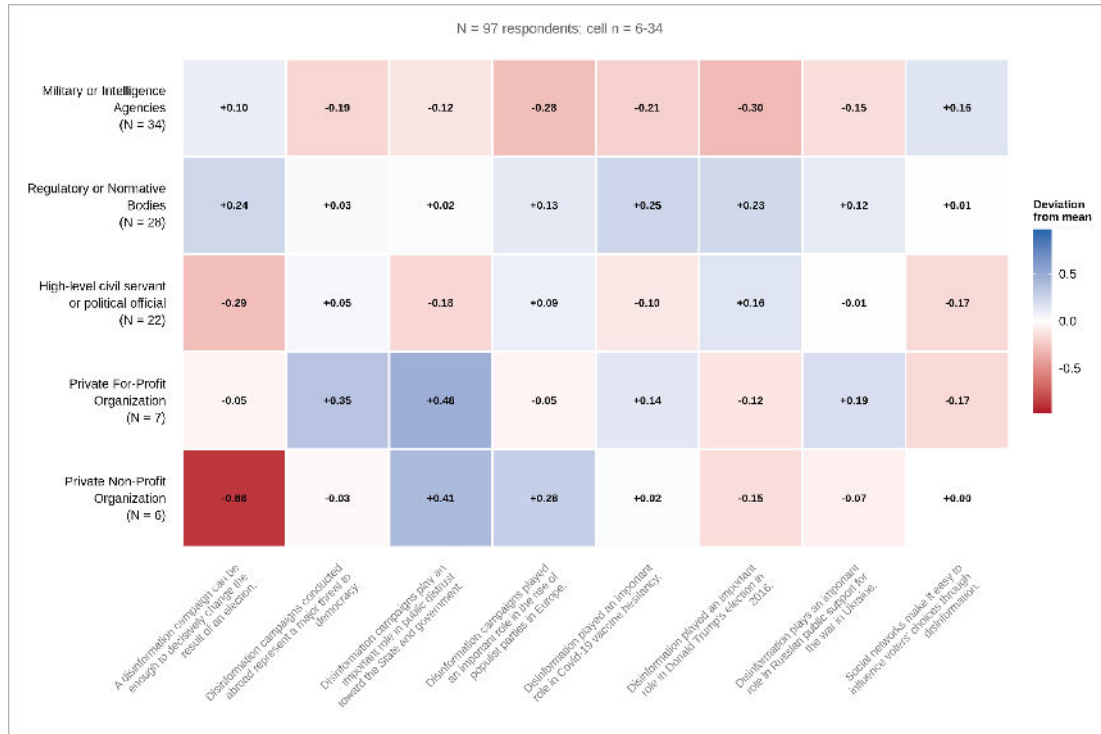


Figure D7. Perceived impact by organization type (N = 97). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

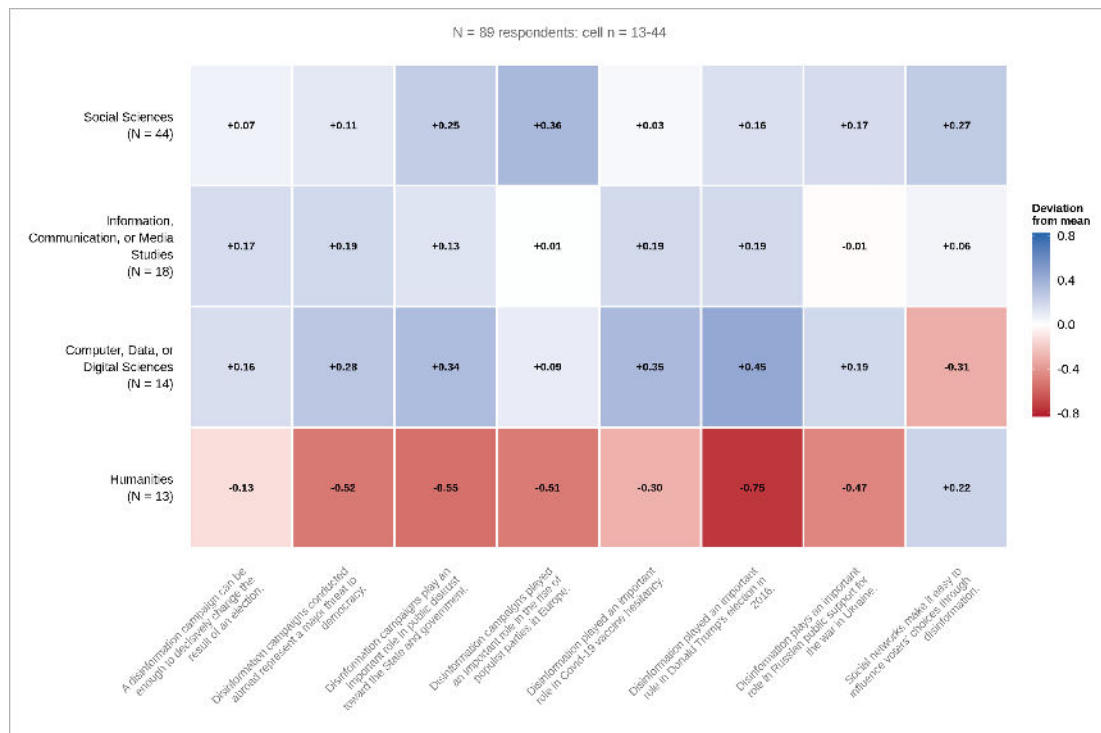


Figure D8. Perceived impact by educational background (N = 89). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

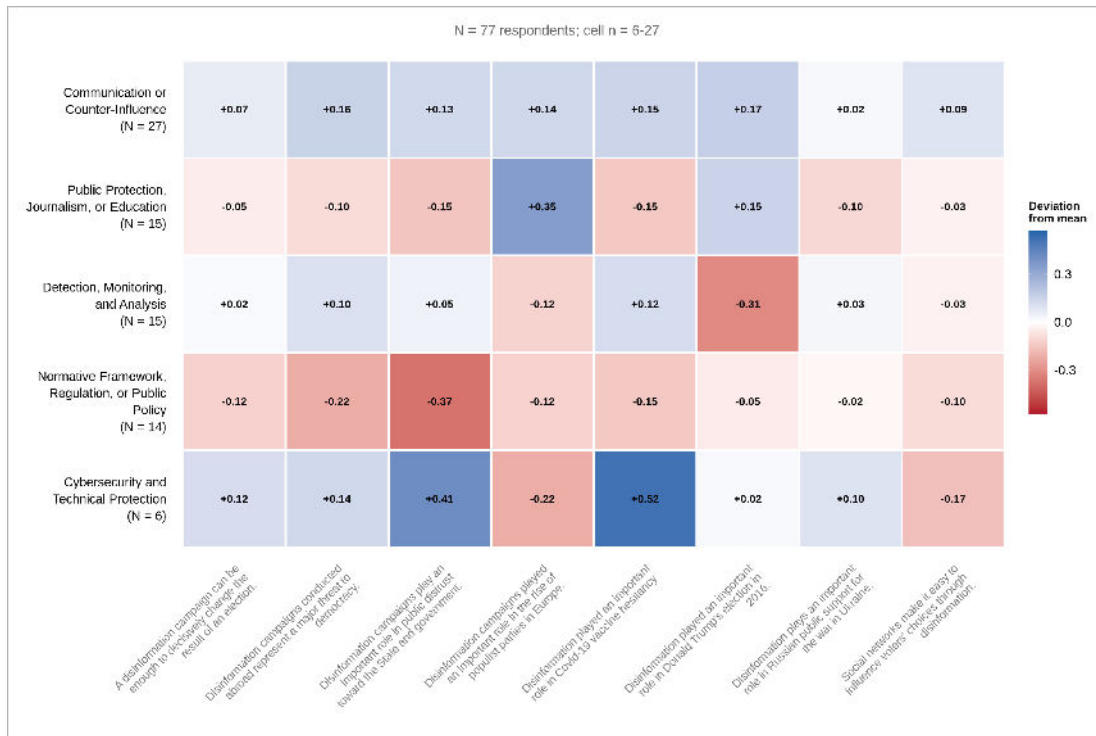


Figure D9. Perceived impact by professional role (N = 77). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

