Effects of Fact-Checking Political Misinformation on Perceptual Accuracy and Epistemic Political Efficacy

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Abstract

Numerous studies have shown fact-checks can debunk misinformation and improve perceptions of reality surrounding a specific political issue. We examine whether fact-checks might also boost epistemic political efficacy (EPE), which is confidence in one's ability they can perceive reality surrounding political issues in general. Using a survey experiment ($N = 1,139$), we find discrediting misinformation with a fact-check increases accuracy in issue perceptions and, indirectly, EPE. However, fact-checking's direct effect on EPE is negative, suggesting fact-checks generally help individuals perform an immediate cognitive task—deciding which aspects of a political issue are true—while weakening confidence in task performance.

That journalistic fact-checks and other forms of official corrections mitigate the harmful effects of political misinformation on issue perceptions is now a well-established finding in the communication, political science, and psychology literatures. To date, a wide variety of experimental studies have shown that fact-checks can discredit misinformation

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and assist in realigning issue perceptions with what is demonstrably or verifiably real (see M. P. S. Chan et al., 2017; Walter & Murphy, 2018; Walter & Tukachinsky, 2019). These studies suggest fact-checks help individuals perform an important cognitive task following exposure to misinformation: deciding which aspects of the political issue at hand, if any, are true. The upshot of completing this task is possessing a firmer grasp of the truth behind an issue.

We find it plausible that a related consequence of fact-checking misinformation is increased epistemic political efficacy (EPE), which is confidence in one's ability to grasp the truth behind political issues in general (Pingree, 2011; Pingree et al., 2013, 2014). This is because fact-checks give readers the opportunity to practice a small political truth-detection task that should build confidence they can perform effectively within the broader political truth-detection task domain. Fact-checks, in other words, may function as type of "enactive mastery" experience (Bandura, 1982, 1997), offering readers the chance to complete a cognitive task that boosts confidence they can successfully perform that task in the future. Crucially, if fact-checking misinformation does enhance EPE, such an effect would potentially have significant consequences for political behavior, as high levels of EPE have been linked to increased political information seeking (Farman et al., 2018; Pingree, 2011). Yet, the effects of fact-checking misinformation on confidence in one's ability to locate objective political reality remain a completely uncharted area of the literature.

We address this gap in the literature by examining how fact-checking misinformation relates to both perceptual accuracy and EPE. Specifically, we conducted a survey experiment ($N = 1,139$) in which we exposed participants to misinformation about a federal pediatric vaccine mandate with or without a subsequent fact-check. We then measured how well each group's issue perceptions aligned with political reality as well as their levels of EPE. Our results show fact-checks generally increased accuracy in issue perceptions and increased accuracy indirectly promoted EPE. However, counter to our predictions, the direct effect of fact-checking on EPE was negative. This means that participants who received a fact-check were less confident in their ability to detect political truth compared with participants who received only misinformation, even though the fact-check group was objectively better at the truth-detection task. The misinformation-only group held wildly inaccurate perceptions of the vaccine mandate issue but reported greater confidence in their ability to discover what is true in politics. That is, individuals exposed only to misinformation were unskilled at detecting political truth and unaware of it. We present possible explanations for these findings and discuss implications for political information seeking. We also offer practical suggestions for creating effective fact-checks.

Literature Review

Fact-checking, or the process of systematically verifying factual claims made in public forums, has become an integral part of national political reporting and individual information search in the internet age (Amazeen, 2015). Since the launch of the first mainstream fact-checking website *Snopes.com* in 1994, an estimated 149 websites

dedicated to fact-checking have emerged to combat the growing threat of political misinformation (Wang, 2018), which can be defined as demonstrably false information pertaining to politics. Today, stand-alone fact-checking organizations such as the Poynter Institute's *PolitiFact* are regularly called upon to identify for audiences which political claims comport with reality and which do not. In addition, distinguished national news outlets such as the *New York Times* routinely incorporate fact-checking features in their political coverage (Graves, 2016; Graves et al., 2016).

Fact-checking efforts like these offer real benefits to democratic citizens. A considerable body of experimental research has shown, for example, that fact-checks and other types of official corrections are effective at debunking misinformation and enhancing accuracy in perceptions of issues such as climate change (Benegal & Scruggs, 2018), government-backed "death panels" (Berinsky, 2017; Nyhan et al., 2013), genetically modified organisms or GMOs (Bode & Vraga, 2015), and the Zika virus (Bode & Vraga, 2018; Vraga & Bode, 2017, 2018). Similar experimental studies have shown it is possible to correct misperceptions related to immigration and the death penalty (Weeks, 2015) and the construction of a mosque near the former site of the World Trade Center (Garrett et al., 2013).

