Title: Robustness checks appendix for "Happiness and surprise are associated with worse truth discernment of COVID-19 headlines among social media users in Nigeria"
Authors: Leah R. Rosenzweig (1), Bence Bago (2), Adam J. Berinsky, (3) David G. Rand (4)
Date: August 10th, 2021
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 C: Robustness checks

C.1 Strength of emotional reaction

For robustness, we check whether the strength of the emotional reaction similarly predicts our three outcomes for our main results for happiness and surprise. We run the same mixed-effect models replacing the emotion dummy with a variable that takes a value of 0 if the emotion was not selected, and a value between 1 and 7 as the respondent answered in the follow-up intensity question if the emotion was selected. Table C1 presents the results for happiness and Table C2 for surprise. As we can see the results remain: both happiness and surprise are associated with worse belief and sharing discernment (evidence by negative interaction terms for emotion*veracity(true)), but are both unrelated to clicking.

Table C1. *Strength of emotion and outcomes: Happiness.*

	Dependent variable:		
	belief	click	share
	(1)	(2)	(3)
happy strength	0.03***	0.02***	0.03***
	(0.01)	(0.004)	(0.004)
true	0.29***	0.12*	0.20***
	(0.08)	(0.06)	(0.08)
happy strength:true	−0.03***	−0.02*	−0.03***
	(0.01)	(0.01)	(0.01)
Constant	0.73***	0.77***	0.63***
	(0.04)	(0.03)	(0.04)
Observations	13,410	13,409	13,409
Log Likelihood	−5,846.00	−5,392.00	−6,702.00
Akaike Inf. Crit.	11,710.00	10,803.00	13,422.00
Bayesian Inf. Crit.	11,778.00	10,870.00	13,490.00
Note:			*p<0.1; **p<0.05; ***p<0.01

Table C2. *Strength of emotion and outcomes: Surprise.*

	Dependent variable:		
	belief	click	share
	(1)	(2)	(3)
surprise strength	0.005***	0.02***	0.01***
	(0.001)	(0.001)	(0.001)
true	0.24***	0.11	0.17*
	(0.08)	(0.07)	(0.09)
surprise strength:true	−0.01***	−0.004	−0.01***
	(0.003)	(0.002)	(0.003)
Constant	0.76***	0.77***	0.65***
	(0.04)	(0.03)	(0.04)
Observations	13,410	13,409	13,409
Log Likelihood	−6,141.00	−5,436.00	−6,928.00
Akaike Inf. Crit.	12,297.00	10,886.00	13,870.00
Bayesian Inf. Crit.	12,349.00	10,939.00	13,923.00
Note:			*p<0.1; **p<0.05; ***p<0.01

C.2 Main models with controls

Here we present linear mixed effect models looking at our three outcomes of interest for neutral (no emotion), happiness, and surprise. In each model, we control for gender, age, and education level as we prespecified in our pre-analysis plan. We also control for social media use and support for the governing party (APC), as requested by our anonymous reviewers. The tables reveal a continued positive correlation between neutral (no emotion) and belief discernment (Table C3). In fact, this relationship increases in statistical significance due to improved precision with covariate adjustment. We also observe that the negative association between happiness (Table C4) and surprise (Table C5) with both belief and sharing discernment still holds after including these controls.

