

Conceptual Replication of Four Key Findings about Factual Corrections and Misinformation During the 2020 U.S. Election: Evidence from Panel Survey Experiments

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Abstract

In the final two months of the 2020 U.S. election, we conducted eight panel experiments to evaluate the immediate and medium-term effects of misinformation and factual corrections. Our results corroborate four sets of existing findings: fact-checks reliably improve factual accuracy, while misinformation degrades it; effects of fact-checks on belief accuracy endure, although they fade with time; effects on attitudes are minuscule; and there are important partisan asymmetries. We also offer one new empirical finding suggesting that effect heterogeneities by personality type and cognitive style may reflect attention paid to treatments. Our study confirms that the fundamental push and pull of misinformation and factual corrections on political beliefs holds even in electoral settings as saturated with mistruths as the 2020 U.S. election.

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The 2020 U.S. election featured an incumbent president with a well-documented penchant for spreading falsehoods (Kessler, 2020) and culminated in an insurrection that policymakers have attributed to misinformation about the “big lie” of election fraud (Dillard, 2020; on Energy and Staff, 2021). While absolute levels of exposure to online misinformation are lower than media reports have suggested (Guess, Nagler, and Tucker, 2019), exposure to unreliable sources continues to rise (Fischer, 2020). Belief in falsehoods may shape political attitudes and behavior in ways that damage democratic accountability (Einstein and Hochschild, 2015; Nyhan, 2020) with some even suggesting that misinformation directly influences evaluations of political figures, thereby influencing election outcomes (Gunther, Beck, and Nisbet, 2019; Jamieson, 2018).

Both traditional and social media have turned to fact-checks to respond to this onslaught of misinformation (Chan et al., 2017; Walter et al., 2019; Graves, 2016). For example, in advance of the 2020 election, Facebook announced that it would partner with fact-checking organizations to review dubious claims and promote fact-checks to its users (Culliford, 2019). These and similar efforts are premised on the assumption that at a crucial moment of democratic reckoning—high-intensity political campaigns—factual corrections offer an effective counter-measure against misinformation.

Prior academic work on the effects of fact checks has established, to varying degrees of certainty and generality, four important findings. First, fact-checks reliably improve factual belief accuracy, while misinformation degrades it (Chan et al., 2017; Porter and Wood, 2019; Wood and Porter, 2018; Guess, 2020). Second, although these effects fade with time, they remain detectable after immediate exposure (Porter and Wood, 2021; Berinsky, 2015; Swire et al., 2017). Third, the downstream effects of fact-checks on attitudes toward the fact-checked politician or group are minuscule at best (Nyhan et al., 2019) (though see Loomba et al. (2021); Wintersieck (2017)). Fourth, Democrats and Republicans both respond to fact-checks by be-

coming more accurate, but with important partisan asymmetries. Democrats appear to respond more strongly to fact-checks of partisan-congenial information than do Republicans (Shin and Thorson, 2017; Jennings and Stroud, 2021; Guay and Rand, 2020; Edelson and McCoy, 2021).

The goal of the present study is to systematically re-confirm these findings while extending them to one of the most politically important settings for fact-checks: the 2020 U.S. Presidential election. While prior research has investigated the effects of fact-checks and misinformation on factual beliefs during other election seasons, no work of which we are aware investigates these particular questions at comparable scale and timing. Most work on fact checks has evaluated single corrections, sometimes outside the context of elections (Wintersieck, 2017; Nyhan et al., 2019). Since party leaders' messages (including false statements) are magnified during campaigns—as is the influence of these messages on voters' beliefs and attitudes (Lenz, 2012)—we might be concerned that real-world fact checks deployed during campaigns would have smaller effects. In particular, a persistent concern is that the partisan polarization and media fragmentation that characterized the 2020 election cycle might render fact-checks ineffective.

To study fact-checking during the 2020 election season, we conducted eight pre-registered panel experiments (total $N = 17,681$). For each panel study, we selected fact-check treatments from the set of recent articles produced by the non-partisan organization PolitiFact, along with the corresponding misinformation treatments in their original forms (including Facebook posts, videos and “fake news” articles). In total, we evaluated the effects of 21 widely-disseminated pieces of misinformation and corresponding fact-checks during the final two months of the 2020 election. We evaluated the effects of these treatments in almost real time: on average, thirteen days separated the first appearance of the misinformation online from the inclusion of that misinformation in our experiments.

We can confirm each of the four prior findings generalize to the 2020 election. Exposure

to misinformation increased false beliefs by an average of 4.3 points on a 100-point belief certainty scale. Exposure to fact-checks more than corrected this effect, decreasing false beliefs by 10.5 points. We show that 66% of the initial effect of fact-checks on factual beliefs is still detectable one week after initial exposure, with 50% detectable after more than two weeks. Both misinformation *and* fact-checks have very small effects on attitudes toward politicians and political organizations: on 100-point feeling thermometers, the effects of fact-checks and misinformation on subsequent attitudes are smaller than one-quarter of a point. With regard to treatment effect heterogeneity by partisanship, we find that Democrats became more accurate than Republicans following exposure to fact-checks that were in conflict with their partisanship.

