Experimental economics

Lecture 8: Data analysis

Matej Lorko
matej.lorko@euba.sk
Materiály: www.lorko.sk/lectures

Case study

Russo-Ukrainian war disinformation: the effect of debunking vs. prebunking

Link: https://osf.io/preprints/psyarxiv/w3mfy

Institute of Experimental Psychology - Matej Lorko, Vladimíra Čavojová, Jakub Šrol
Insittute for Financial Policy - Richard Priesol, Paulína Jalakšová, Berenika Tužilová

Research questions

- Does debunking intervention lower the trust in Russo-Ukrainian war disinformation?
- Does prebunking intervention lower the trust in Russo-Ukrainian war disinformation?
- Does debunking intervention yield stronger effect than prebunking intervention?

Experimental design (simplified)

- Laborarory experiment on student sample with 2 sessions, 2 weeks apart

Treatment	Measurement 1	Message (within Measurement 1)	Measurement 2	Other measures
Control	5 disinformation	Neutral message about war	5 disinformation	
Prebunk		Message revealing disinformation	5 disinformation	· Demographics · Attitutes towards war, Russia, Ukraine, West
Debunk	5 disinformation	Message revealing disinformation	5 disinformation	

Data

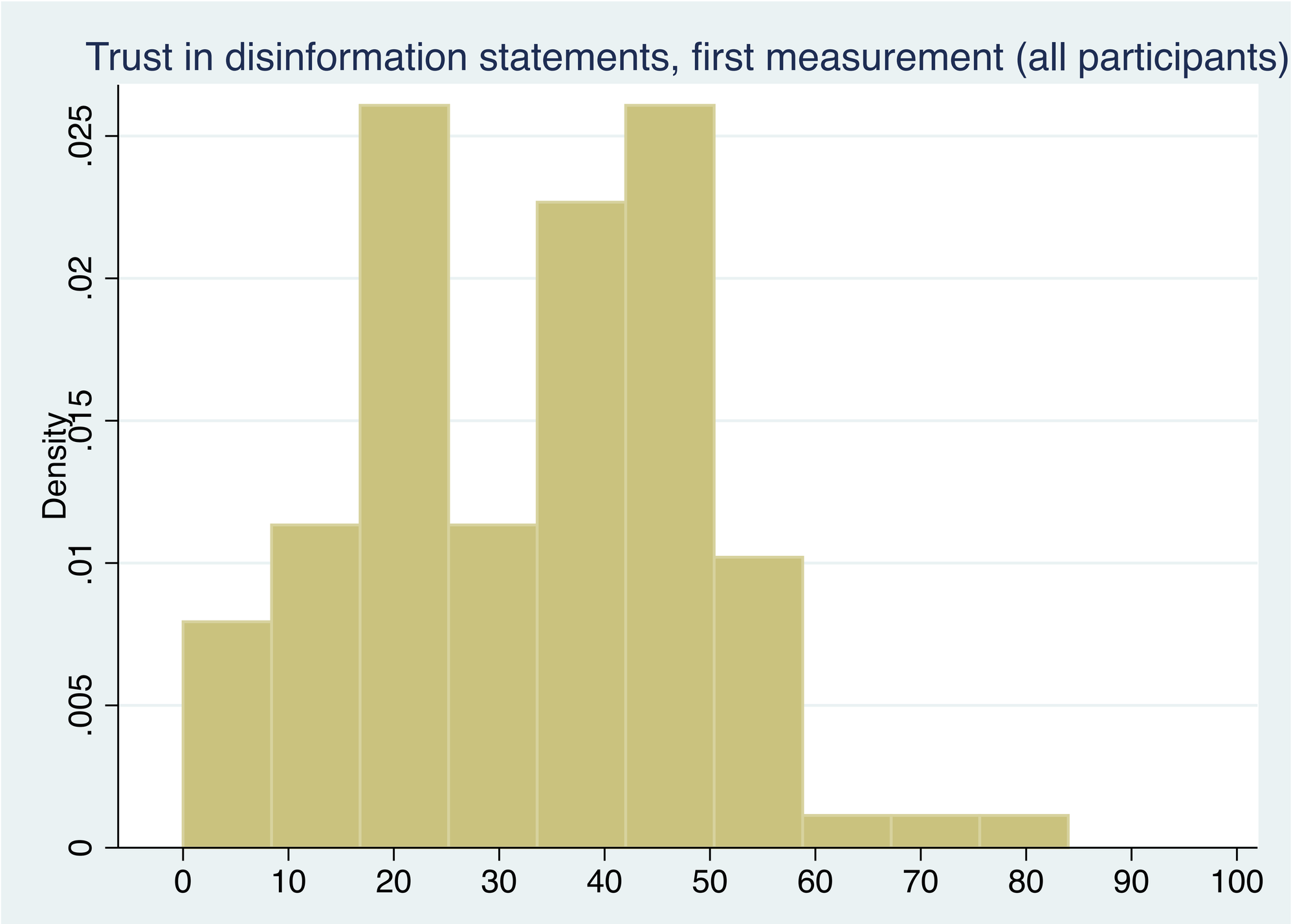
	treatment	Int_time	Dezinfo	Dezinfo_2	blames_west	blames_rus	blames_ukr	rus_fan	ukr_fan	female	age	Control	Prebunk	Debunk
184	1	66.843	.	44	1	1	1	1	0	0	21	1	0	0
185	1	42.906	.	38.6	0	0	0	0	1	1	21	1	0	0
186	1	41.25	.	30	0	1	0	0	1	1	22	1	0	0
187	1	35.656	.	12	0	1	0	0	1	0	21	1	0	0
188	1	59.265	.	20.6	1	1	0	0	1	0	22	1	0	0
189	1	36.453	.	36.2	1	1	1	0	1	1	22	1	0	0
190	4	149.359	44.6	14.6	0	1	0	0	1	1	22	0	0	1
191	4	102.843	23.2	57.8	0	1	0	0	1	1	21	0	0	1
192	4	93.703	43.8	12.6	0	0	0	0	0	0	22	0	0	1
193	4	106.093	60	84.8	0	1	0	0	1	1	22	0	0	1
194	4	96.265	45.4	49.2	0	1	0	0	1	1	21	0	0	1
195	4	116.828	7	17.4	0	1	0	0	1	0	22	0	0	1
196	4	139.156	84	40	1	0	1	1	0	0	21	0	0	1
197	4	199.687	10	10	0	1	0	0	1	1	22	0	0	1
198	4	178.672	36.2	28.4	1	1	0	0	1	0	21	0	0	1
199	4	74.843	28.4	27.4	0	1	0	0	1	0	23	0	0	1
200	4	142.937	30	4	0	0	0	0	0	1	23	0	0	1
201	4	133.062	57.6	57	0	1	0	0	1	1	23	0	0	1
202	4	122.047	19.8	37.8	0	1	0	0	1	0	22	0	0	1
203	4	93.156	31	12.4	0	1	0	0	1	1	22	0	0	1
204	4	119.687	29	25.2	0	1	0	0	1	1	22	0	0	1

