

Title: Statistical results appendix for “Feedback and education improve human detection of image manipulation on social media”

Authors: Adnan Hoq (1), Matthew Facciani (1), Tim Weninger (1)

Date: April 2<sup>nd</sup>, 2025

Note: The material contained herein is supplementary to the article named in the title and published in the Harvard Kennedy School (HKS) Misinformation Review.

---

## Appendix: Statistical results

*Table A1. Mean of correct responses by each condition group.*

Group	<i>M (SD)</i>	<i>n</i>
Control	18.02 (3.34)	93
Feedback	22.09 (2.55)	94
Feedback+Education	22.26 (2.30)	81

*Table A2. ANOVA results for correct responses by condition.*

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>Prof &gt; F</i>
Between Groups	1047.01	2	523.50	67.29	0.001
Within Groups	2061.65	265	7.78		
Total	3108.66	267	11.64		

### *Power analysis*

An *a priori* power analysis was conducted via GPower software (Faul et al., 2009) for our OLS regression comparing mean differences in correct responses as the dependent variable with our treatment vs control variable as the independent variable. We had eight predictor variables in total (seven control variables plus our independent variable), and our power analysis was set at an alpha level of .05. Our power analysis found that to achieve .95 power with a medium (.15) effect size (see Cohen, 1988), we would need at least 160 participants. Our sample size exceeded 160 in our main analyses, which provided a satisfactory number of participants for our study.

**Table A3.** OLS regression tables for treatment 1 vs. control and treatment 2 vs. control.

	Feedback vs. Control	Feedback+Education vs. Control
<b>Male</b>	-0.883* (0.490)	-0.869 (0.530)
<b>Age</b>	-0.0715 (0.271)	-0.0927 (0.278)
<b>Education</b>	0.317 (0.273)	0.182 (0.270)
<b>White</b>	-0.0195 (0.527)	0.105 (0.533)
<b>Social media</b>	-0.219 (0.300)	-0.520* (0.299)
<b>Familiarity</b>	0.915** (0.409)	0.904** (0.432)
<b>Conservative</b>	-0.0640 (0.218)	-0.0342 (0.232)
<b>Feedback</b>	4.106*** (0.478)	
<b>Feedback + Education</b>		4.112*** (0.496)
<b>Constant</b>	16.95*** (2.138)	18.63*** (2.060)
<b>Observations</b>	164	146
<b>R<sup>2</sup></b>	0.347	0.384

Note: Standard errors in parentheses; \*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .10$

**Table A4.** Exploratory analysis of first four images.

	Accuracy of first four images
<b>Male</b>	0.203 (0.122)
<b>Age</b>	0.026 (0.066)
<b>Education</b>	0.033 (0.064)
<b>White</b>	0.215 (0.128)
<b>Social media</b>	-0.134 (0.075)
<b>Familiarity</b>	0.119 (0.103)
<b>Conservative</b>	-0.023 (0.053)
<b>Treatment conditions combined vs. Control</b>	0.530*** (0.122)
<b>Constant</b>	1.887*** (0.519)
<b>Observations</b>	228
<b>R<sup>2</sup></b>	0.123

Note: Standard errors in parentheses; \*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

All Mean Differences Between Image Types Across Each Condition Group

**Table A5.** Control descriptive statistics by group.

Group	<i>M</i>	<i>SD</i>	<i>n</i>
Erasing	0.401	0.491	374
Copy-paste	0.567	0.496	372
Splicing	0.621	0.486	372
Photoshop touchup	0.650	0.478	371

**Table A6.** Analysis of variance.

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	prob > <i>F</i>
Between groups	13.826	3.0	4.609	19.380	0.0
Within groups	353.163	1485.0	0.238		
Total	366.990	1488.0	0.247		

**Table A7.** Control post hoc Bonferroni test results (control).

Group 1	Group 2	<i>MD</i>	<i>p</i> -adj	95% CI		Reject
				Lower bound	Upper bound	
copy-paste	erasing	-0.166	.000	-0.258	-0.074	True
copy-paste	Photoshop touchup	0.082	.098	-0.010	0.174	False
copy-paste	splicing	0.054	.436	-0.038	0.146	False
erasing	Photoshop touchup	0.249	.000	0.157	0.340	True
erasing	splicing	0.220	.000	0.128	0.312	True
Photoshop touchup	splicing	-0.029	.854	-0.121	0.063	False

**Table A8.** Treatment 1 (feedback) descriptive statistics by group.

Group	<i>M</i>	<i>SD</i>	<i>n</i>
Erasing	0.617	0.487	376
Copy-paste	0.686	0.465	376
Splicing	0.750	0.434	376
Photoshop touchup	0.670	0.471	376

**Table A9.** Post hoc Bonferroni test results (treatment 1).

Group 1	Group 2	MD	p-adj	95% CI		Reject
				lower bound	upper bound	
copy-paste	erasing	-0.069	.173	-0.156	0.018	False
copy-paste	Photoshop touchup	-0.016	.965	-0.103	0.071	False
copy-paste	splicing	0.064	.235	-0.023	0.151	False
erasing	Photoshop touchup	0.053	.396	-0.034	0.140	False
erasing	splicing	0.133	.001	0.046	0.220	True
Photoshop touchup	splicing	0.080	.086	-0.007	0.167	False

**Table A10.** Treatment 2 (feedback + education) descriptive statistics by group.

Group	M	SD	n
Erasing	0.574	0.495	324
Copy-paste	0.701	0.459	324
Splicing	0.781	0.414	324
Photoshop touchup	0.744	0.437	324

**Table A11.** Post hoc Bonferroni test results (treatment 2).

Group 1	Group 2	MD	p-adj	95% CI		Reject
				lower bound	upper bound	
copy-paste	erasing	-0.127	.002	-0.218	-0.035	True
copy-paste	Photoshop touchup	0.043	.617	-0.048	0.135	False
copy-paste	splicing	0.080	.109	-0.011	0.172	False
erasing	Photoshop touchup	0.170	.000	0.078	0.261	True
erasing	splicing	0.207	.000	0.115	0.298	True
Photoshop touchup	splicing	0.037	.037	-0.054	0.129	False

**Table A12.** Correlation between time spent and image classification accuracy for all images.

		SE	z	p >  z	95% CI	
					[0.025	0.975]
Const	.945	0.039	24.357	.000	0.869	1.021
Time Spent	-.034	0.003	-10.589	.000	-0.040	-0.027

Note:  $r_{pb}$ : -0.12, p-value < .001

**Table A13. Demographic data.**

<b>Demographic Category</b>	<b><i>n</i></b>
<b>Gender</b>	
Women	112
Men	95
Preferring not to say	33
Other genders	28
<b>Age</b>	
18-24	36
25-34	103
35-50	80
50+	44
<b>Education Level</b>	
High school	32
Some college	62
College degree	118
Graduate degree	53
<b>Social Media Use</b>	
Daily	208
Weekly	42
Monthly	3
Less than monthly	7
Never	6
<b>Familiarity with Image Manipulation</b>	
Not familiar	18
Somewhat familiar	165
Very familiar	79
Experts	4
<b>Political Affiliation</b>	
Liberal	76
Somewhat liberal	74
Moderate	59
Somewhat conservative	27
Conservative	15
Apolitical	16
<b>Racial Demographics</b>	
White	178
Black	32
Asian	22
Latino/a/x	19
Other	15