Table C3. *Predicting outcomes with controls: Neutral.*

	Dependent variable:		
	belief	click	share
	(1)	(2)	(3)
neutral	−0.17***	−0.20***	−0.22***
	(0.03)	(0.02)	(0.02)
true	0.27***	0.07	0.15*
	(0.09)	(0.07)	(0.08)
age	−0.001	0.003***	0.002
	(0.001)	(0.001)	(0.001)
female	0.01	−0.01	−0.04***
	(0.01)	(0.01)	(0.02)
education	−0.002	−0.003	−0.01*
	(0.005)	(0.01)	(0.01)
social media use	−0.001	0.01***	0.01***
	(0.002)	(0.003)	(0.003)
APC	0.05***	0.05***	0.10***
	(0.02)	(0.02)	(0.02)
neutral:true	0.13**	−0.03	0.03
	(0.06)	(0.03)	(0.03)
Constant	0.74***	0.56***	0.46***
	(0.06)	(0.06)	(0.08)
Observations	13,190	13,190	13,190
Log Likelihood	−5,889.00	−5,223.00	−6,683.00
Akaike Inf. Crit.	11,806.00	10,473.00	13,394.00
Bayesian Inf. Crit.	11,910.00	10,578.00	13,498.00

Note: *p<0.1; **p<0.05; ***p<0.01

Table C4. *Predicting outcomes with controls: Happiness.*

	Dependent variable:		
	belief	click	share
	(1)	(2)	(3)
happy	0.15***	0.11***	0.16***
	(0.03)	(0.03)	(0.03)
true	0.19***	0.08	0.11*
	(0.06)	(0.05)	(0.06)
age	−0.001	0.003***	0.002*
	(0.001)	(0.001)	(0.001)
female	0.004	−0.02	−0.05***
	(0.01)	(0.01)	(0.02)
education	−0.002	−0.003	−0.01*
	(0.005)	(0.01)	(0.01)
social media use	−0.0000	0.01***	0.01***
	(0.002)	(0.003)	(0.004)
APC	0.05***	0.06***	0.10***
	(0.02)	(0.02)	(0.02)
happy:true	−0.20***	−0.09*	−0.20***
	(0.06)	(0.05)	(0.05)
Constant	0.83***	0.64***	0.57***
	(0.05)	(0.06)	(0.07)
Observations	13,190	13,190	13,190
Log Likelihood	−5,751.00	−5,276.00	−6,599.00
Akaike Inf. Crit.	11,529.00	10,581.00	13,226.00
Bayesian Inf. Crit.	11,634.00	10,685.00	13,331.00
Note:			*p<0.1; **p<0.05; ***p<0.01

Table C5. *Predicting outcomes with controls: Surprise.*

	Dependent variable:		
	belief	click	share
	(1)	(2)	(3)
surprise	0.02**	0.09***	0.06***
	(0.01)	(0.01)	(0.01)
true	0.22***	0.10	0.15*
	(0.08)	(0.07)	(0.09)
age	−0.001	0.003***	0.002*
	(0.001)	(0.001)	(0.001)
female	0.004	−0.01	−0.05***
	(0.01)	(0.01)	(0.02)
education	−0.002	−0.003	−0.01*
	(0.005)	(0.01)	(0.01)
social media use	0.0002	0.01***	0.01***
	(0.002)	(0.003)	(0.004)
APC	0.05***	0.06***	0.10***
	(0.02)	(0.02)	(0.02)
surprise:true	−0.06***	−0.02*	−0.04**
	(0.02)	(0.01)	(0.02)
Constant	0.79***	0.64***	0.54***
	(0.06)	(0.06)	(0.08)
Observations	13,190	13,190	13,190
Log Likelihood	−6,039.00	−5,321.00	−6,821.00
Akaike Inf. Crit.	12,103.00	10,665.00	13,666.00
Bayesian Inf. Crit.	12,192.00	10,755.00	13,756.00
Note:			*p<0.1; **p<0.05; ***p<0.01

C.3 Examining partisanship

Table C6 interacts support for the governing party ("APC") with our main independent variables of interest: headline veracity and an indicator for the absence of any emotional reaction (neutral). We see that the triple interaction term is not statistically significant, but the main interaction of interest (neutral*true) does not change in magnitude. In other words, the relationship between emotional reaction, veracity, and belief in the headline does not differ by partisanship. This is also the case when we include the triple interaction in our regressions for happiness (Table C7). For surprise (Table C8), our main result for belief (surprise*true) remains similar in magnitude as well. Here we also see that the triple interaction term is statistically significant, which means there is a difference between APC supporters' and other respondents' belief in true/false headlines when they are surprised by the headline. More broadly, we also see that APC supporters are more likely to believe, click, and share headlines than nonpartisans and opposition supporters. These results suggest that partisanship is significantly related to belief in headlines–APC supporters are less likely to believe true headlines than other respondents–but partisanship does not alter the relationship between emotions and our outcomes of interest. The relationship between partisanship and reactions to misinformation should be further studied in this context.