By directly challenging false claims, it is also possible for fact-checks and official corrections to produce at least modest improvements in public perceptions of vaccine safety. For instance, in a survey experiment, Nyhan and colleagues (2014) found that supplying participants with a correction disproving the link between pediatric vaccines and autism helped dispel the myth that vaccines cause autism. In a similar study, Nyhan and Reifler (2015) found an official correction could mitigate the false belief that receiving a flu shot triggers the flu. In both studies, correcting misinformation generally realigned participant perceptions to the consensus view in the scientific community that vaccines are safe.

Meta-analysis of the misinformation literature has shown that corrections are mostly effective at rebutting false claims and improving accuracy in perceptions across a variety of political issue contexts (see M. P. S. Chan et al., 2017; Walter & Murphy, 2018; Walter & Tukachinsky, 2019). While a person's political party affiliation, political ideology, and prior attitudes may blunt fact-checking effects on issue perceptions (e.g., Weeks, 2015), the presence of a fact-check following misinformation exposure should still enhance issue perceptions on average. We would therefore predict that

> **H1**: Individuals exposed to misinformation followed by a fact-check will possess more accurate issue perceptions than individuals who do not receive a fact-check.

Fact-Checking and EPE

It is also possible that fact-checking misinformation can enhance EPE, or "confidence in one's own ability to determine the truth about factual aspects of politics" (Pingree, 2011, p. 23; Pingree et al., 2013, 2014; see also Pingree et al., 2012). Rooted in Bandura's (1977) self-efficacy theory, EPE is a cognitive construct that refers not to confidence in one's ability to affect politics, but "confidence in one's ability to understand it" (Pingree,

2011, p. 23). EPE essentially gauges how self-assured individuals are they can distinguish political fact from fiction. When individuals possess low EPE, they may feel incapable of detecting what is true in the political arena. In such cases, individuals may avoid news, resist learning new political information, or eschew politics altogether because they believe they are unable to discover the truth (Farman et al., 2018; Pingree, 2011). Conversely, high EPE is associated with political information-seeking because individuals feel confident their searches will ultimately yield the truth behind issues (Pingree, 2011).

In the past, research on EPE has primarily examined how levels of the construct change as a result of receiving an experimental stimulus purporting to be a real news story about a factual political dispute (e.g., Pingree, 2011). In one version of the story, the dispute is presented in a "he said/she said" format that allows those on one side of a political issue to make factual claims that directly contradict claims made by the other side. The second version of the news story adjudicates the dispute, explicitly telling participants which side's claims comport with reality. Participants who view the adjudicated news stimulus that overtly identifies the truth typically report higher EPE—or global confidence in their ability to detect what is real in politics—relative to the "he said/she said" group. Thus, simply telling participants what is true in one issue context increases confidence in their ability to find the truth behind political issues in general. Giving readers the opportunity to practice the task of detecting which aspects of an issue are true bolsters confidence that it is possible to detect which aspects of other issues are true.

We suspect EPE will function similarly in the framework of misinformation and fact-checking. This is because fact-checks, like news stories that contain adjudication, provide readers an opportunity to practice the cognitive task of detecting political truth amid competing claims. In this way, fact-checks offer readers the opportunity to build confidence they can complete a task by practicing the task itself, which is what Bandura called an "enactive mastery" experience (Bandura, 1982). Enactive mastery experiences are "the most influential source of efficacy information because they provide the most authentic evidence of whether one can muster whatever it takes to succeed" at a given task, increasing the likelihood of future performance (Bandura, 1997, p. 80). It is the same mechanism by which Pingree et al. (2014) suggested adjudication in news stories enhances EPE (p. 622). Whether readers realize it or not, practicing the task of discerning the truth in a specific political issue context boosts underlying confidence in their ability to locate the truth across multiple issue contexts. We would accordingly predict that

> **H2**: Individuals exposed to misinformation followed by a fact-check will possess higher levels of EPE than individuals who do not receive a fact-check.