Codebook

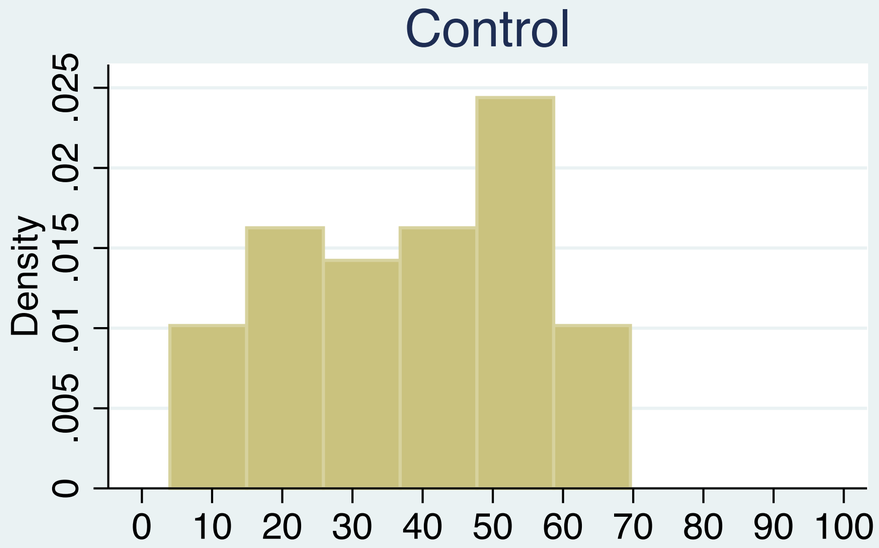
- treatment - Control (1,2), Prebunk (3), Debunk (4)
- Int_time - Time spent reading the message (seconds)
- Dezinfo - average trust in 5 war disinformation, first measurement (0-100%)
- Dezinfo_2 - average trust in 5 war disinformation, second measurement (0-100%)
- blames_west - assigns blame for war to West (0 no, 1 yes)
- blames_rus - assigns blame for war to Russia (0 no, 1 yes)
- blames_ukr - assigns blame for war to Ukraine (0 no, 1 yes)
- rus_fan - wishes that Russia wins (0 no, 1 yes)
- ukr_fan - wishes that Ukraine wins (0 no, 1 yes)
- female - gender (0 male, 1 female)
- age - age (years)
- Control - was in a Control treatment (0 no, 1 yes)
- Prebunk - was in a Prebunk treatment (0 no, 1 yes)
- Debunk - was in a Debunk treatment (0 no, 1 yes)