Lastly, our design enables the systematic study of treatment effect heterogeneity along multiple dimensions of personality and cognitive style. Here, we find limited heterogeneity in the effects of misinformation, but substantial heterogeneity in the effects of fact checks. In an exploratory analysis, we offer evidence that these heterogeneities may be due to differences in the amount of time different kinds of people spent reading the treatments.

Prior research

To contextualize our contribution, we briefly review the prior experimental evidence on each of the four empirical findings we replicated.

First, recent evidence shows that fact-checks increase belief accuracy, while misinformation degrades it. One meta-analysis (Chan et al., 2017) gathered together 20 studies with 52 independent treatments to show that misinformation decreases accuracy and fact-checks increase it. Porter and Wood (2019) inspect 63 issues overall (including the issue experimentally evaluated in (Haglin, 2017)), finding that corrections significantly improving accuracy for more than 96% of issues, and observe no corrections “backfiring,” or reducing belief accuracy on their own. The scholarly consensus that corrections improve belief accuracy is summarized in Lewandowsky

et al. (2020). On the misinformation side, Guess (2020) randomize exposure to two “fake news” stories, finding that it decreases belief accuracy about the story in question.

Second, prior research shows that the effects of fact-checks endure, at least to some extent, after exposure. Porter and Wood (2021) re-contact participants in three countries two weeks after initial exposure to fact-checks. For eleven of seventeen issues, belief accuracy increases were still detectable at this later date. Forty percent of the first wave effect remained detectable in the second wave. Similarly, Porter and Wood (2022b) re-contact participants in ten countries two weeks after a randomized exposure to a COVID-related correction, and conclude that 39% of the correction’s effect remains detectable. However, there have been divergent findings on this matter; in a similar multi-wave study, Carey et al. (2022) find that the effects of corrections on COVID belief accuracy do not persist in either the U.S. or Great Britain (albeit across a smaller set of false claims than tested here and in the other papers).

Third, much of the available evidence shows that, at most, corrections and misinformation have very small downstream effects on attitudes. Nyhan et al. (2019) found that exposure to a fact-check of a false Donald Trump claim increased belief accuracy, including among Trump supporters, but had no discernible impact on either supporters’ or opponents’ attitudes toward Trump. Similarly, in their 10-country study of COVID-19 corrections and misinformation, Porter and Wood (2022b) do not find evidence that either corrections or misinformation affected attitudes toward vaccines. However, Wintersieck (2017) finds that evaluations of candidates’ debate performance improve when a fact-check shows they made accurate statements during the debate. Guess (2020) find that randomized exposure to misinformation affects self-reported vote intention, but has no impact on feelings toward the media or political parties.

Fourth, studies of corrective interventions have often (but not always) found evidence of partisan asymmetries. Observational evidence of Twitter users during the 2012 election shows Republicans were more likely to tweet fact-checks of Democratic president Obama than Democrats

were to tweet fact-checks of Republican candidate Romney (Shin and Thorson, 2017). In an experiment conducted on a mock version of the Facebook news feed, Jennings and Stroud (2021) find only Democrats respond to fact-checking labels by becoming more accurate (but see Porter and Wood (2022a) for a similar study that finds fact-checks making both Democrats and Republicans more accurate). Finally, exposure to an accuracy nudge (an intervention related to but distinct from fact-checks) has small-to-negligible effects on accuracy among conservatives, with its effectiveness concentrated among Democrats and independents (Rathje, 2022).

Design

We administered six two-wave panels and two three-wave panels between September and November of 2020. Four panels were fielded on Mechanical Turk and four were fielded on Lucid.

The first wave of every panel was structured identically. Before the experimental portion, we measured pre-treatment covariates. After answering demographic questions, subjects completed batteries measuring political knowledge, cognitive reflection (CRT-2), need for cognition, and a ten-question personality inventory. Because demographic information is provided directly for Lucid respondents, the Mechanical Turk samples were asked more extensive demographic questions whose response categories matched the Lucid categories exactly (see the appendix for the full instrument). Subjects then participated in three independently-randomized experiments, each relating to a separate topic of misinformation. For each topic, respondents were assigned to one of three conditions: pure control, misinformation only, or misinformation followed by a fact-check. In the appendix, we demonstrate that these randomizations generated experimental groups balanced on pre-treatment covariates.

Each week throughout the study, PolitiFact shared internal data with us about the popularity of their fact-checks (measured via web traffic). These data informed the selection of the fact-checks used in the experiments. The topics were chosen based on the following criteria. First,