Importantly, building self-efficacy through enactive mastery experience is also contingent on individuals feeling like they have succeeded at the relevant task. A series of successful enactive mastery experiences, as opposed to failures, is what ultimately creates enduring confidence in one's ability to perform a task, and thus, improved task

performance (Bandura, 1997). Consider the hypothetical example of learning how to drive a car. If a person's initial attempts at driving are met with successes, such as accelerating through empty parking lots without causing accidents, they will have accomplished small driving tasks that make them feel more confident in their ability to drive. However, if attempts are met with failures, such as high-speed wrecks, it is doubtful a person will feel very confident they can drive a car at all. Failure to complete the small task undermines confidence one can act within the task domain.

In the context of this study, fact-checking effects on EPE may therefore be contingent on both receiving a fact-check and feeling successful at the task of deciding what is true with regard to the political issue at hand. A "success" in this context would be to interpret a fact-check's content to reflect definitive reality relative to misinformation, and, as a consequence, realign issue perceptions to be consistent with the information presented in the fact-check. A "failure" to understand or accept a fact-check and realign one's perceptions is also certainly possible. It has been established that corrections are not universally accepted by those who receive them (e.g., Lewandowsky et al., 2012; Nyhan & Reifler, 2010; Thorson, 2016). In cases in which individuals are not persuaded that a fact-check offers the definitive account of reality, it may be possible that both task performance (holding accurate issue perceptions) and confidence to perform within the task domain (EPE) decline. In other words, the effects of fact-checking misinformation on EPE may depend on first successfully completing the task of deciding which aspects of a political issue are real. Based on Bandura's premise that the successful completion of tasks is key to building efficacy, we predict that

H3: Perceptual accuracy that results from receiving a fact-check will mediate the effect of fact-checking on EPE.

Misinformation Content and EPE

Our principal interest in this article is the influence of fact-checking on EPE. However, given our experimental design, which is explained in detail below, it is worthwhile to explore the possibility that aspects of misinformation content may also influence our focal outcome.

First, political misinformation may be resistant to correction when the content of the misinformation places blame for a social problem or casts aspersions on elite members of an un-likeminded political party. People typically process misinformation and corrections in ways that are consistent with their prior beliefs, ideologies, and group affiliations (e.g., Flynn et al., 2017; Weeks, 2015). It is therefore possible that fact-checks are less effective in correcting misinformation, for example, when individuals are motivated to reject fact-checks on partisan grounds. However, it is unclear how attributions of partisan blame in misinformation content would influence EPE. Accordingly, we ask the following question:

RQ1: How do attributions of partisan blame cited within misinformation content alter fact-checking effects on EPE?

Second, the source of misinformation may also alter how individuals view its truthfulness as well as the credibility of a subsequent fact-check. Political misinformation often adopts the style and format of real news. For instance, in January 2019 political activists handed out realistic looking but fabricated issues of the *Washington Post* at several locations in Washington D.C. and shared links to a website mimicking the *Post*'s (Funke, 2019). The same group handed out thousands of fake copies of the *New York Times* and links to a fabricated *Times* website in 2008 (S. Chan, 2008). Such realistic-looking deceptions that hijack existing source cues may appear highly credible and thus prove particularly difficult to debunk. On the other hand, some research indicates individuals often ignore source cues or simply cannot distinguish between genuine news sources and counterfeit ones. Adolescents and young adults who have limited experience with existing news sources and their official visual (e.g., logo) and textual cues are especially susceptible to being unable to identify fake sources (Wineburg et al., 2016). It is possible, then, that the purported source of misinformation plays no role in fact-checking effects on EPE as individuals cannot discriminate between legitimate sources and imitations. Because no previous research has examined misinformation source effects on EPE, we ask as follows:

RQ2: How does the source of misinformation alter fact-checking effects on EPE?

Method

Data Collection and Sample

To test our hypotheses and explore research questions, we designed a survey experiment and administered it to participants enrolled in the Amazon Mechanical Turk (MTurk) participant pool. The MTurk pool is operated by Amazon as a stand-alone resource for researchers to inexpensively recruit participants to complete a wide range of public opinion surveys, experimental studies, or more narrow tasks such as "identifying objects in a photo or video, performing data de-duplication, transcribing audio recordings or researching data details" (MTurk, 2019). MTurk participants are able to earn small monetary incentives—often $0.25 to $1.00 per task—in exchange for their time and cognitive investments.[1]

We fielded our study on MTurk from September 25, 2017, to October 17, 2017. During that period, MTurk participants over 18 years old who reported living in the United States could view our study called "Health Issues in the News Survey" on a roster of MTurk "human intelligence tasks" (HITs). If participants clicked on our study's title, they were provided a description of our study as a "quick survey that will ask you to provide your opinions about a recent health news issue." Participants were told they could take the study once in exchange for a $0.25 incentive. Upon electing to take the study, participants were given an anonymous survey link to a Qualtrics survey, wherein they were provided with informed consent, randomly assigned to a treatment group (described below), and asked a series of Likert-type response items about the stimuli as well as their demographic characteristics and political dispositions.