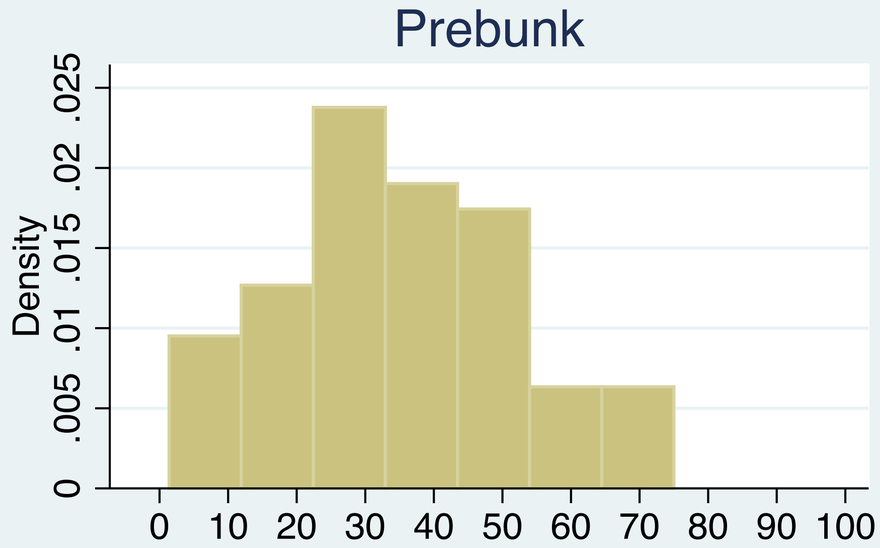
Descriptive statistics

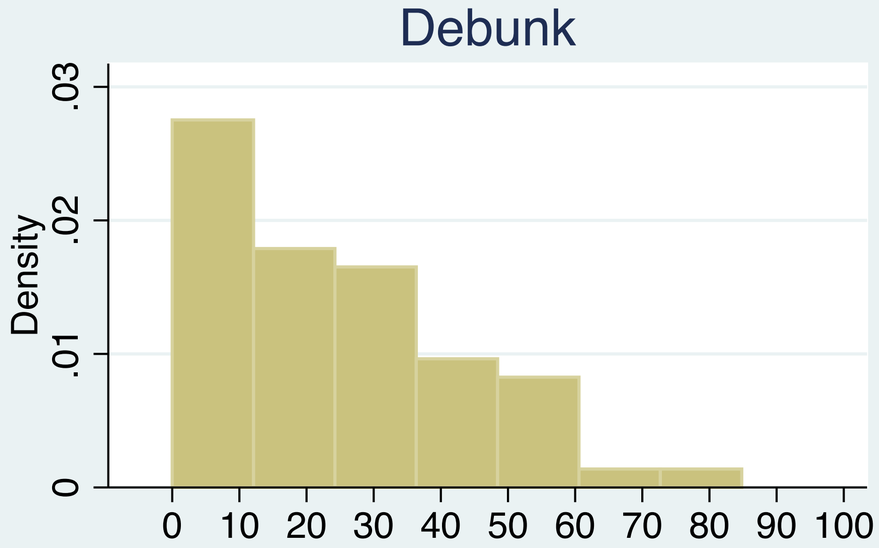
Treatment	Control	Prebunk	Debunk
N (number of observations)	45	60	60
Females	47%	57%	50%
Age (years, SD)	22.7 (4.1)	22.2 (0.9)	22.4 (1.9)
Time spent reading (sec, SD)	63.8 (30.6)	123.8 (32.6)	116.1 (30.2)
Trust in disinfo 1 (%, SD)	32.4 (15.7)		32.6 (16.6)
Trust in disinfo 2 (%, SD)	37.5 (17.2)	34.5 (17.3)	23.1 (19.8)
Blames West	16%	25%	15%
Blames Russia	87%	95%	92%
Blames Ukraine	13%	22%	10%
Wishes Russia to win	4%	0%	3%
Wishes Ukraine to win	73%	87%	85%

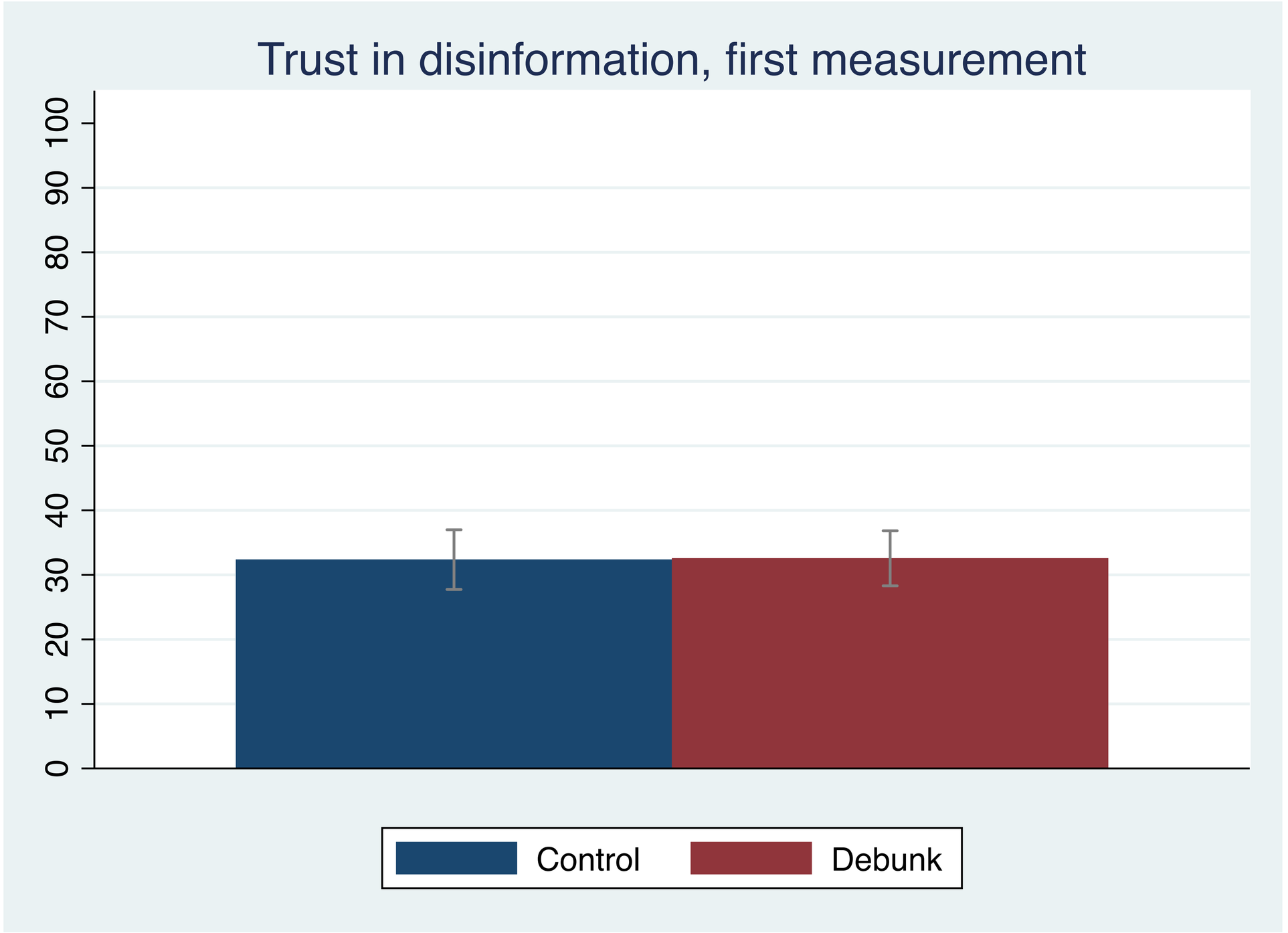

Trust in disinformation statements, first measurement (all participants)
Density
0
.005
.01
.015
.02
.025
0
10
20
30
40
50
60
70
80
90
100