Relative importance

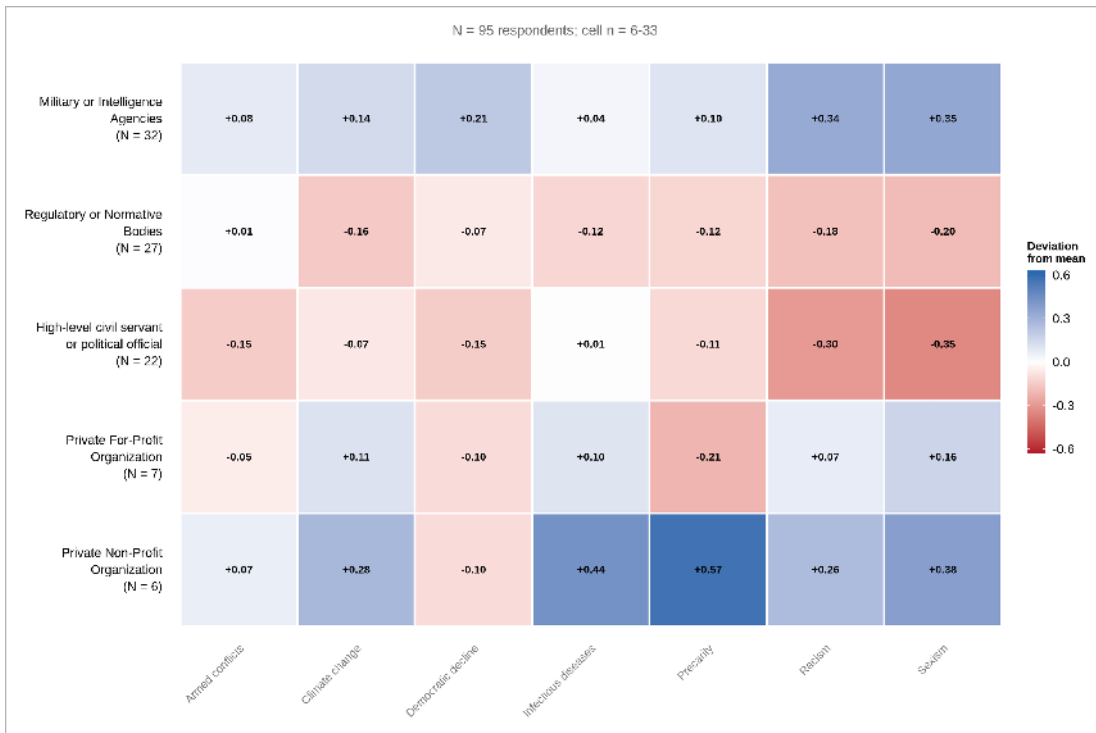


Figure D10. Relative importance by organization type (N = 95). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.



Figure D11. Relative importance by educational background (N = 88). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

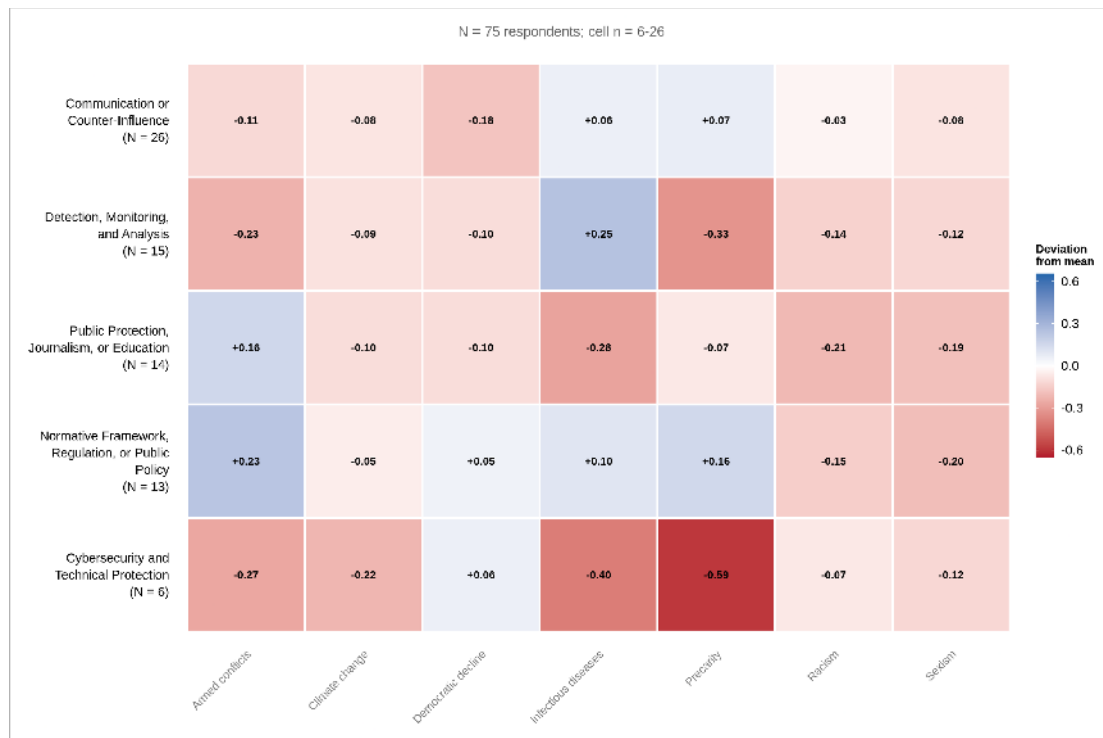


Figure D12. Relative importance by professional role (N = 75). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

Reasons for belief



Figure D13. Reasons for belief by organization type (N = 89). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

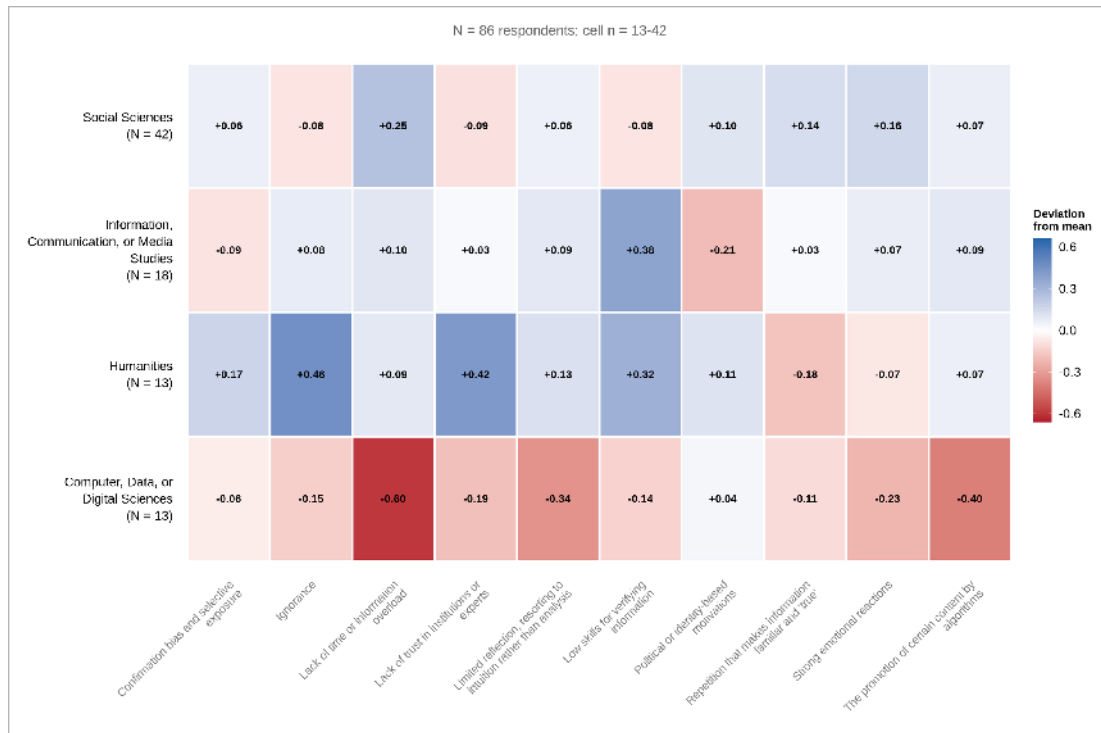


Figure D14. Reasons for belief by educational background (N = 86). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