Data quality checks. Our initial MTurk sample consisted of 1,526 participants who completed the study.[2] Of these 1,526 participants, 301 participants (19.72% of the sample) were excluded from the analysis because they provided a duplicate response, which we determined from their IP address. We then ran an automated quality check of the remaining IP addresses against a database of server farms that are often used to disguise a respondent's location (see Winter, 2019). This process yielded an additional 45 participants (2.95% of 1,526) with IP addresses linked to a server farm and a separate group of 41 participants who had non-U.S. IP addresses (2.69% of 1,526).[3] We excluded these participants from the analysis as well. Finally, we ran checks for "speeders" who completed the survey too quickly, "idlers" who provided a delayed response, and checks for whether time spent taking the study differed by condition. We found minimal evidence that time to complete the survey varied by condition.[4] Thus, we simply control for survey duration (measured in seconds) in our analysis rather than omit observations.

Final sample characteristics. The final sample ($N = 1,139$) was 36% male and 64% female. The average age was 37 years ($SD = 12.42$). The majority of the sample reported their race/ethnicity as White (80.25%). Participants' formal level of education was measured on a 6-point scale from "High school incomplete" (coded 0) to "Post graduate degree" (coded 5). On average, participants fell between "some college" and a "four-year college degree" ($M = 2.78$, $SD = 1.19$). Income was measured on a 12-point ordinal scale that ranged from "less than $10,000" (coded 0) to "more than $150,000" (coded 11) of total income earned last year. The average participant income was estimated at $59,933 ($SD = $41,218$). In terms of political party affiliation, the sample was comprised of 36.82% Democrats, 21.30% Republicans, and 41.88% Independents. We also assessed political ideology using a scale from "very liberal" (coded 0) to "very conservative" (coded 6) with "moderate" as a midpoint ($M = 2.61$, $SD = 1.71$).

Experimental Procedure

All participants who consented to take the study were initially told that they would be reading and responding to health news. Depending on their randomly assigned condition, participants read one or two mock stories: a news article containing misinformation and, for some, a fact-check correcting this misinformation (see Figure 1). Participants were required to view the mock news article for a minimum of 45 s and the fact-check for 60 s due to the relative length of each. Prior to exposure to the news article, all participants were instructed: "Please read the following article. You will be tested on your knowledge of the article afterward to verify you read the article." Those who randomly received the fact-check were given a prompt after reading the news article that stated, "The article you just read was published by [SOURCE]. Now you will read a fact-check from *NewsCheck*." *NewsCheck* was the name of the fact-checking organization we created for use in the experiment.

Big Pharma Democrats Push Risky PAV Vaccine for Children

By: John Hamilton | ABC News | Posted on March 12, 2017

Congressional Democrats are pushing for a controversial new law that would mandate children entering kindergarten receive Quobinsol, a new and potentially harmful vaccination against the deadly Perisus Accemis Virus (PAV).

"This legislation would require incoming kindergarteners be vaccinated against the dangers of PAV," Democratic Representative from Wisconsin and author of the bill Kelly Anderson, said. "We must ensure the safety of our nation's schools."

Anderson's bill has already been roundly criticized by Congressional Republicans as heavily favoring Biolex, the manufacturer of Quobinsol. Last year Anderson came under fire from congressional watchdogs for accepting $385,000 from Biolex during a 2016 re-election campaign.

"Representative Anderson is trying to rush this bill through Congress before we even know if the Quobinsol vaccine is safe to placate large campaign donors rather than protect children," Republican Representative Alex Cook (R-Iowa) said.

Quobinsol is currently the only drug treatment for PAV undergoing clinical trials by the Food and Drug Administration (FDA). However, the FDA recently ordered a "partial clinical hold" on Quobinsol testing after several patients in clinical trials died. Biolex confirmed patients were taking the experimental drug, but cautioned there was no evidence directly linking Quobinsol to the fatalities.

In July 2014 a PAV outbreak killed 12 children and sickened over 300 across five U.S. states. Residents in Iowa, Nevada, and California were hardest hit. About 10% of survivors suffered permanent disabilities.

PAV primarily affects children, 0- to 10-years-old. PAV symptoms include sepsis, brain inflammation, and stroke.