Table C6. *Interacting support for governing party with emotional reaction and headline veracity.*

	Dependent variable:		
	belief	click	share
neutral	−0.17***	−0.21***	−0.23***
	(0.03)	(0.02)	(0.02)
true	0.27***	0.07	0.15*
	(0.09)	(0.07)	(0.08)
APC	0.03	0.10***	0.17***
	(0.03)	(0.03)	(0.03)
neutral:true	0.10*	−0.04	0.02
	(0.06)	(0.04)	(0.04)
neutral:APC	−0.03	0.08*	0.13**
	(0.05)	(0.05)	(0.05)
true:APC	−0.01	0.06	0.02
	(0.04)	(0.04)	(0.04)
neutral:true:APC	0.10	0.12	0.07
	(0.08)	(0.08)	(0.09)
Constant	0.70***	0.71***	0.57***
	(0.05)	(0.03)	(0.04)
Observations	13,410	13,409	13,409
Note:		*p<0.1; **p<0.05; ***p<0.01	

Table C7. *Interacting support for governing party with happy and headline veracity.*

	Dependent variable:		
	belief	click	share
happy	0.16***	0.12***	0.17***
	(0.03)	(0.03)	(0.03)
true	0.20***	0.08	0.11*
	(0.06)	(0.05)	(0.06)
APC	0.05**	0.05***	0.11***
	(0.02)	(0.02)	(0.03)
happy:true	−0.20***	−0.08*	−0.19***
	(0.06)	(0.05)	(0.05)
happy:APC	−0.01	−0.08***	−0.07***
	(0.03)	(0.02)	(0.03)
true:APC	−0.05**	−0.01	−0.02
	(0.02)	(0.02)	(0.03)
happy:true:APC	0.04	−0.04	−0.01
	(0.05)	(0.05)	(0.05)
Constant	0.80***	0.82***	0.69***
	(0.03)	(0.03)	(0.03)
Observations	13,410	13,409	13,409
Note:	*p<0.1; **p<0.05; ***p<0.01		

Table C8. *Interacting support for governing party with surprise and headline veracity.*

	Dependent variable:		
	belief	click	share
surprise	0.01	0.09***	0.05**
	(0.01)	(0.03)	(0.02)
true	0.22***	0.08	0.13*
	(0.07)	(0.06)	(0.08)
APC	0.05***	0.06***	0.12***
	(0.02)	(0.02)	(0.02)
surprise:true	−0.04*	−0.04	−0.05
	(0.03)	(0.05)	(0.04)
surprise:APC	0.04	−0.04*	0.005
	(0.02)	(0.02)	(0.03)
true:APC	−0.07***	0.004	−0.02
	(0.02)	(0.02)	(0.02)
surprise:true:APC	−0.11**	−0.001	−0.05
	(0.05)	(0.04)	(0.05)
Constant	0.76***	0.81***	0.66***
	(0.04)	(0.03)	(0.04)
Observations	13,410	13,409	13,409
Note:	*p<0.1; **p<0.05; ***p<0.01		

Table C9 analyzes the correlation between support for the governing party (APC) and trust in different media sources. Respondents who report supporting the governing party (APC) trust what they see on television and hear on the radio more than other respondents – who either support a different party or do not identify with any political party. Interestingly, however, there is not a statistically significant (at the conventional 5%) difference in trust levels between APC partisans and other respondents with respect to social media.