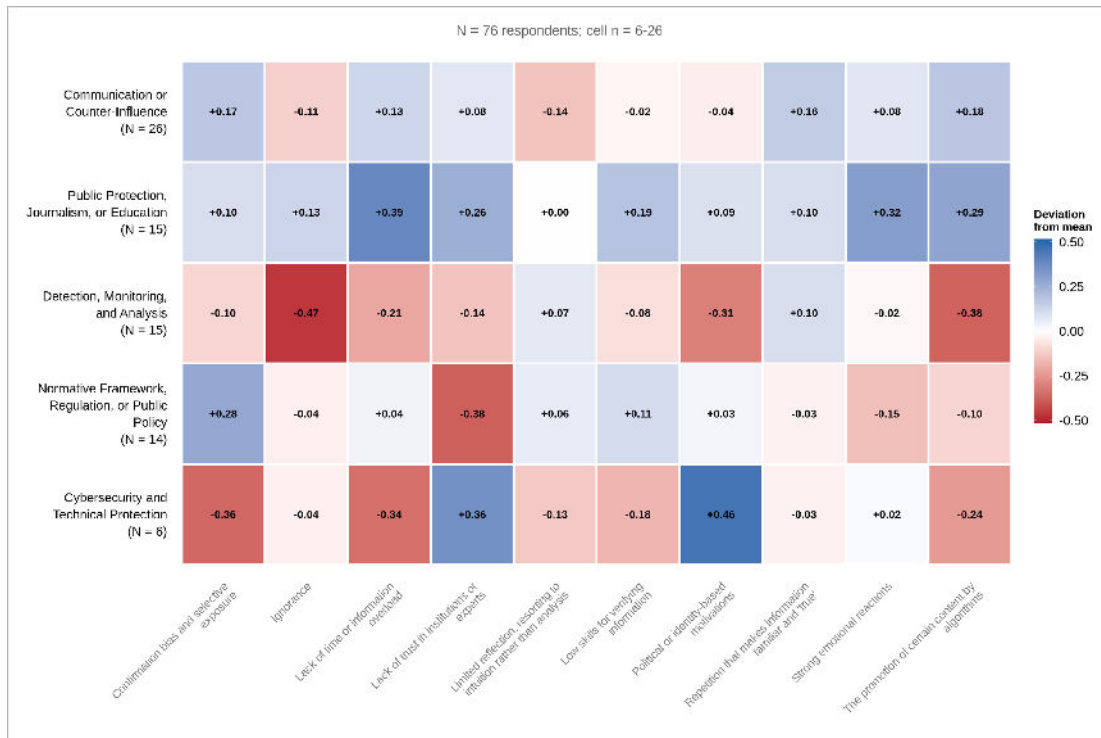


Figure D15. Reasons for belief by professional role (N = 76). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

Mechanisms

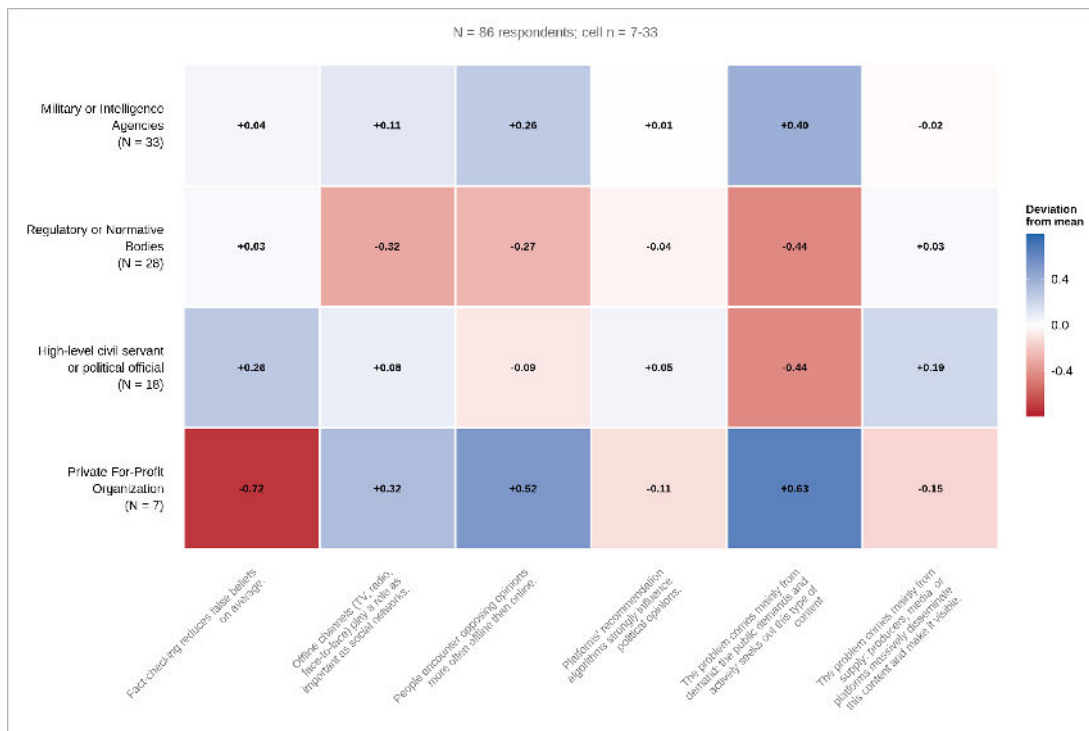


Figure D16. Mechanisms by organization type (N = 86). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.



Figure D17. Mechanisms by educational background (N = 83). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