You will be allowed to proceed to the next question after 45 seconds.

Anti-Vaccination Group Behind Fake "Perisus Accemis Virus (PAV)" Story

By: Robert Jameson | NewsCheck | Posted on March 19th, 2017

The story on *ABC News* was damning.

The headline "Big Pharma Democrats Push Risky PAV Vaccine for Children" appeared on *ABC News* in March 2017 and is still being shared on social media.

The problem with PAV? It doesn't exist.

PAV may be many things, but real is not one of them. It is an urban legend, a myth, a tall tale, a rumor, a hoax about a fictional disease.

A recent press release from the Centers for Disease Control and Prevention (CDC) has made it clear that, "There is no such disease as PAV. It is 100% false. In fact, the evidence shows that an anti-vaccination group intentionally mislead the public by promoting this falsehood on the internet and social media."

One reason the PAV myth may have spread so quickly on the internet and social media is because of the fear and confusion surrounding diseases, vaccines, and health in general. Where does this mistrust of vaccines come from?

"At the heart of this is: People aren't scared of the diseases [the vaccines protect against] because they don't see diseases like polio or Haemophilus influenzae type b (or Hib)," says Dr. Paul Offit, professor of pediatrics in the division of infectious diseases and director of the Vaccine Education Center at the Children's Hospital of Philadelphia. "To some extent, vaccines are victims of their own success, and people are scared by erroneous information that they see on the internet from anti-vaccine groups. That's the one-two punch."

A recent article in the medical journal Pediatrics reported most of this misinformation comes from the internet. The most influential medium for parents' beliefs about immunizations seems to be the internet. Approximately 74% of Americans have internet access. In 2006, 16% of users searched online for information on immunizations or vaccinations. Over half (52%) of users believe "almost all" or "most" information on health sites are credible, yet the availability of inaccurate and deceptive information online has labeled the internet a "modern Pandora's box."

Our Ruling

The "PAV" disease has no basis in reality.

A story from *ABC News* about PAV was the result of journalists falling for a wildly popular viral story that was originally manufactured by an anti-vaccination group called The Vaccine Resistance Movement, or VRM.

Not only was PAV fictitious, the drug company Biolex and the purported $385,000 campaign donation to Kelly Anderson was completely fabricated in the VRM-backed story. There are no records that the "Biolex" company has ever existed, nor is there evidence that a drug called "Quobinsol" has ever been developed, tested, or administered.

The purported symptoms of PAV, such as sepsis and brain inflammation, are so common they can easily be linked to many other conditions.

We rate this story "three strikes." —Completely False

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You will be allowed to proceed to the next question after one minute.

Figure 1. Example political misinformation and fact-check treatments.

Note. Example treatment (left) showing manipulations for party responsible for advancing the PAV vaccine mandate (Democrats pictured) and source (ABC News pictured) with corresponding fact-check (right). We used custom HTML within each stimulus to manipulate variables. For example, custom HTML was used to randomly alter the fake news story's logo and byline. This code was also simultaneously used to alter question prompts: "The article you just read was published by [SOURCE] . . . ." PAV = Perisus Accemis Virus.

The first article read by all participants contained misinformation about a congressional effort to mandate a pediatric vaccine in response to an outbreak of a disease called Perisus Accemis Virus (PAV). We created the name "Perisus Accemis Virus," a vaccine called "Quobinsol," and a vaccine manufacturer known as "Biolex" using an online random name generator. We adapted the language for our news stimuli from a now-defunct fake news website, *ABCNews.com.co*. We also deliberately chose the topical context of a congressional debate over a pediatric vaccine mandate for two reasons: (a) vaccination is a pressing health issue besieged by real-world misinformation and (b) it is a contested issue with detractors on each side of the political aisle. In fact, public opinion data show a minority of vaccination opponents exist across party lines and along the ideological spectrum (Pew Research Center, 2015), which is perhaps due to general distrust of science (Hamilton et al., 2015) or of large pharmaceutical companies that manufacture vaccines (Lewandowsky et al., 2013).

The fact-check was designed to explicitly and definitively invalidate the false claims made in the news article. Specifically, the fact-check clearly explained that PAV, the Quobinsol vaccine manufactured to fight the disease, the Biolex drug company, and all political actors in the news article were simply not real. The fact-check explained that the " . . . story from [SOURCE] was the result of journalists falling for a widely popular viral story that was originally manufactured by an anti-vaccination group called The Vaccine Resistance Movement, or VRM." We created the VRM and the context of viral misinformation as a means to explain how a mainstream news source could be duped into publishing the false claims.