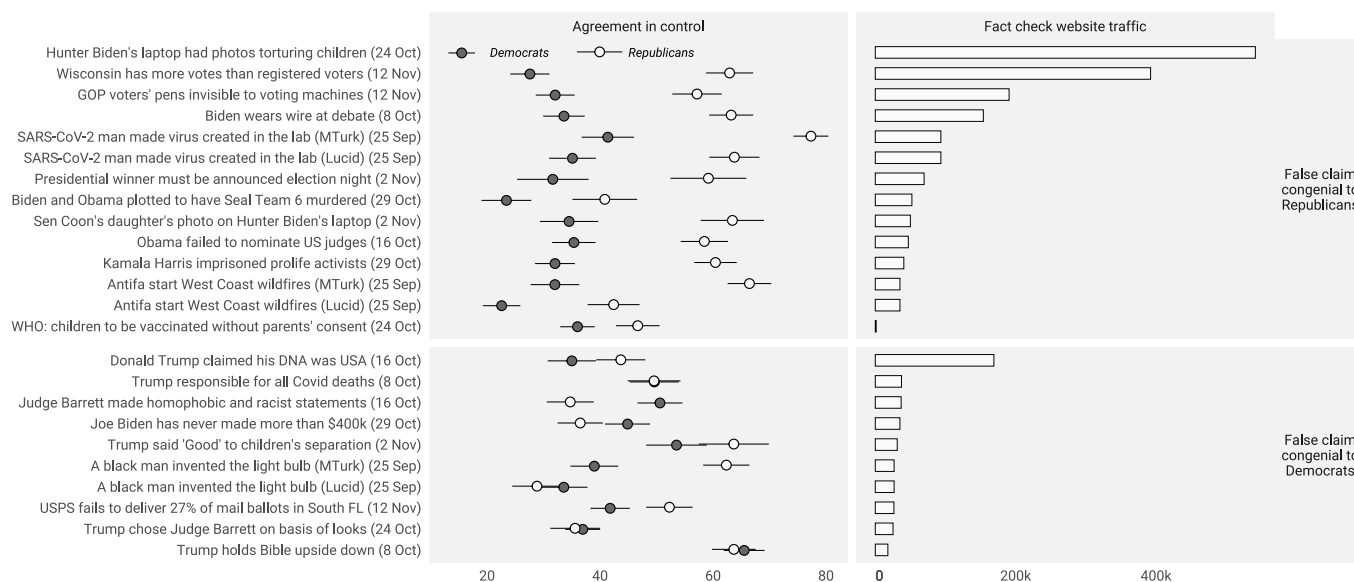
each received relatively high traffic on the PolitiFact website (see Figure 1). Second, each panel included one false claim that we anticipated would be congenial to Republicans, one false claim expected to be congenial to Democrats, and a third chosen to tap into unfolding events, regardless of expectations about differential partisan response.

Two-thirds of our tested fact-checks were produced by PolitiFact as part of their partnership with Facebook. Through that partnership, Facebook presented PolitiFact and other fact-checking organizations a set of widely-circulating misinformation, dividing the sets into three tiers based on internal data. The most popular pieces were in the first tier, the least popular in the third. The fourteen Facebook partnership fact-checks in our experiment were all from the first tier.

Participants saw the misinformation and fact-checks in as close to their original form as possible, including transcripts, Facebook posts, tweets, video, and “fake news” articles. The fact-checks adhered to the format and text used by PolitiFact. They included the PolitiFact logo, a headline, and a graphic illustrating the verdict (e.g., “Pants on Fire”). All text and images in the fact-checks were taken from PolitiFact. The complete set of stimuli are in the appendix.

Figure 1 shows the cumulative page views of each of the tested fact-checks, by congeniality. On average, fact-checks of Republican-congenial misinformation (shown in the top panel) received 138,971 views over the eight weeks following the original post. By contrast, the average fact-check of Democratic-congenial misinformation received 45,123 views. This pattern complements descriptive work which shows that during the 2020 election, Republican-congenial misinformation on social media received far more engagement than Democratic-congenial misinformation. Just as Republican-congenial misinformation is more popular than Democratic-congenial misinformation, so are articles debunking that misinformation.

Figure 1: Cumulative page views of each fact check used in treatments, and respondents' agreement in control, by the partisan congeniality of the false claim. The right column reports the count of total visits to each false claim's associated fact check URL. The left column reports agreement with each false claim, according to respondents' partisanship. Points indicate mean agreement, and the ranges indicate 95% confidence intervals.



After treatment, all respondents, including those in control conditions, answered questions about their belief in each piece of misinformation, measured via two questions. The first asked how accurate they thought the misinformation was, and the second how confident they were in their answer. The use of multiple outcome measure helps mitigate concerns about measurement error (Swire, DeGutis, and Lazer, 2020). Our use of a confidence measure allows us to account for effects on beliefs while being mindful of the way in which limited belief certainty may impact misperceptions (Graham, 2020) and even lead researchers to conflate *uninformed* participants with *misinformed* participants (Pasek, Sood, and Krosnick, 2015). Finally, to assess effects on attitudes, participants were presented with feeling thermometers for the groups and people prominently featured in the misinformation and fact-checks.

At the close of the first wave, we debriefed subjects in the misinformation conditions to

inform them that the misinformation was false, showing them the corresponding fact checks. Because we could not be certain that all participants would return for subsequent surveys, we believed it unethical to expose them to uncorrected misinformation. We therefore do not measure the over-time effect of misinformation alone, but rather the effect of misinformation plus fact-check, relative to control. Evaluating the over-time effect of *fact-checked* misinformation allows us to address the pressing real-world question of whether the effects of fact-checks *in the presence of misinformation* endure beyond immediate exposure.