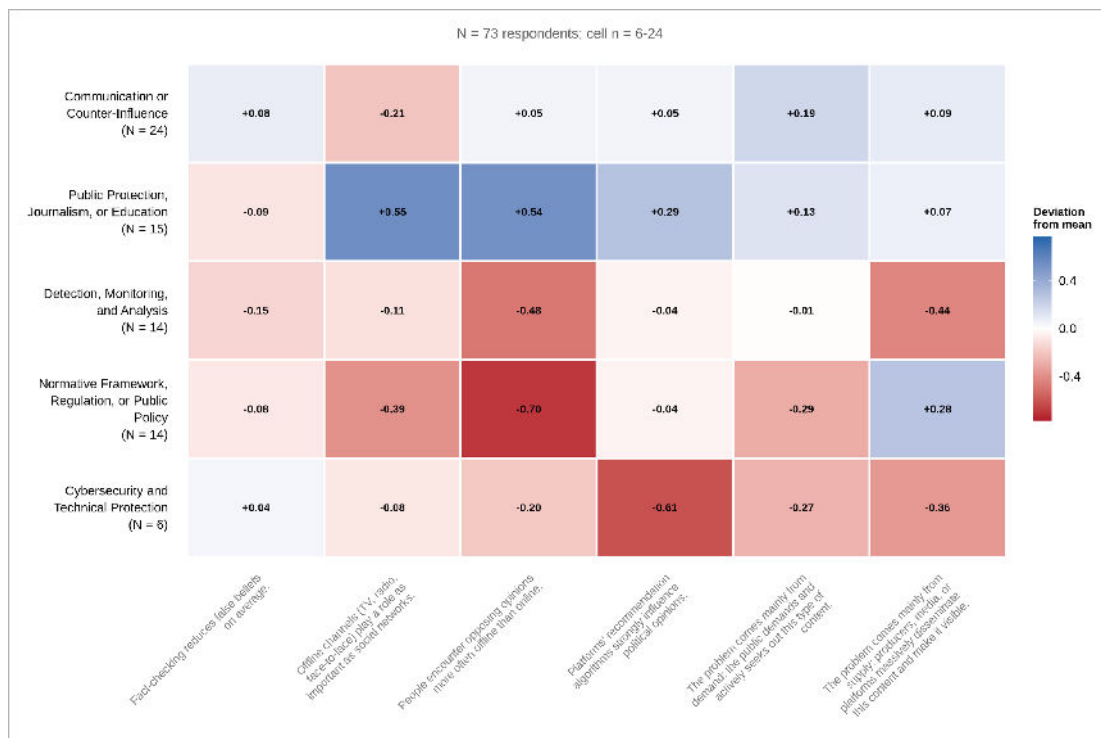


Figure D18. Mechanisms by professional role (N = 73). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

Obstacles

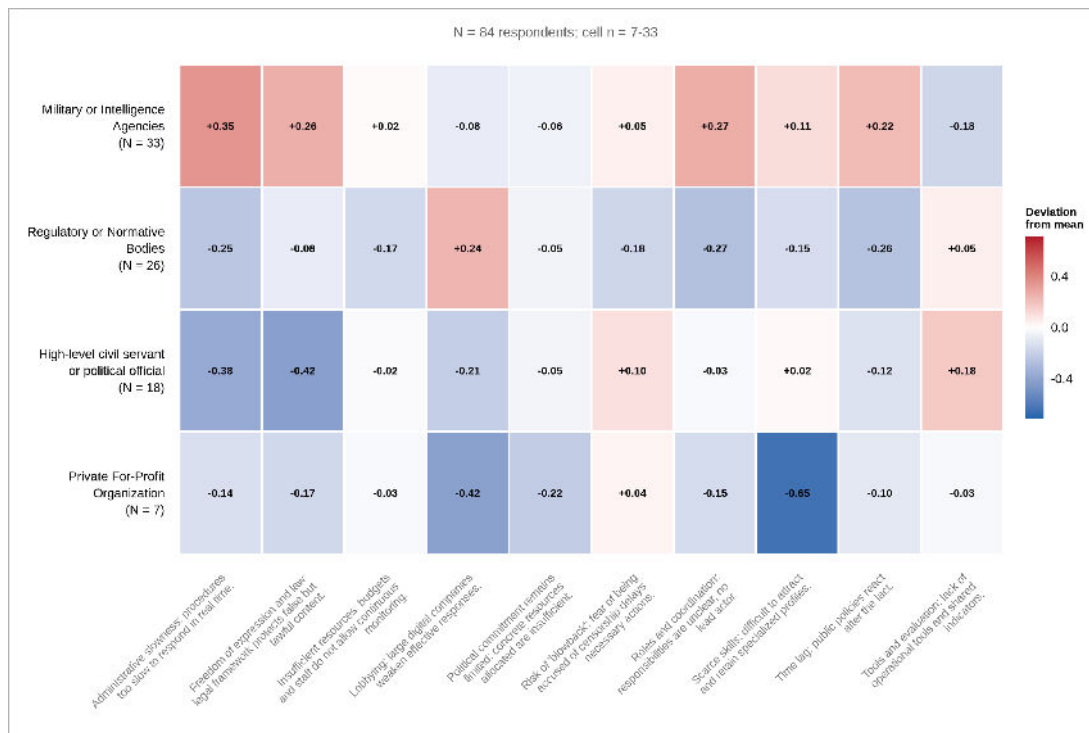


Figure D19. Obstacles by organization type (N = 84). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

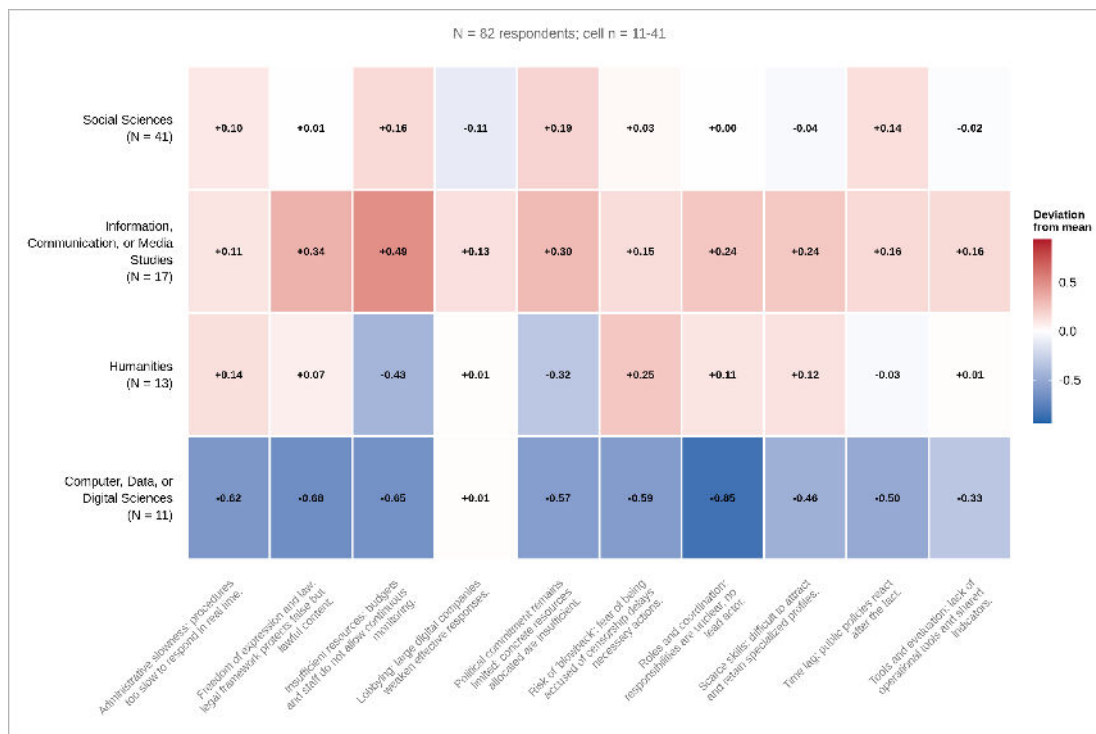


Figure D20. Obstacles by educational background (N = 82). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.



Figure D21. Obstacles by professional role (N = 70). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