Table C9. *Correlation between support for governing party and trust in different media.*

	Dependent variable:		
	T.V.	Radio	Social Media
APC	0.25***	0.19**	0.16*
	(0.08)	(0.09)	(0.09)
Constant	1.10***	0.99***	0.37***
	(0.03)	(0.03)	(0.03)
Observations	1,289	1,224	1,301
R^2	0.01	0.004	0.002
Adjusted R^2	0.01	0.003	0.002
Note:		*p<0.1; **p<0.05; ***p<0.01	

C.4 Leave one out analysis

The graphs below plot the coefficients on the interaction terms (emotion*veracity) for the linear mixed effect models predicting belief. These graphs plot estimates on the y axis. The points represent the iterated estimates when 1 out of the 10 headlines is removed from the analysis (to ensure that the results are not being driven by any particular headline). The x-axis indicates which headline is left out. We see that the results are not driven by a particular headline.

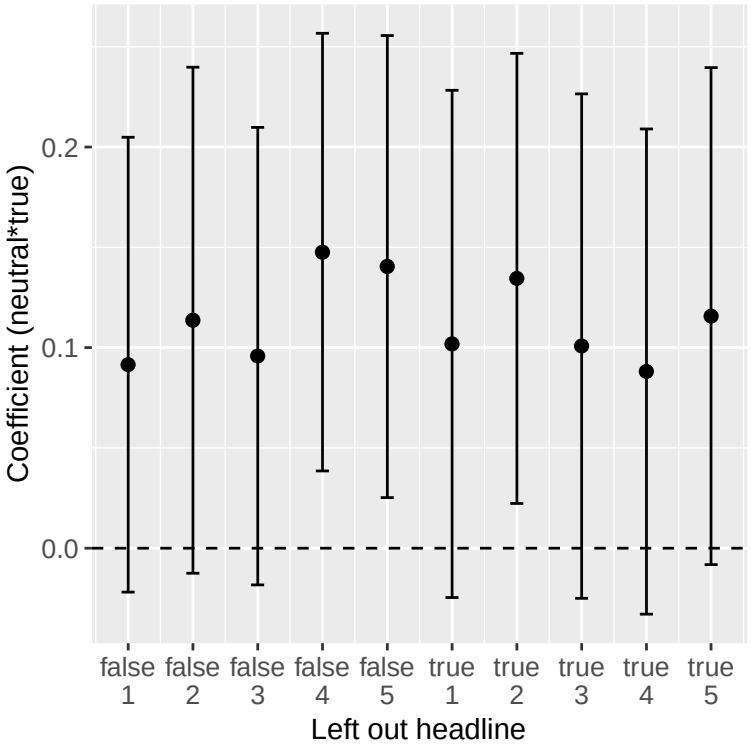

Figure C1. Leave one out analysis – Neutral.