To measure over-time effects, we recontacted participants at least once, with a minimum of seven days separating waves. Six of our eight panels were comprised of two waves; the remaining two featured a third wave. Post-treatment waves measured the same set of outcomes as the first wave. In the appendix, we demonstrate that our treatments do not appear to change whether subjects respond to outcome questions, either immediately post-treatment or in subsequent waves, allaying concerns about differential attrition.

Results

We begin our discussion of results with the averages of the belief confidence measure for Democrats and Republicans in the control condition. Figure 1 shows a partisan gap across issues: Republicans are more likely than Democrats to believe all of the Republican-congenial false statements, but Democrats are more likely than Republicans to believe only two of the Democratic-congenial false statements.¹ These results should be interpreted with caution, as they are based on observational data gleaned from convenience samples.

As our primary interest is in treatment effects, we next turn to the average effects of exposure to misinformation and fact-checks. Figure 2 displays the outcome distributions by topic and condition. Belief certainty is plotted on the vertical axis, ranging from 0 (completely certain

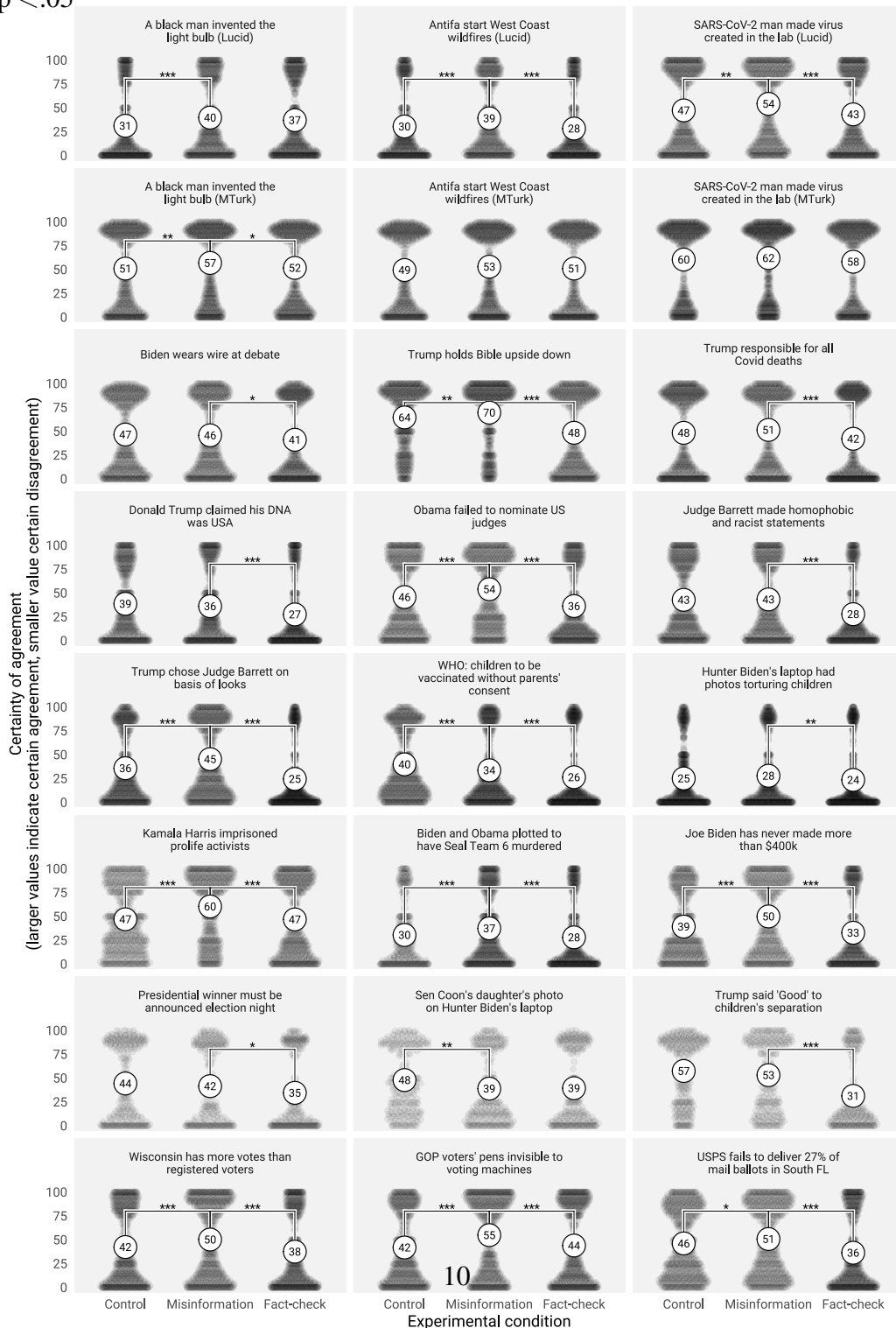
¹All reported tests are two-sided.

the false statement is inaccurate) to 100 (completely certain the statement is accurate). The first column in each graph shows the control condition, the second the group that saw only the misinformation, and the third the group that saw both the misinformation and the fact-check. Overall, exposure to the misinformation significantly decreased accuracy in 12 out of the 24 opportunities. Compared to the misinformation condition, 20 of the fact-checks had statistically significant negative average effects on belief certainty, and none “backfired,” or increased false beliefs. Using random-effects meta-analysis, we estimate the average misinformation effect (relative to control) to be 4.30 points (SE: 1.07) and the average fact-check effect (relative to misinformation) to be -10.5 points (SE: 1.1).