Research obstacles

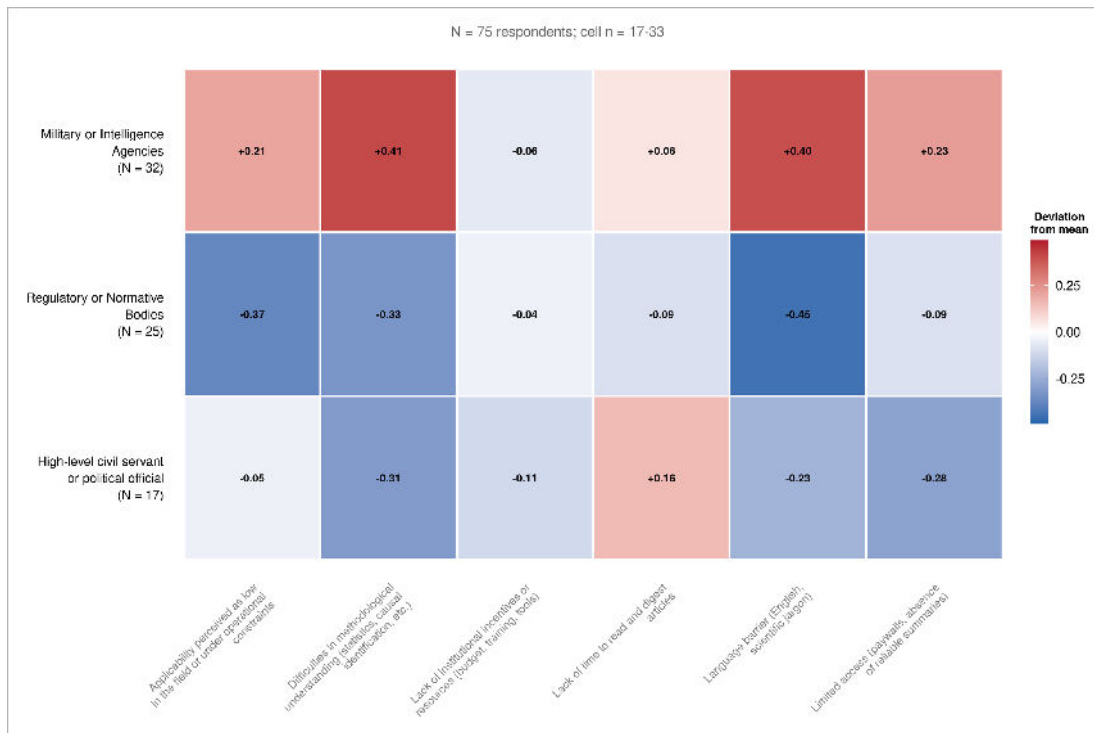


Figure D22. Research obstacles by organization type (N = 75). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

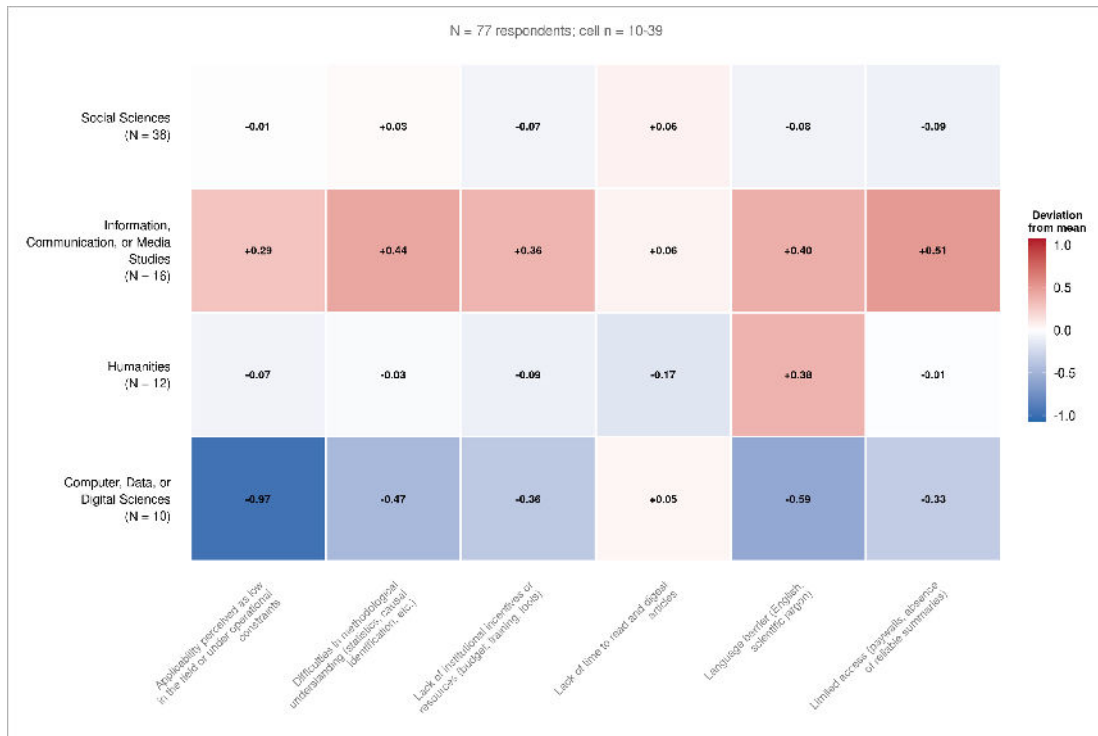


Figure D23. Research obstacles by educational background (N = 77). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

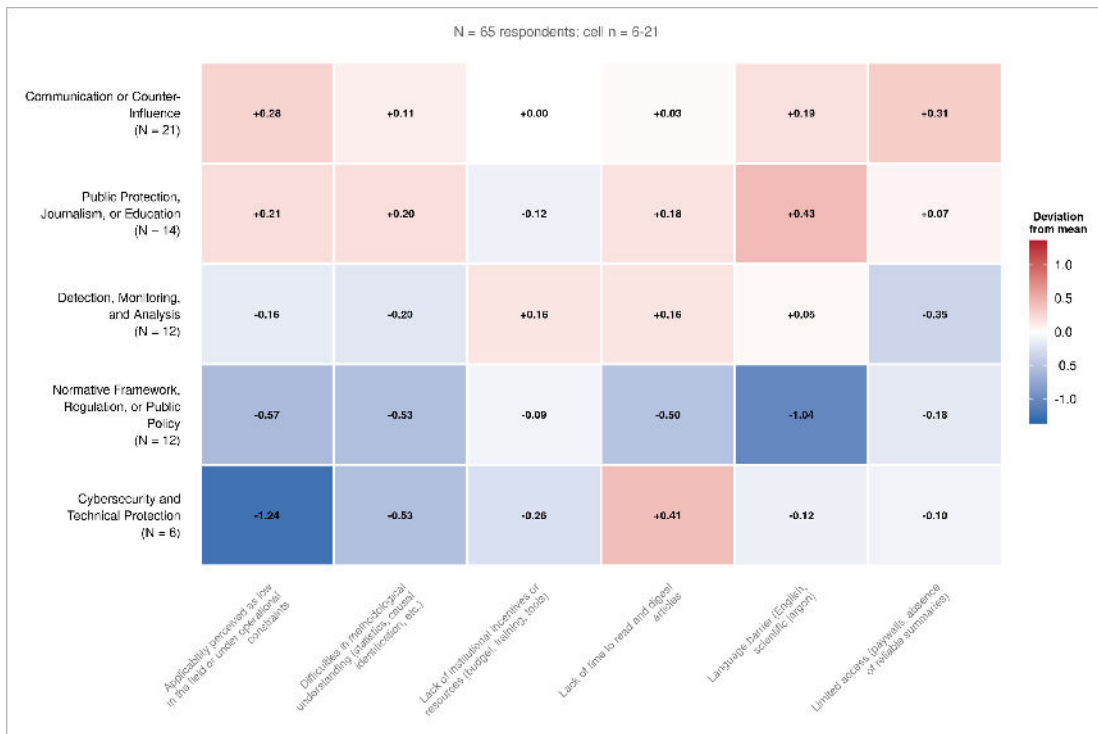


Figure D24. Research obstacles by professional role (N = 65). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