Participants were also be randomly assigned to a control group. In the control group, participants were told to read a story credited to *USA Today* about how to make blueberry pancakes—a topic we believed would be totally unrelated to the treatments. Participants assigned to this group had to read the story for a minimum of 45 s before they could continue.

Following exposure to stimuli, all participants proceeded to a posttest questionnaire. Participants were thanked for completing the study. After a 1-week delay, all participants received an email debrief. The debrief carefully explained that both the news story and the fact-check were experimental stimuli which were constructed by the authors.

Experimental Design and Manipulations

Our study used a 2 (fact-check or no fact-check) × 2 (Democrat or Republican representative supporting the PAV mandate) × 4 (source of misinformation is *ABC News, The Hill, Breitbart*, or *HuffPost*) quasi-experimental design. The design was between-subjects, posttest only. Experimental manipulations were used as exogenous variables in the analysis, although the first manipulation (receive fact-check) was the manipulation of interest. We should note that the design and manipulations used in this study are part of a larger experimental project intended to test how individuals process misinformation and corrections.

Receive fact-check. Our focal experimental manipulation was whether participants viewed political misinformation with or without a fact-check. Participants were randomly assigned to conditions in which the fact-check treatment was presented following exposure to the mock news article about PAV. About half of the participants viewed the fact-check after the story ($n = 546$; 47.94%). Another group of participants saw only the misinformation about PAV and then immediately proceeded to the posttest questions ($n = 543$, 47.67%). Control group participants ($n = 50$, 4.39%) received the unrelated news article and proceeded to the posttest.

Party advancing PAV. As part of our broader research design, we also randomly varied the party identification of the congressional group supporting the PAV bill and the specific representative on record supporting the bill, "Kelly Anderson." One group of participants viewed a mock news story in which the Republicans and Republican Representative Kelly Anderson supported the bill ($n = 565$, 49.60%). Others were randomly assigned to view the same story, but one in which Democrats and Democratic Representative Anderson supported the bill ($n = 524$, 46.01%). In addition, in all treatment groups, participants were told that the specific representative on record opposing the bill, "Alex Cook," was affiliated with the party opposite Kelly Anderson and those supporting the bill. In sum, this gave the impression of a partisan political dispute over legislation to institute a federal vaccine mandate. No party supported the bill in the control group ($n = 50$, 4.39%) because the control group's story was unrelated.

Source of misinformation. The source of the mock news article was also manipulated as part of our broader design. Specifically, the source was manipulated such that the mock article was attributed to a source with a putative liberal (*HuffPost*), conservative (*Breitbart*), neutral online (*The Hill*), or neutral traditional (*ABC News*) ideological slant.[5] This amounted to four misinformation sources: *HuffPost* ($n = 260$, 22.83%), *Breitbart* ($n = 275$, 24.14%), *The Hill* ($n = 280$, 24.58%), and *ABC News* ($n = 274$, 24.06%). *USA Today* was the control ($n = 50$, 4.39%).

Criterion Variables

Perceptual accuracy. All participants were asked five perceptual questions referencing information discussed in the stimuli. Three of these questions contained multiple choice responses. These items asked respondents: "Based on the [article/s] you just read, how many Americans has PAV killed?"; "Based on the [article/s] you just read, which age group is most affected by PAV?"; and "Based on the [article/s] you just read, how much money did Representative Kelly Anderson receive from Biolex?" The two remaining questions used a true/false format. These items asked participants to respond: "TRUE or FALSE: Biolex is real" and "TRUE or FALSE: Quobinsol is real." Perceptual accuracy was ultimately measured by calculating an index of "correct" responses to these items. A correct answer recognized that PAV, its epidemic statistics, and the political dispute over its federal mandate were not real. For example,

if the question asked about the number of people PAV has killed, participants who answered "0" would be correct. Participants who responded that PAV has killed "12," "300," or "3,000" people and participants who said "Don't Know" or "Not Sure" were incorrect. The total number of correct answers was averaged to generate a perceptual accuracy scale (KR-20 = 0.82). This scale ranged from 0 to 5 ($M = 1.45$, $SD = 1.60$).