While fact-checks reduced false beliefs overall, we observed partisan asymmetries. The first column of Figure 3 isolates the effects of misinformation on beliefs. Being exposed to misinformation increased belief in the false claim by about the same amount across categories, among Republicans and Democrats. The second column of Figure 3 shows the effect of fact-checks on belief confidence. The effects are negative for Republicans and Democrats. For false claims congenial to Republicans, the effects are approximately equal in magnitude across party lines. However, Democrats update substantially further than Republicans when corrected about congenial false claims. This asymmetry is the *opposite* of what would be predicted by a motivated reasoning theory under which partisans are resistant to treatments that are hostile to their partisan identity. Here, Democrats move even further than Republicans, even though the correction is counter-attitudinal for them.

We thus observe the following partisan asymmetry. Once shown counter-attitudinal corrections, Democrats are made more accurate than Republicans. This difference may be attributable to differences in the partisan information environments. An inspection of PolitiFact traffic data (see Figure 1), and available social media data on the tested misinformation, indicates that Republican congenial misinformation may have been circulating more widely than

Figure 2: Outcome distributions by topic and condition. Each cloud depicts the distribution of belief certainty within each experimental condition. Each label shows the conditional mean. Statistically significant differences between control and misinformation, and misinformation and fact-checks, are labelled with the associated significance level. *Note*: *** $p < .001$, ** $p < .01$, * $p < .05$



Democratic-congenial misinformation (corroborating Edelson and McCoy (2021)). This pattern could explain why Republicans responded differently than Democrats: Republicans entered our studies more likely to have seen the tested misinformation, with this prior exposure making false beliefs more difficult to dislodge. Differences in responses to counter-attitudinal fact-checking may also be explained by source cues. Once exposed to a counter-attitudinal correction, Democrats may have become more accurate than Republicans because they viewed PolitiFact more favorably than Republicans (Walker and Gottfried, 2019).

In Figure 4, we turn to the medium-term effects of exposure to misinformation followed by fact checks (versus control). The top row of facets presents meta-analytic estimates for all issues, conditional on subjects responding in the first and second waves of the study. The effects of fact checks observed immediately after treatment dissipate somewhat from wave 1 to wave 2, on average at 66.4% of the initial magnitude. This pattern of decay is broadly consistent across issues that are congenial to either partisan group and among Democratic and Republican respondents (see Appendix Figure 9 for additional estimates). The bottom row of Figure 4 shows the meta-analytic averages for the six issues in studies with three-wave panels, and conditions the analysis on responding in the first and third waves of the panel. On average, the effect in the third wave is 50% the magnitude of the original effect, though the smaller number of issues and subjects increases our uncertainty.

Figure 3: Effects by party. Points are the predicted effects by partisanship. Ranges indicate 95% confidence intervals. Points are increased in size, and labelled, when an effect is significantly different to 0 (at $p < .05$). Partisan *differences* in correction or misinformation effects, and depicted with asterisks. *Note*: *** $p < .001$, ** $p < .01$, * $p < .05$