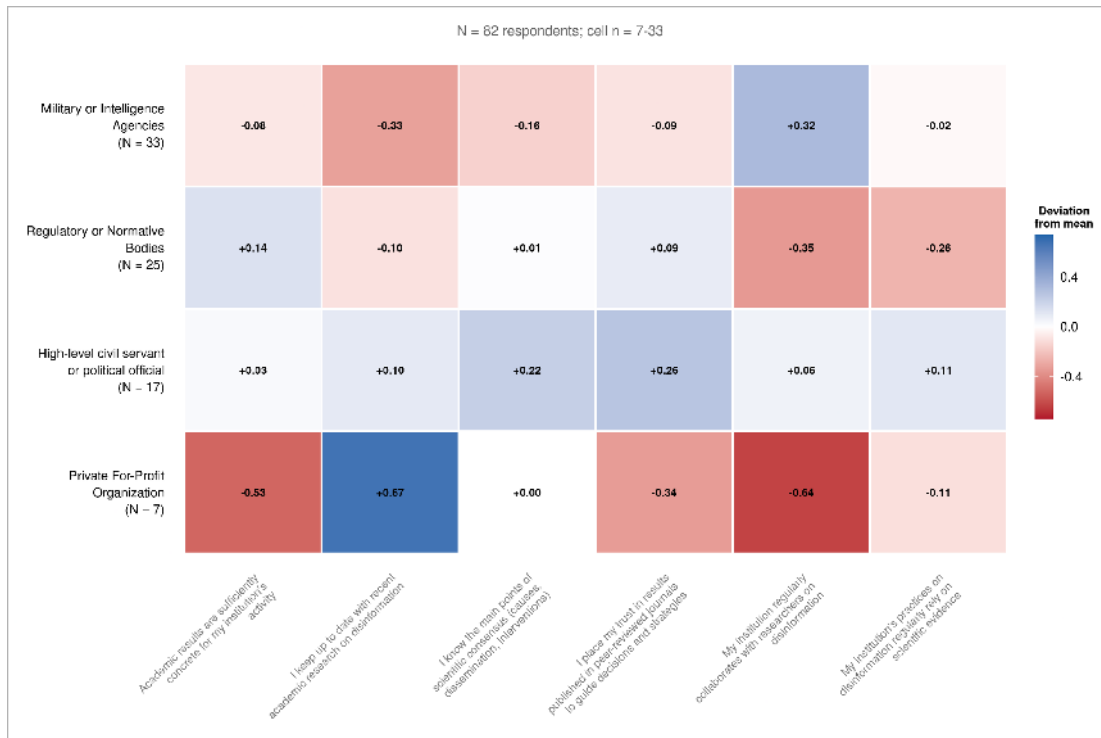


Figure D25. Research use by organization type (N = 82). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

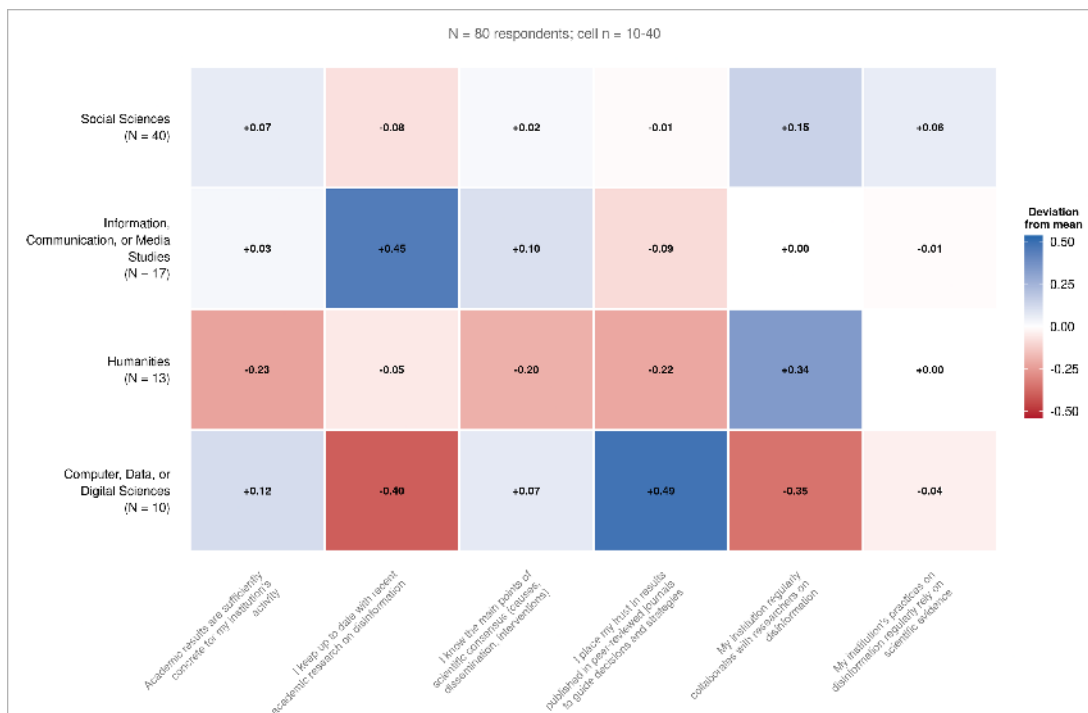


Figure D26. Research use by educational background (N = 80). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

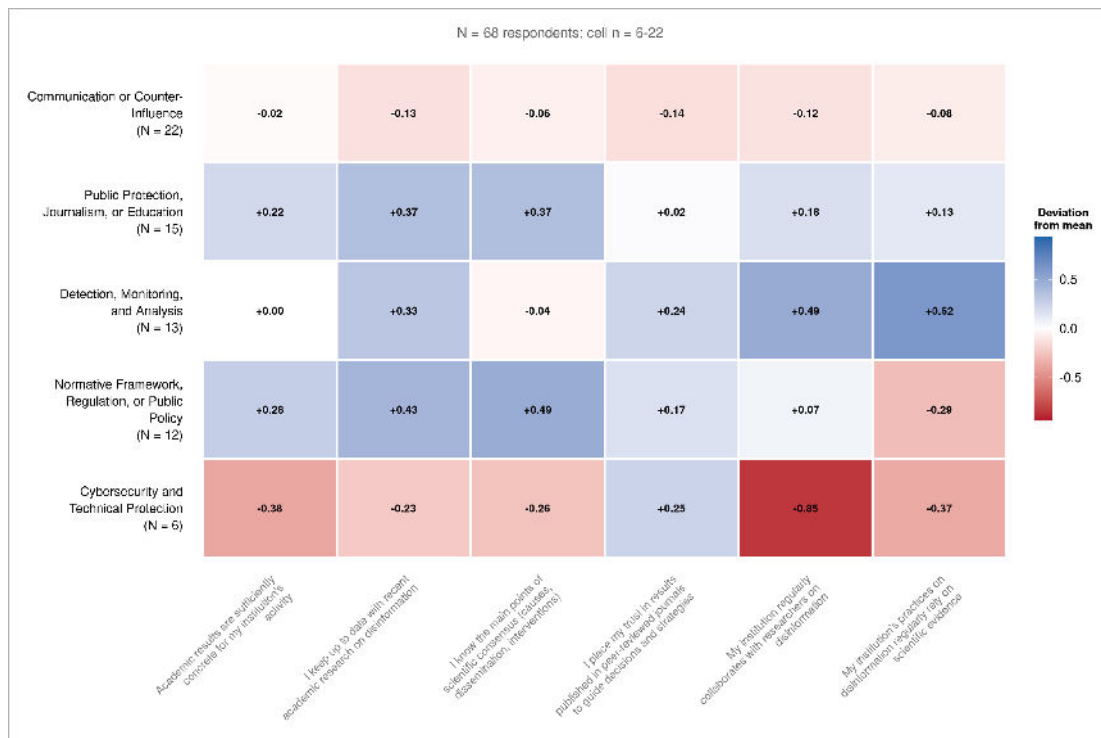


Figure D27. Research use by professional role (N = 68). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