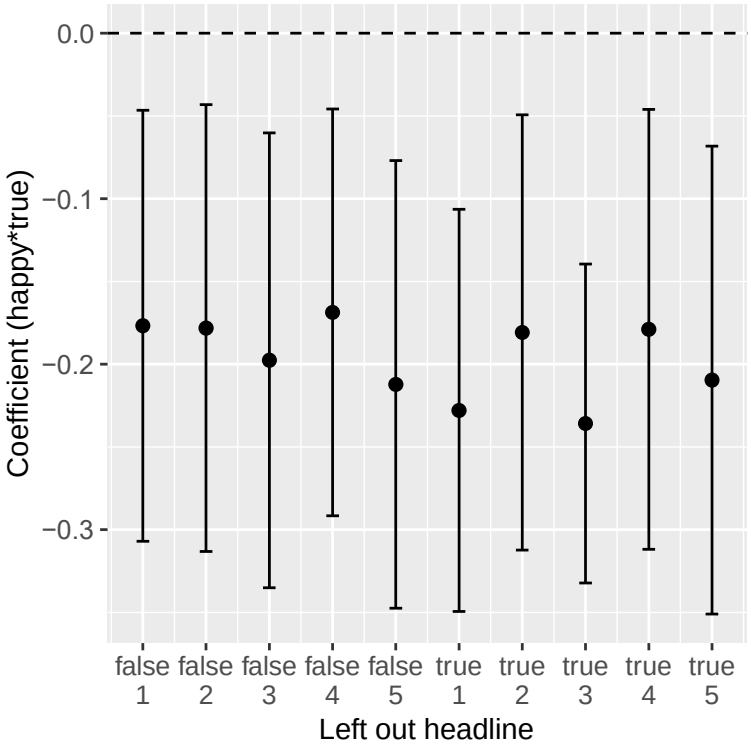

Figure C2. Leave one out analysis – Happiness.

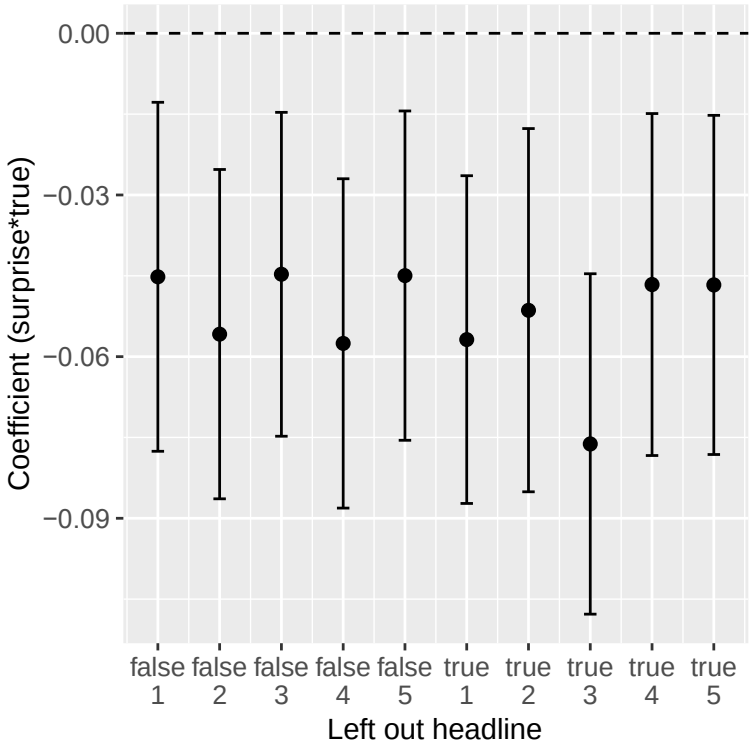

Figure C3. Leave one out analysis – Surprise.

C.5 Order of questions

Does being asked about emotions/belief first matter? We check and verify in Table C10 that the order of the questions (emotions and then belief, or belief and then emotions) is not correlated with our outcomes at the conventional 5% level nor is it differentially correlated with discernment for these outcomes.

Table C10. *Order of questions for each outcome.*

	Dependent variable:		
	belief	click	share
	(1)	(2)	(3)
True	2.00***	1.00**	1.10**
	(0.57)	(0.49)	(0.55)
Emotion first	0.17*	0.07	0.17
	(0.09)	(0.11)	(0.12)
True:Emotion first	0.08	−0.17*	0.04
	(0.10)	(0.10)	(0.09)
Constant	0.77*	1.60***	0.59
	(0.40)	(0.35)	(0.40)
Observations	13,410	13,409	13,409
Log Likelihood	−5,874.00	−5,564.00	−6,606.00
Akaike Inf. Crit.	11,761.00	11,140.00	13,223.00
Bayesian Inf. Crit.	11,806.00	11,185.00	13,269.00
Note:			*p<0.1; **p<0.05; ***p<0.01