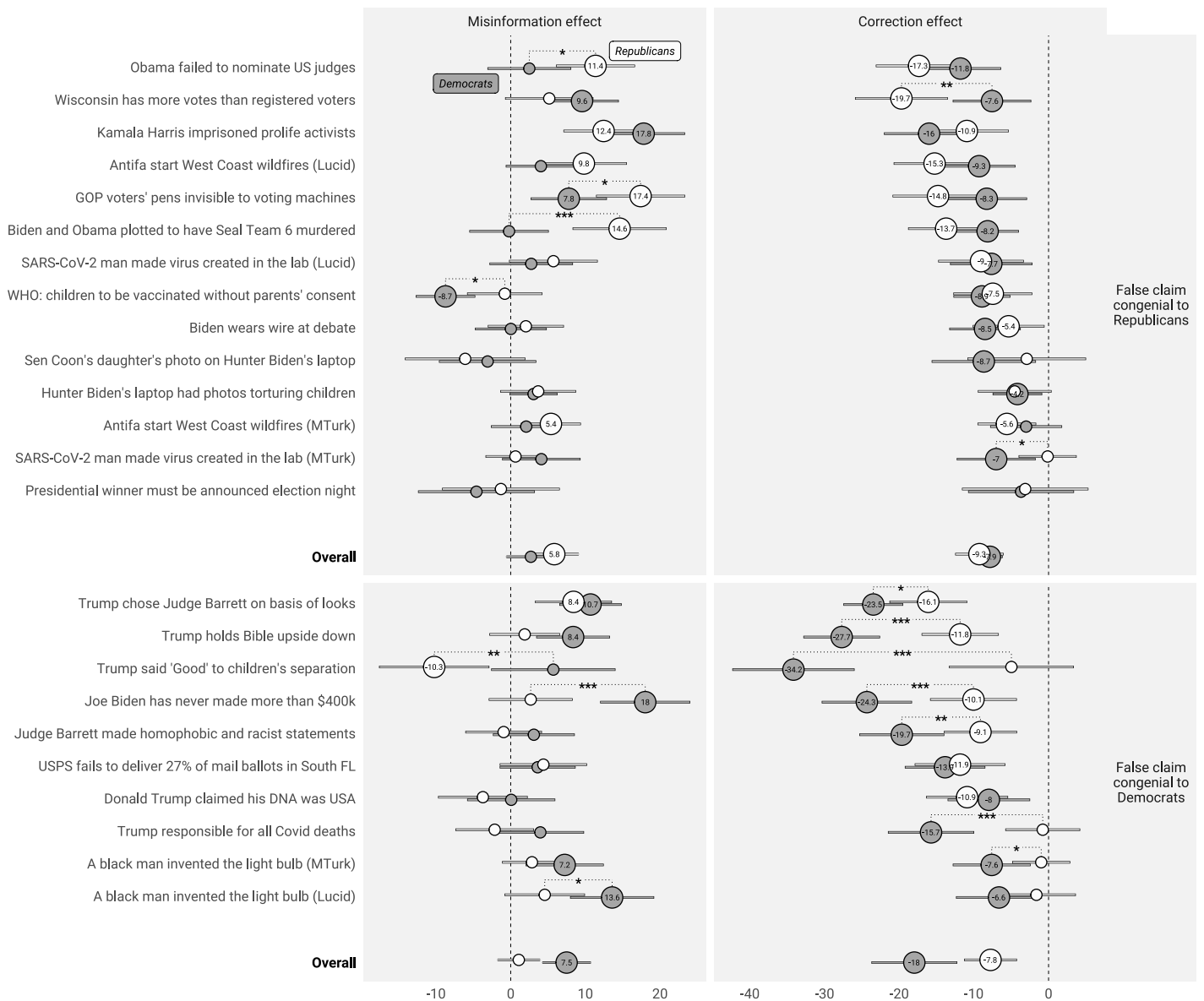
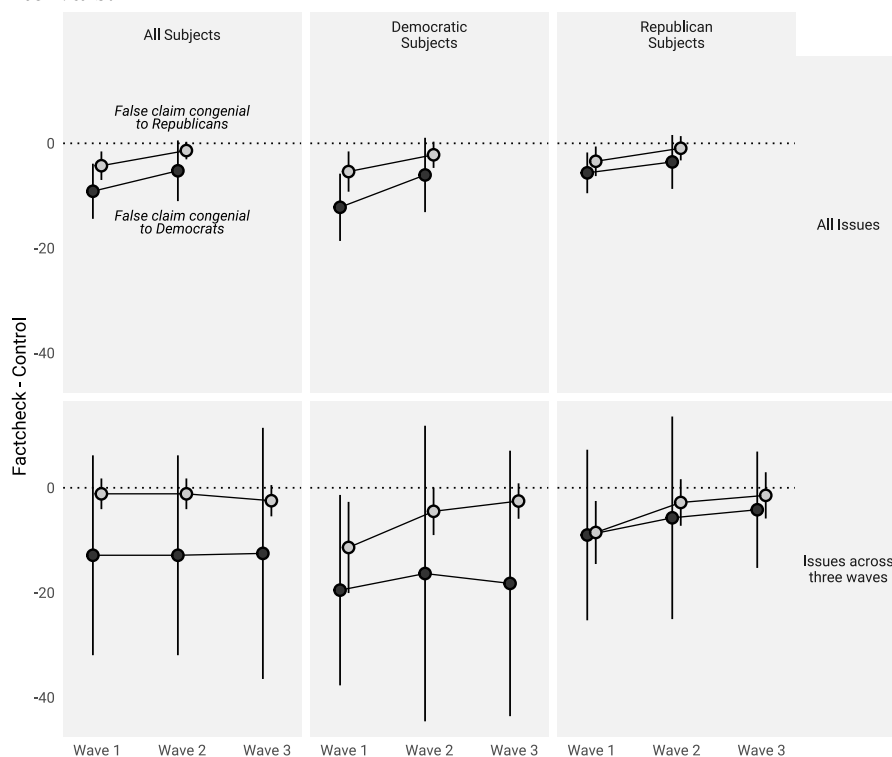


Figure 4: Duration of effects. Points indicate the mean effect, and line ranges report the 95% confidence intervals.