Information sources

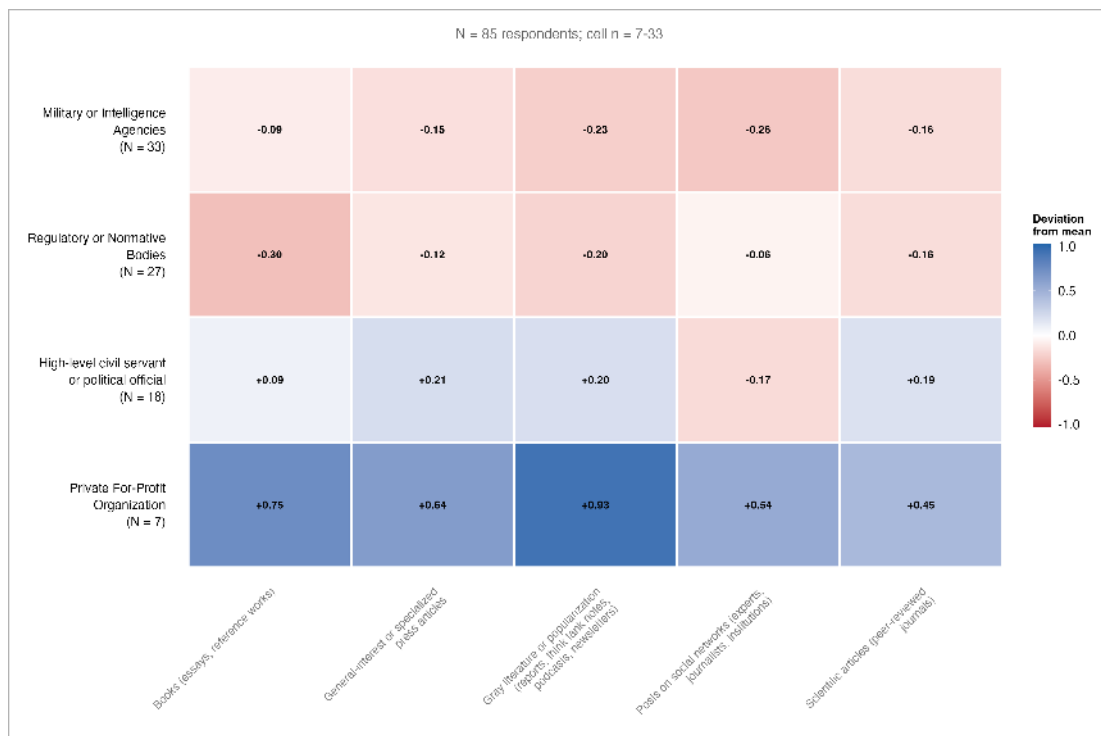


Figure D28. Information sources by organization type (N = 85). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

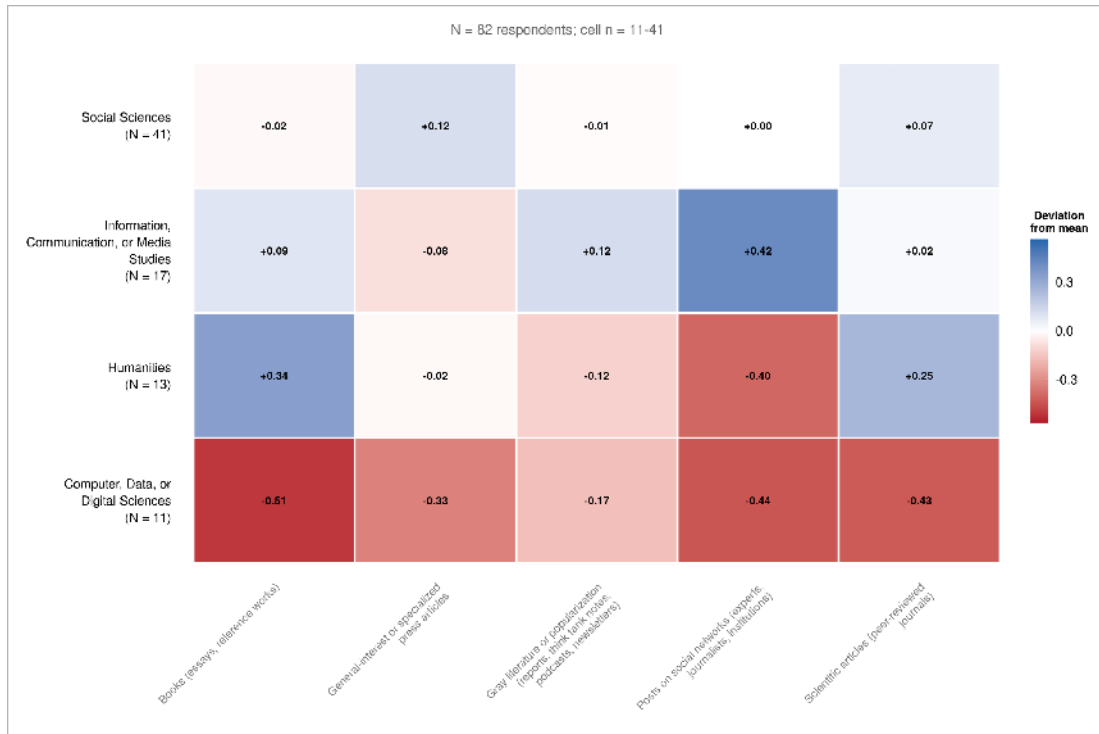


Figure D29. Information sources by educational background (N = 82). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

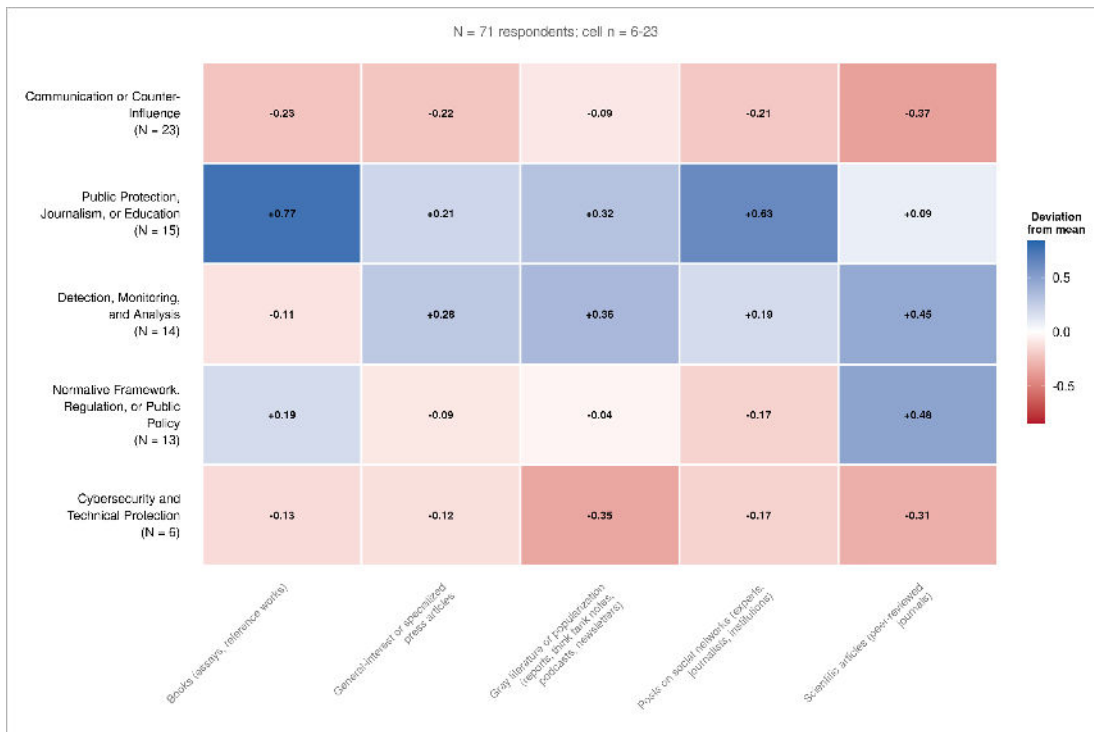


Figure D30. Information sources by professional role (N = 71). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