EPE. EPE was measured using items from Pingree (2011). Responses to each item were measured on 7-point scales ranging from "strongly disagree" (coded 0) to "strongly agree" (coded 6). Items asked participants to respond to the statements: "I feel confident that I can find the truth about political issues"; "If I wanted to, I could figure out the facts behind most political disputes"; "It is possible to figure out the truth about political issues"; and "There are objective facts behind most political disputes, and if you try hard enough you can find them." Responses were combined in an averaged index ($M = 3.72$, $SD = 1.15$, range = 0–6, $\alpha = .89$).

Analysis Plan

We estimated separate linear regression models for each criterion variable using *Stata 15*. The initial model for each variable examined main effects. The second model for EPE examined main effects plus perceptual accuracy entered as an independent variable. Dummy codes for the fact-check, misinformation source, and party purportedly advancing the PAV vaccine mandate were also entered in each model. No fact-check received, *ABC News*, and the Republican party were used as the excluded reference groups. We used *Stata*'s SEM package to estimate a path model exploring mediation between fact-checking, perceptual accuracy, and EPE.

Results

We hypothesized fact-checking misinformation would have two desirable cognitive consequences: increased accuracy in perceptions about the political issue at hand and enhanced EPE, or confidence in one's ability they can detect what is true in the political arena. We further predicted that fact-checking effects on EPE would also be contingent on the fact-check successfully improving perceptual accuracy. Table 1 shows our main effects models (Model 1). The second model (Model 2) uses perceptual accuracy as a predictor of EPE.

The first model in Table 1 shows that receiving a fact-check had a main effect of increasing accuracy in issue perceptions ($\beta = .59$, $p < .001$). As expected, participants randomly assigned to view misinformation followed by a fact-check held more accurate issue perceptions consistent with the claims made in the fact-check ($M = 2.42$, 95% confidence interval [CI] = [2.30, 2.55]) than did those who received only misinformation ($M = 0.55$, 95% CI = [0.46, 0.65]) as well as those who viewed an irrelevant news story in the control group ($M = 0.10$, 95% CI = [0.00, 0.22]). Participants in the control group held the least accurate issue perceptions of any group, even less accurate than those who received pure misinformation ($\beta = -0.06$, $p = .018$), which is

Table 1. Main Effects on Perceptual Accuracy and EPE ($N = 1,139$).

Variables	Perceptual accuracy				EPE			
	[Model 1]		[Model 2]		[Model 1]		[Model 2]	
	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β
Main Effects								
Receive fact-check	1.87 (0.08)	.59***	—	—	−0.08 (0.07)	−.03	−0.28 (0.09)	−.12**
Control	−0.48 (0.20)	−.06*	—	—	0.19 (0.19)	.03	0.25 (0.18)	.04
Party advancing PAV	−0.02 (0.08)	−.01	—	—	0.13 (0.07)	.06	0.13 (0.07)	.06
HuffPost	0.06 (0.11)	.01	—	—	−0.03 (0.10)	−.01	−0.03 (0.10)	−.01
The Hill	−0.16 (0.11)	−.04	—	—	0.11 (0.10)	.04	0.13 (0.10)	.05
Breitbart	0.04 (0.11)	.01	—	—	0.05 (0.10)	.02	0.05 (0.10)	.02
Perceptual accuracy	—	—	—	—	—	—	0.10 (0.03)	.14***
Constant	0.58 (0.10)	—	—	—	3.65 (0.09)	—	3.58 (0.09)	—
R^2	36.37%				0.68%		1.96%	

Note. Models show unstandardized beta coefficients with standard errors in parentheses. Standardized coefficients (β) are shown at right. All models controlled for the duration the respondent took to complete the survey in seconds. Duration was not significant in any model, so we omit the variable from the table to enhance readability. We ran the first perceptual accuracy model as an ordered logistic regression for comparison. Results were substantively identical and are available from the first author by request. We found no evidence of multicollinearity in any model. EPE = epistemic political efficacy; PAV = Perisus Accemis Virus.
*$p < .05$. **$p < .01$. ***$p < .001$.

understandable considering those in the control group received irrelevant information. It is also notable that the average difference in "correct" issue perceptions between the control and misinformation-only groups (Mdn = 0.45) was far smaller than the difference between the fact-check and pure misinformation groups (Mdn = 1.83). Taken together, the evidence suggests receiving a fact-check resulted in more accurate issue perceptions. **H1** is supported.