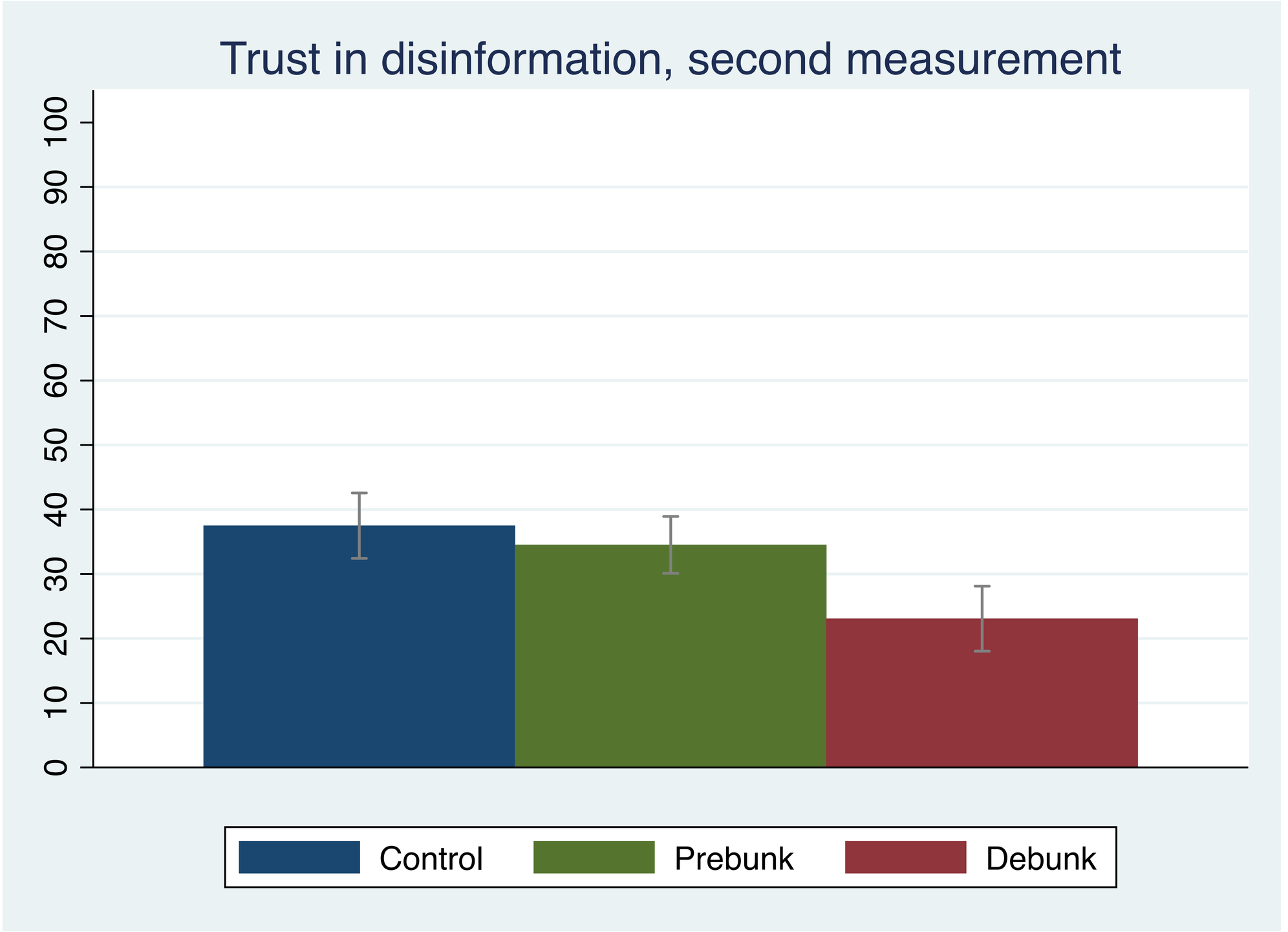
Trust in disinformation statements, second measurement