Expected evolution

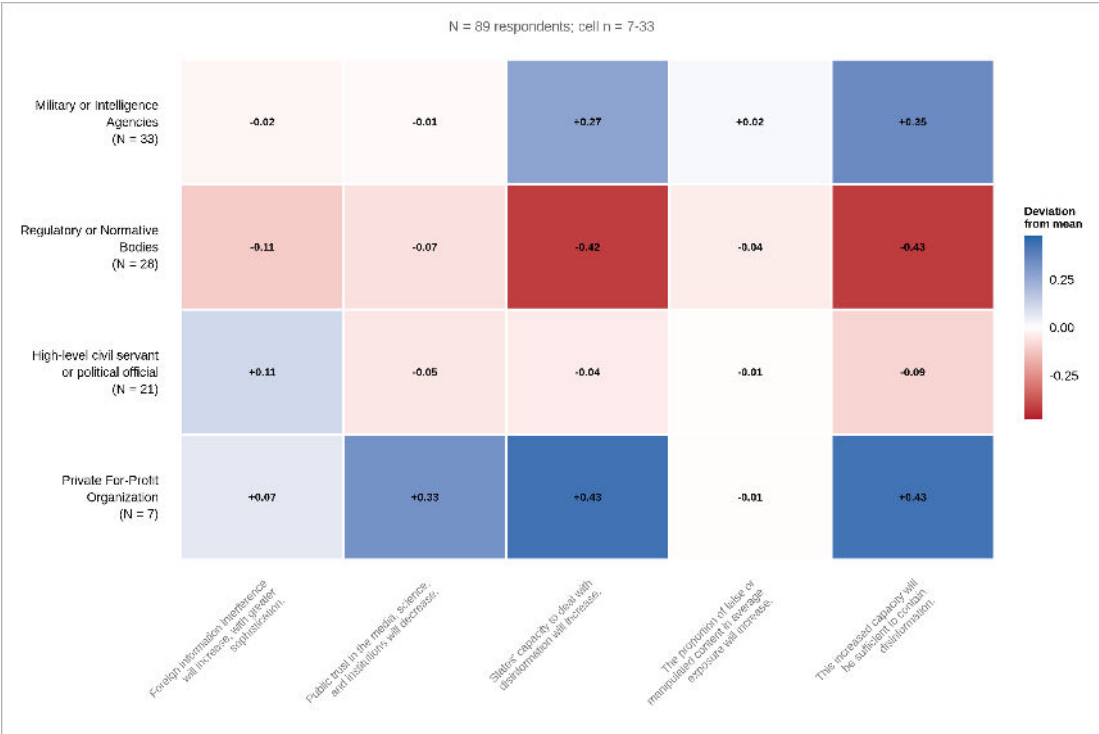


Figure D31. Expected evolution by organization type (N = 89). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

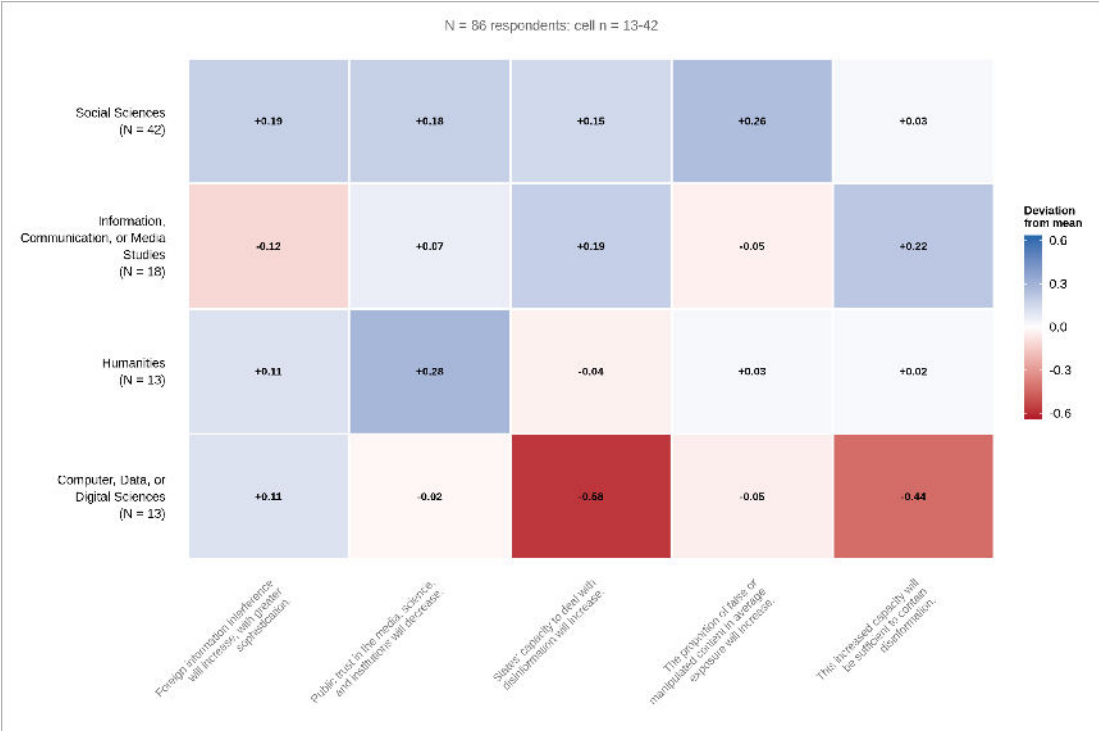


Figure D32. Expected evolution by educational background (N = 86). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.



Figure D33. Expected evolution by professional role (N = 76). Cells show deviations from the item mean. Subgroup Ns vary; results are exploratory.

D.6 Public versus private organizations

To assess whether the underrepresentation of non-state actors affects the aggregate results, we compared respondents from public-sector institutions (military or military-affiliated institutions, senior government and central administration, independent regulatory authorities; Q3 categories 1–3, $n = 88$) and respondents from private and non-state organizations (journalism and media, private for-profit, private non-profit; Q3 categories 4–6, $n = 17$). One respondent reporting an “other” affiliation was excluded. For each of the ten question blocks, we estimated a linear mixed-effects model with the same structure as in D.1 (response $\sim$ group $\times$ item, random intercept per respondent, REML), with the public/private indicator as the grouping variable. These models were fitted in R with lme4 (Bates et al., 2015); inference uses Wald chi-square tests with sum-to-zero contrasts, so the group test reflects a main effect averaged across items. The resulting 20 p-values (10 blocks $\times$ group main effect and group $\times$ item interaction) were corrected with the Benjamini–Hochberg procedure as one family. Given the size of the private group, item-level contrasts have a minimum detectable effect of $d \approx 0.74$ ($\alpha = .05$, 80% power); non-significant results should accordingly be read as an absence of detectable differences, not as evidence that no differences exist.

One effect survived correction: a group main effect on information sources (Q19; Wald $\chi^2 = 9.41$, $df = 1$, $p_{\text{raw}} = .002$, $p_{\text{adj}} = .043$). Private and non-state respondents reported more frequent use of most information channels, with the largest item-level contrasts on posts on social networks (public $M = 3.00$ vs. private $M = 4.00$, $d = -0.87$), gray literature (3.23 vs. 4.00, $d = -0.68$), and books (2.85 vs. 3.60, $d = -0.66$). Two interactions approached but did not reach the corrected threshold (both $p_{\text{adj}} = .063$): perceived threats (Q10; $\chi^2 = 18.90$, $df = 7$), where public respondents rated journalists and press organizations as a greater threat ($d = 0.55$) while private respondents rated foreign governments higher ($d = -0.54$), and research engagement (Q22; $\chi^2 = 15.21$, $df = 5$), where the gap concentrated on keeping up to date with recent academic research (2.75 vs. 3.67, $d = -0.80$). All remaining tests were non-

significant, including every group main effect on the substantive blocks: relative importance, perceived impact, perceived threats, reasons for belief, mechanisms of spread, obstacles, research obstacles, and expected developments.

In sum, public and private respondents in this sample do not detectably differ in their substantive diagnosis of the disinformation problem; the detectable differences concern information practices.