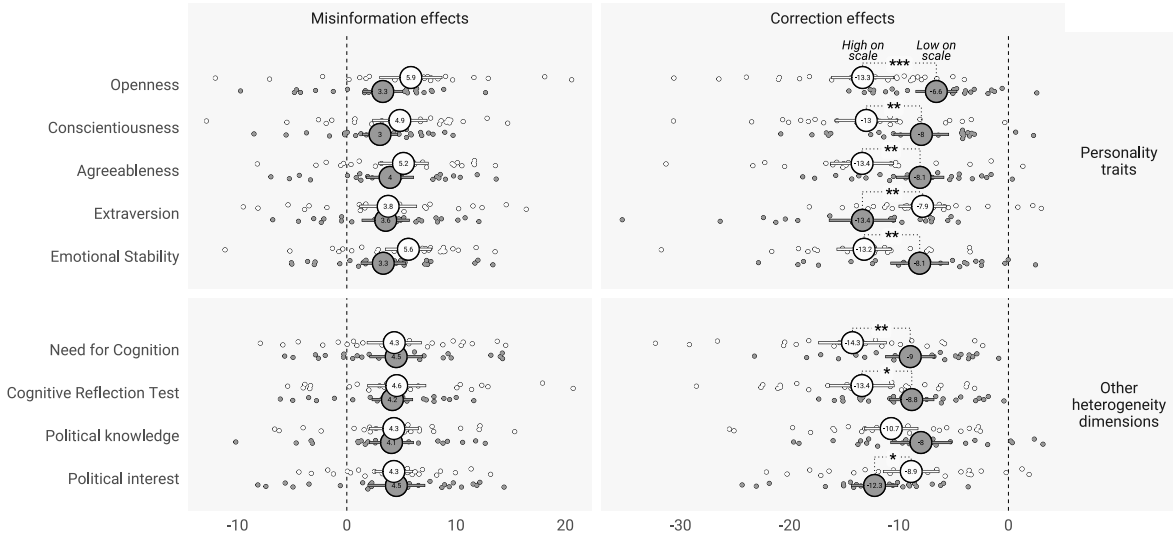
Next, we consider how the immediate effects of fact-checks and misinformation may differ by the following sources of potential heterogeneity: levels of political interest, political knowledge, need for cognition, performance on the Cognitive Reflection Test, and Big Five personality measures.² Figure 5 shows the estimated effects for subjects in the top versus bottom tercile of each index.³ None of these covariates moderate the effects of misinformation (left panels) but several of them moderate the effects of fact-checks (right panels). This same pattern

²The relationship between cognitive reflection and susceptibility to misinformation has been studied extensively (e.g., Pennycook and Rand, 2019), as has political knowledge (Kuklinski and Rich, 2000) and political interest (Schaffner and Luks, 2018). Need for cognition is also being studied in this area (Leding and Antonio, 2019). Previous research has shown that personality type is associated with political knowledge and interest (Gerber et al., 2011b) and engagement with political information (Gerber et al., 2011a)—all of which are relevant to the study of misinformation and correction.

³This analysis procedure differs from our preregistered approach. The regression-based approach we preregistered is shown in the appendix.

of heterogeneity persists after one week, at diminished magnitudes (see appendix).

Figure 5: Heterogeneous treatment effect estimates. Each small point is an underlying effect estimate, for some potential source of effect heterogeneity (each source is described on the y-axis). Effects for those with low values are depicted with dark points, effects for those with high values are depicted with dark points. Larger points, labels, and lineranges, are meta-analytic summaries of these distributions. Significance levels report when these meta-analytic estimates are different. *Note*: *** $p < .001$, ** $p < .01$, * $p < .05$



We consider two potential explanations for why these traits, in particular cognitive reflection and need for cognition, are associated with the effectiveness of fact-checks. One possibility is that people high in these traits may have better reasoning skills and therefore be more capable of understanding, evaluating, and applying the evidence presented in fact-checks. A second possibility is that people high in these traits may simply be more attentive to fact-checks.

To begin to distinguish between these two mechanisms, we conduct an exploratory analysis of the relationship between traits and time spent on the misinformation page and the fact-checking page. The results (available in the appendix) show that the within-trait ranking of conditional effects shown in Figure 5 is matched exactly by a within-trait ranking of average time spent reading the fact-check. This pattern leads us to believe that attention paid to fact-

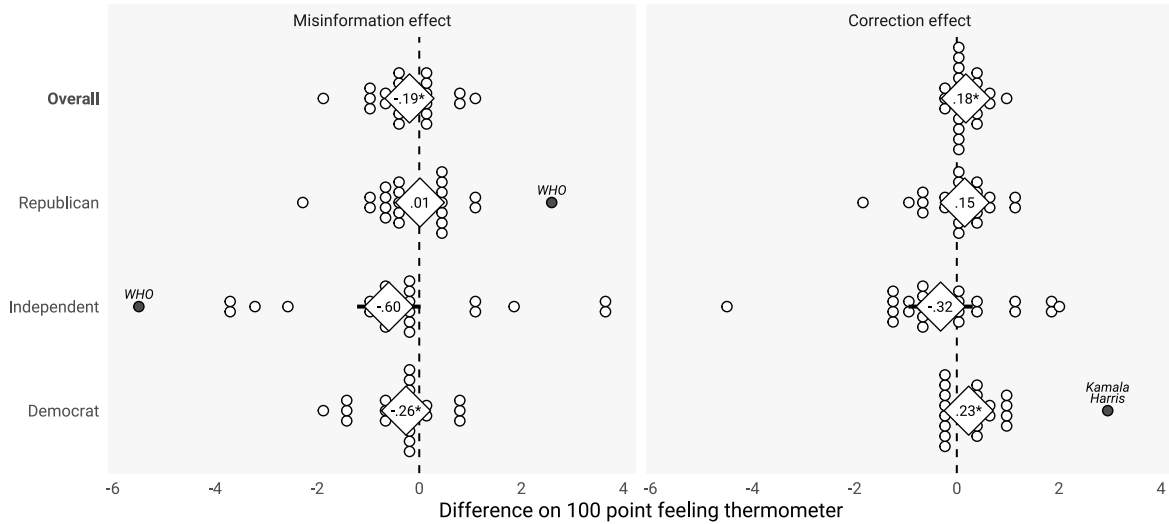
checks explains these heterogeneous effects, not fundamental differences in cognitive ability. Of course, this observation only backs up the question to why people who score differently on these scales spend different amounts of time reading fact-checks.