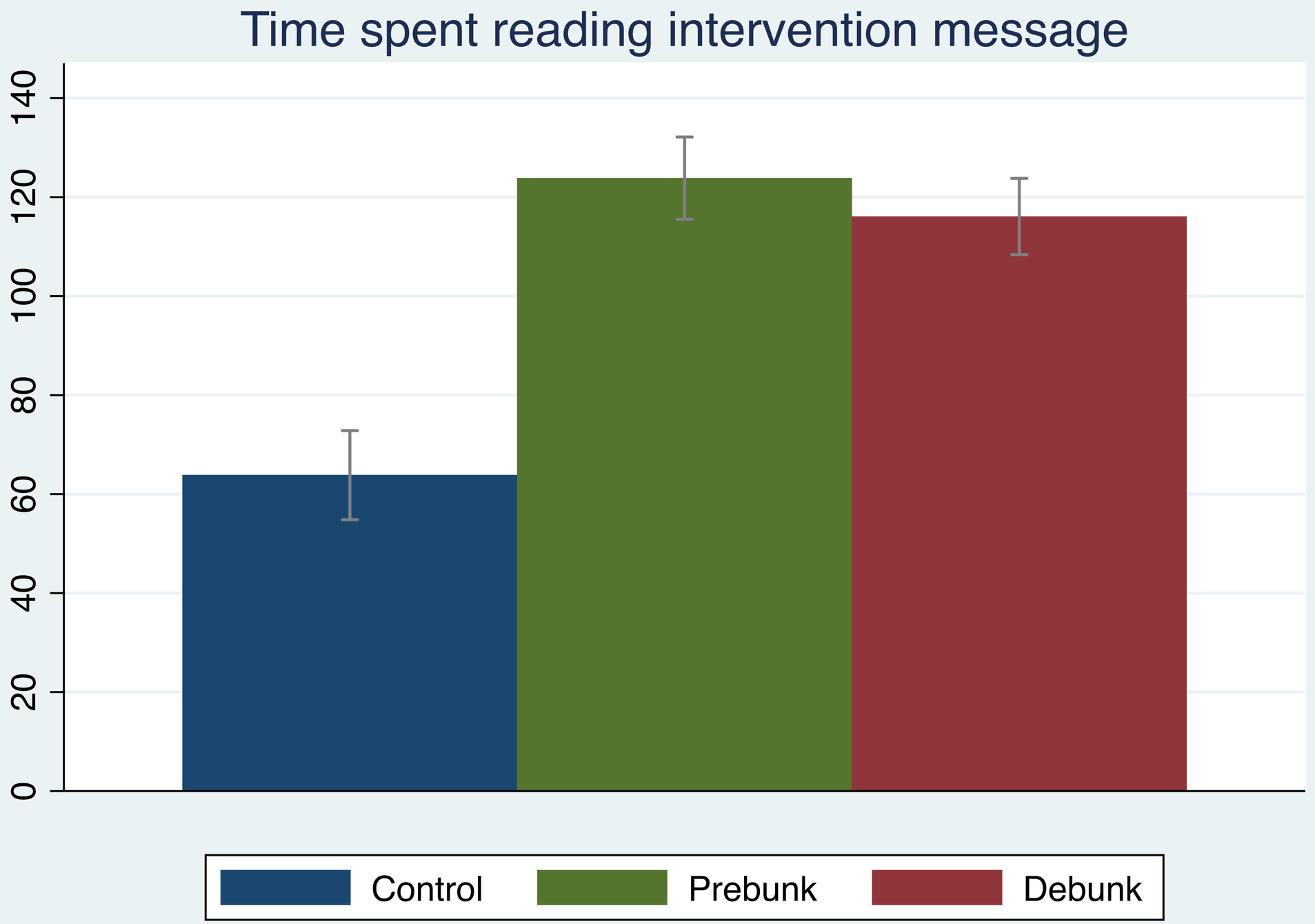


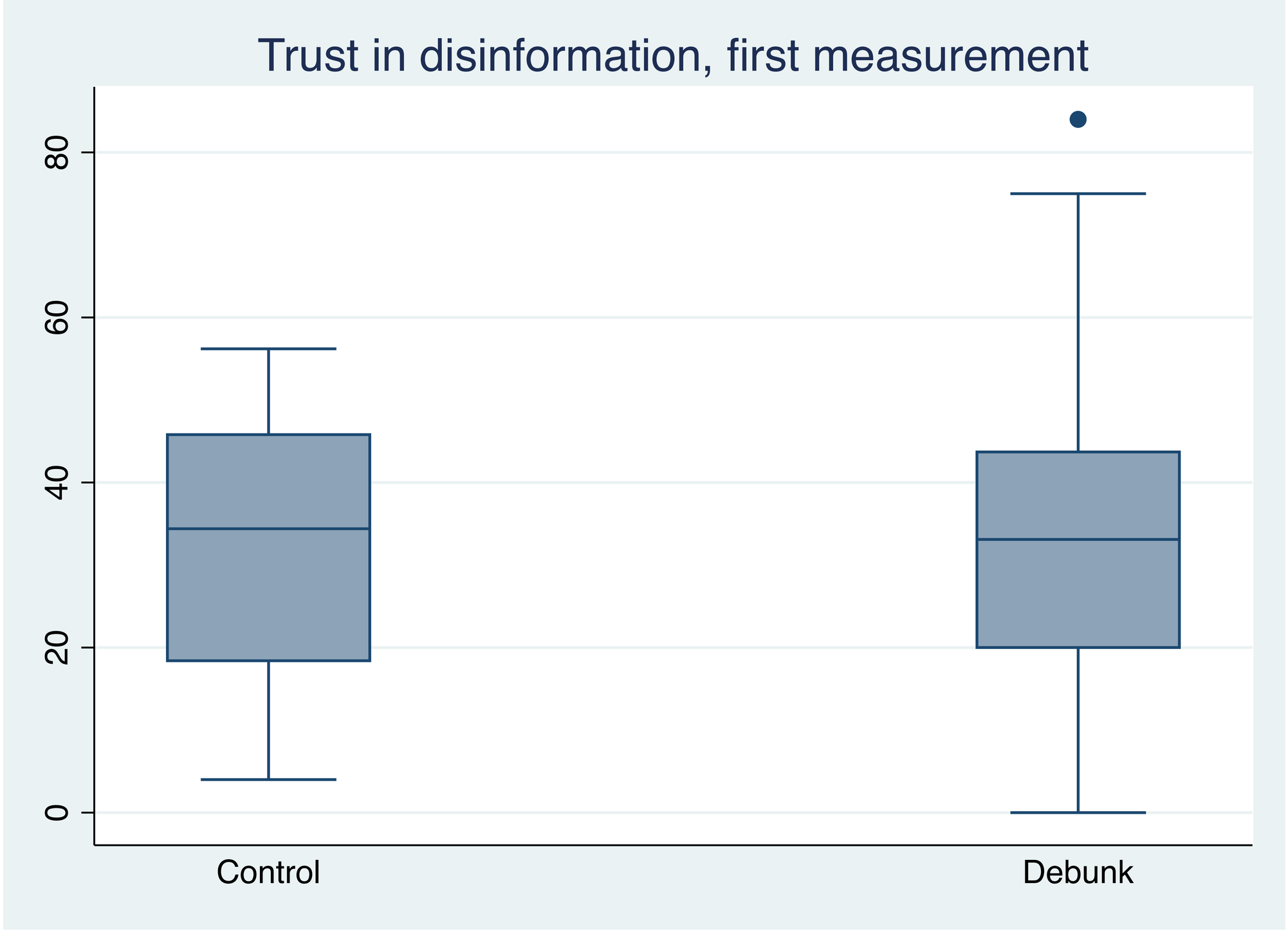


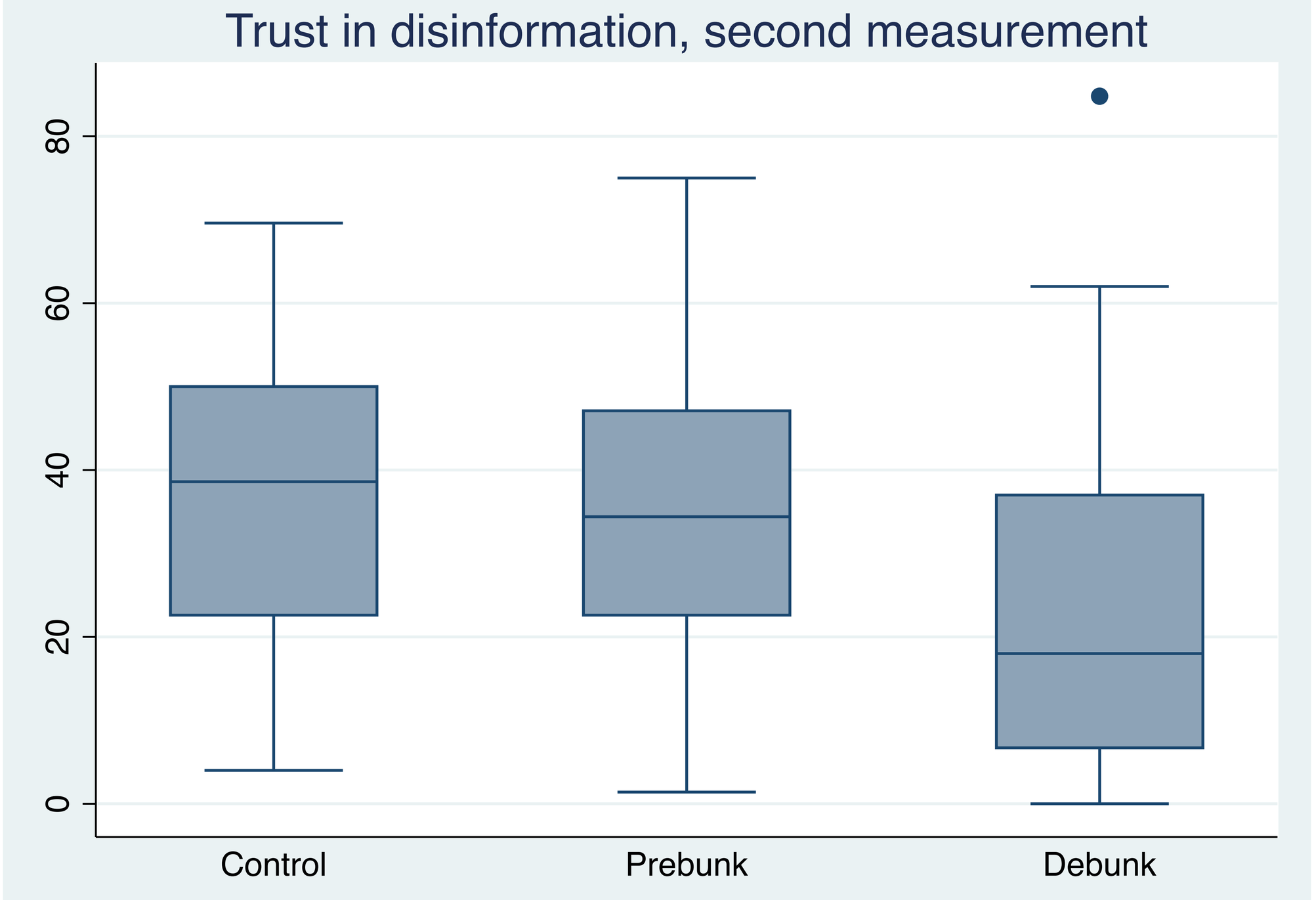



Trust in disinformation, first measurement
0
10
20
30
40
50
60
70
80
90
100
Control
Debunk

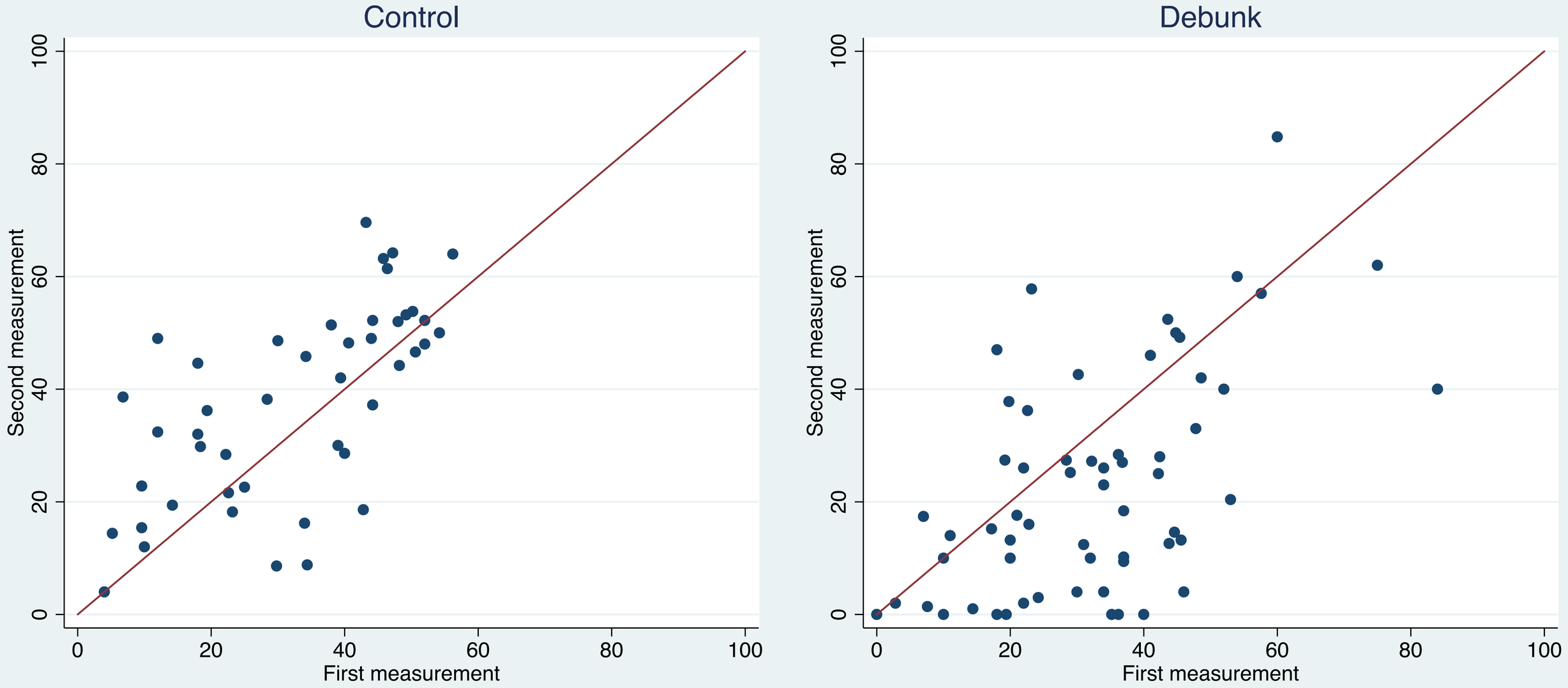

Trust in disinformation, second measurement
0
10
20
30
40
50
60
70
80
90
100
Control
Prebunk
Debunk

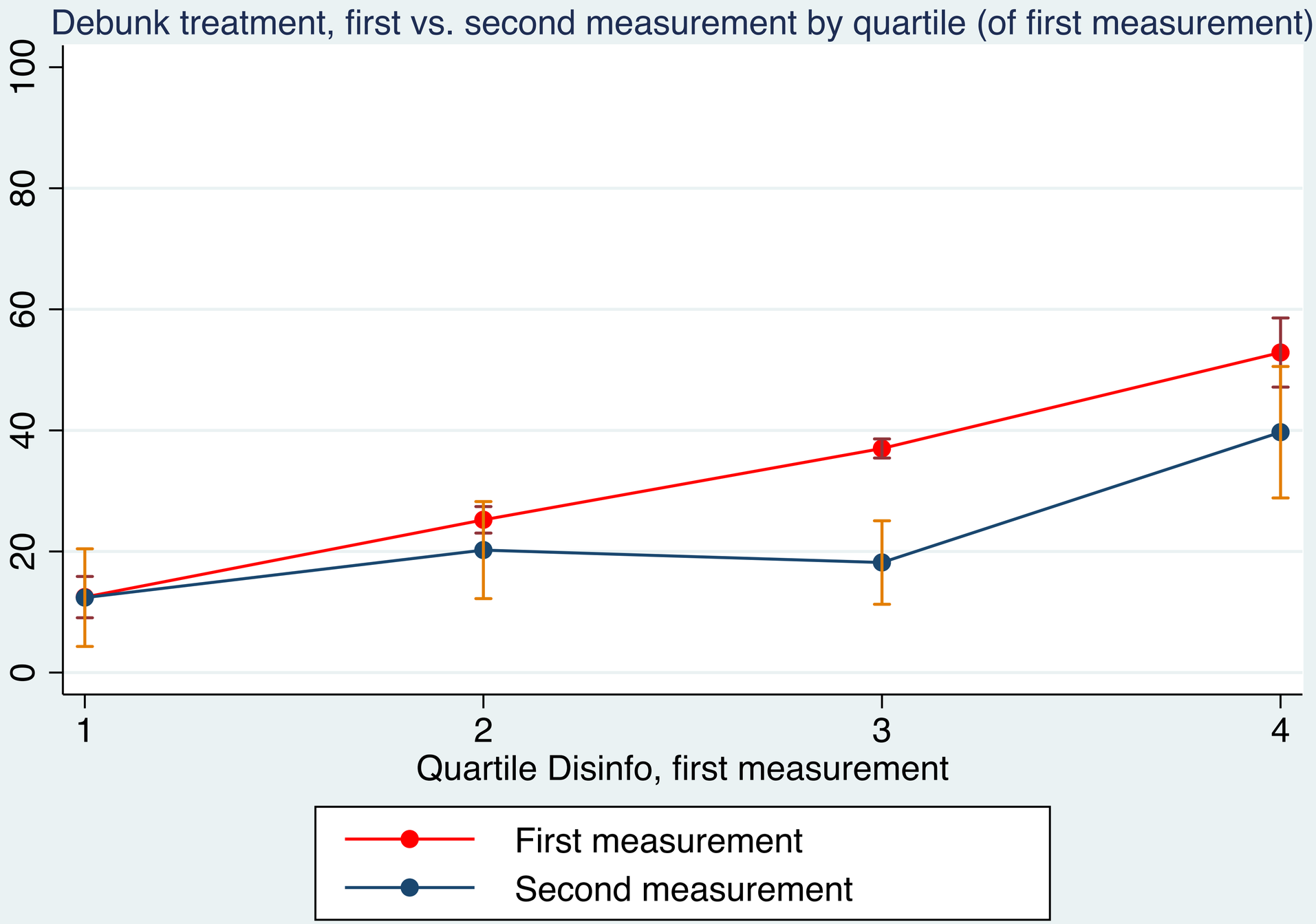

Time spent reading intervention message
0
20
40
60
80
100
120
140
Control
Prebunk
Debunk