Lastly, we find that both fact-checks and misinformation had extremely limited influence on related attitudes. In Figure 6, we display the effects of misinformation and fact-checks on political figures and groups mentioned in the misinformation, overall and conditional by party. As pre-registered, we isolate attitudes toward the target of the misinformation and corresponding fact-check. For example, for misinformation alleging that Amy Coney Barrett once made homophobic remarks, we evaluate attitudes toward Barrett in the misinformation and fact-check conditions. Meta-analysis shows that the overall effects of misinformation and fact-checks on attitudes were each smaller than half a point on the 100-point feeling thermometer. While the effects were in the expected direction, with fact-checks making respondents more positive and misinformation more negative, the effects were very small. In the appendix, we show that when we relax assumptions about the target of the misinformation and fact-checks, the same pattern holds.

Discussion

Eight multi-wave experiments extend prior findings about factual corrections and misinformation to the 2020 U.S. election. Consistent with a broad set of prior findings (Wintersieck, 2017; Lewandowsky et al., 2020), we observe fact-checks improving belief accuracy. Over time, the effects attenuate, but they remain detectable. The effects of fact-checks persisted at 66% the original magnitude after one week and at 50% after more than two weeks. This, too, echoes previous research (Porter and Wood, 2021). As other research has also found (Nyhan et al., 2019) even as corrections durably improve accuracy, they have at best minor effects on downstream political attitudes. Finally, in line with evidence attesting to partisan asymmetries in

Figure 6: Estimated effects on attitudes, overall, and by partisanship. Each point shows the effect of being misinformed (in the left facet) or being corrected (in the right facet). Shaded points are those effects where the misinformation or correction effects are significant ($p < .05$). Diamonds and point ranges report the meta-analytic average. These averages are also labelled inside these diamonds. *Note:* *** $p < .001$, ** $p < .01$, * $p < .05$



these matters (Shin and Thorson, 2017; Guay and Rand, 2020), we observe Democrats becoming more accurate than Republicans after exposure to corrections that were uncongenial to their partisanship.

Aside from partisanship, do different kinds of people respond differently to misinformation and fact-checks? Here we find the answer is “no” with respect to misinformation and “yes” with respect to fact-checks. The Big Five personality traits, need for cognition, and political interest all moderate the effect of fact-checks. How can we reconcile homogeneity of misinformation effects with heterogeneity of correction effects? We think the answer lies in how easy it is to process our two treatment types. The misinformation treatments are short, simple, and require limited attention. The fact-checks, by contrast, offer details, evidence, and logical reasoning. Therefore, it is easier (and less time-consuming) for people to process the misinformation treatments than the fact-checks. Consequently, correction effects are consistently higher among

subjects who spend more time with the fact-check treatments. Others (Pennycook et al., 2021) have shown that attention shapes people’s response to misinformation. The same appears to be true for fact-checks. Media organizations and fact-checkers should generate factual corrections that are effective at reducing misperceptions while being easy to process.

Several features of our findings suggest avenues for future research. Although misinformation reduces accuracy, on average, the magnitude of the effects of fact-checks is more than twice that of misinformation. Similarly, the effects of misinformation on related attitudes is tiny. Taken together, these results call into question portrayals of misinformation as a substantial barrier to democratic accountability. It is certainly possible that misinformation’s harms only emerge cumulatively, after repeated exposure to many false claims, far beyond what we test here. Future research should investigate whether larger quantities of misinformation and corrections have more pronounced effects on subsequent attitudes.

The quantity of items we test stands out as a limitation of the present study. The present study is also limited by its reliance on real-world misinformation; as a result, the stimuli we test are not exactly identical to one another. This limitation should be kept in mind when examining our data on average time spent with stimuli. While we determined that trading off treatment equivalence for realism was worthwhile, we look forward to future research that takes an alternative approach.

Our results show that, during the 2020 U.S. election, misinformation degraded accuracy, while corrections improved it by roughly twice the amount, often durably so. The effects of misinformation and corrections on attitudes were negligible. Important heterogeneities emerged in our analysis, with implications for scholars, social media companies and policymakers.

Supplementary materials

The file “Appendix for Factual Corrections and Misinformation During the 2020 U.S. Election: Evidence from Panel Experiments” contains supplementary information and can be accessed via Cambridge University Press.

Data availability statement

Upon publication, replication data for this paper will be available on the Harvard Dataverse.

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Competing interests

Authors report no competing interests.

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