Trust in disinformation, first measurement
0
20
40
60
80
Control
Debunk


Trust in disinformation, second measurement
0
20
40
60
80
Control
Prebunk
Debunk

Trust in disinformation, first vs. second measurement




Debunk treatment, first vs. second measurement by quartile (of first measurement)
0
20
40
60
80
100
1
2
3
4
Quartile Disinfo, first measurement
First measurement
Second measurement

Balance check

Treatment	Control	Prebunk	Debunk
Female	47%	57%	50%
Age (years, SD)	22.7 (4.1)	22.2 (0.9)	22.4 (1.9)

- Is treatment assignment balanced in terms of gender and age?
- Gender: chi-square test, p = 0.57 -> YES
- Age: ANOVA p = 0.59, Kruskal-Wallis p = 0.76 -> YES

Randomization check

Treatment	Control	Prebunk	Debunk
N (no. of observations)	45	60	60
Trust in disinfo 1 (%, SD)	32.4 (15.7)		32.6 (16.6)

- Is trust in disinformation in the first measurement similar for all treatments?
- t-test (Control vs. Debunk), p = 0.95 -> YES
- Mann-Whitney test (Control vs. Debunk), p = 0.75 -> YES

Manipulation check

Treatment	Control	Prebunk	Debunk
Time spent reading (sec, SD)	63.8 (30.6)	123.8 (32.6)	116.1 (30.2)

- Did participants in Prebunk and Debunk treatments spent similar amount of time reading the intervention message? (Note - message in the Control treatment was different and most importantly, only half as long)
- t-test, p = 0.18 -> YES
- Mann-Whitney test, p = 0.06 -> YES, but there is a marginally siginificant difference

Treatment effect - within subject

Treatment	Control	Prebunk	Debunk
N (no. of observations)	45	60	60
Trust in disinfo 1 (%, SD)	32.4 (15.7)		32.6 (16.6)
Trust in disinfo 2 (%, SD)	37.5 (17.2)	34.5 (17.3)	23.1 (19.8)

- Hypothesis: trust in disinformation in Control treatment does not decrease between the two measurements
  - Paired t-test, $p = 0.02$ -> did not decrease, in fact it increased
  - Wilcoxon matched-pairs signed-rank test, $p = 0.01$ -> did not decrease, in fact it increased
- Hypothesis: trust in disinformation in Debunk treatment will decrease between the two measurements
  - Paired t-test, $p < 0.01$ -> decreased significantly
  - Wilcoxon matched-pairs signed-rank test, $p < 0.01$ -> decreased significantly

Treatment effect - between subject

Treatment	Control	Prebunk	Debunk
N (no. of observations)	45	60	60
Trust in disinfo 1 (%, SD)	32.4 (15.7)		32.6 (16.6)
Trust in disinfo 2 (%, SD)	37.5 (17.2)	34.5 (17.3)	23.1 (19.8)

- Hypothesis: trust in disinformation in the second measurement will be lower in Prebunk and Debunk treatments compared to the Control treatment
  - ANOVA, $p < 0.01$ -> there are significant differences across treatments, post-hoc tests show that the differences are between Control and Debunk, and between Prebunk and Debunk
  - Kruskal-Wallis, $p < 0.01$ -> there are significant differences across treatments, post-hoc tests show that the differences are between Control and Debunk, and between Prebunk and Debunk
- Conclusion: Trust in disinformation significantly decreased only in the Debunk treatment

Robustness check - difference-in-differences analysis

Treatment	Control	Debunk
N (no. of observations)	45	60
Trust in disinfo 2 minus trust in disinfo 1	+5.1 (13.6)	-9.5 (17.4)

- Hypothesis: trust in disinformation decreases more in the Debunk treatment compared to the Control treatment
  - t-test, $p < 0.01$ -> YES
  - Mann-Whitney test, $p < 0.01$ -> YES

Explorative analysis

Gender / Blames	Does not blame West	Blames West
Male	64	16
Female	70	15

- Are there differences between males and females in blaming west?
  - Fisher exact test, p = 0.43 -> NO
  - Chi-square test, p = 0.70 -> NO

Explorative analysis

Gender / Blames	Does not blame Russia	Blames Russia
Male	5	75
Female	9	76

- Are there differences between males and females in blaming Russia?
  - Fisher exact test, p = 0.24 -> NO
  - Chi-square test, p = 0.32 -> NO

Explorative analysis

Gender Blames	Does not blame Ukraine	Blames Ukraine
Male	68	12
Female	72	13

- Are there differences between males and females in blaming Ukraine?
  - Fisher exact test, p = 0.57 -> NO
  - Chi-square test, p = 0.96 -> NO

Regression analysis

	(1) Trust Disinfo 2	(2) Trust Disinfo 2	(3) Trust Disinfo 2
Prebunk	-2.98	-3.51	-3.94
	(3.4)	(3.43)	(3.48)
Debunk	-14.42***	-14.75***	-13.76***
	(3.62)	(3.61)	-3.52
Female		1.2	1.05
		(2.87)	(2.88)
Age		-0.82	-1.34*
		(0.52)	(0.53)
Fan of Ukraine			-9.52*
			(4.28)
Fan of Russia			-16.82*
			(8.26)
Blames West			1.08
			(3.77)
Blames Russia			0.14
			(6.19)
Blames Ukraine			7.23
			(4.39)
Constant	37.49***	55.50***	73.90***
	(2.56)	(12.06)	(11.92)
N	165	165	165
R^2	0.11	0.12	0.18
Post-estimation tests Prebunk=Debunk	$p < 0.01$	$p < 0.01$	$p = 0.01$

Answers to our research questions

- Does debunking intervention lower the trust in Russo-Ukrainian war disinformation? YES
- Does prebunking intervention lower the trust in Russo-Ukrainian war disinformation? NO
- Does debunking intervention yield stronger effect than prebunking intervention? YES