The main effect of fact-checking on EPE, or lack thereof, was to us a more surprising finding. In the initial EPE model, exposure to the fact-check had a null effect on EPE and the variable's coefficient was trending in the opposite direction of what we anticipated ($\beta = -.03$, $p = .26$). This means that participants who received misinformation followed by a fact-check were marginally less confident in their political truth-detecting ability ($M = 3.67$, 95% CI = [3.57, 3.77]) than were those who received only misinformation ($M = 3.75$, 95% CI = [3.65, 3.84]), although this difference was not significant. Participants in the control group reported higher EPE on average ($M = 3.84$, 95% CI = [3.52, 4.16]) than did participants in the treatment groups, but again between-group differences in EPE were negligible. Therefore, we must conclude that fact-checks did not enhance EPE, at least not directly. **H2** is not supported.

Perhaps, however, the relationship between receiving a fact-check and EPE depends on task success. That is, perhaps participants who felt certain the fact-check offered the definitive account of events held more accurate issue perceptions, and thus, confidence in the political truth-detection task domain. We considered this possibility by estimating a model in which both receiving the fact-check and perceptual accuracy were considered predictors of EPE (Table 1, Model 2). Such a model should account for whether participants received a fact-check and the degree to which they successfully realigned perceptions to the reality presented in the fact-check.

Presumably, both receiving a fact-check and perceptual accuracy should be positively associated with EPE in this latter model. This was indeed the case for perceptual accuracy, which was positively related to EPE ($\beta = .14$, $p < .001$), but the relationship between receiving a fact-check and EPE became significant and negative ($\beta = -.12$, $p = .001$). This latter finding indicates that the fact-check group had less confidence in their ability to detect political reality than did the group that only received misinformation, which we treated as the excluded reference group in the regression models. The size of this effect was small ($\eta_p^2 = 1.2\%$), but it is important to emphasize that this result is in the opposite direction of what we predicted, so even a small effect here seems noteworthy. EPE did not differ, on average, between those in the control group and the group that received only misinformation ($\beta = .04$, $p = .181$).

It is also important to note that if we were to treat the fact-check group as the excluded reference instead of the misinformation group, the result would be significantly higher EPE among the control group ($\beta = .09$, $p = .008$; model not shown). Thus, only the group who received the fact-check possessed low EPE, albeit only slightly lower relative to the misinformation and control groups. The control and
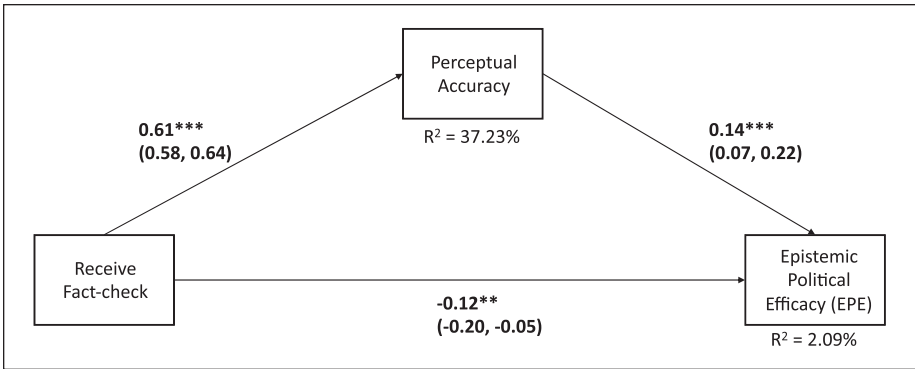
Figure 2. Perceptual accuracy mediating relationship between receiving a fact-check and EPE (*N* = 1,139).
Note. Standardized path coefficients are shown. Fit indices showed the model fits these data well (χ^2_6 = 13.03, *p* = .15; CFI = 0.99; TLI = 0.97, RMSEA = 0.02, 90% CI = [0.00, 0.06]) based on Acock's (2013) guidelines. Control variables were entered in the model to account for all main effects. The model also accounted for random assignment to the control group and survey duration in seconds. The indirect path from receiving a fact-check to EPE via perceptual accuracy was positive and significant (β = .20, *SE* = 0.05, *p* < .001, 95% CI = [0.10, 0.31]). EPE = epistemic political efficacy; CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error approximation; CI = confidence interval.
*p < .05. ***p* < .01. ****p* < .001.

misinformation groups possessed about the same level of confidence in their ability to detect political truth.

We probed these relationships further by constructing a path model with perceptual accuracy mediating the association between receiving a fact-check and EPE (Figure 2). This figure shows that receiving a fact-check and realigning issue perceptions with the political reality depicted in the fact-check increase EPE (indirect path: β = .20, *p* < .001). The direct path from receiving a fact-check to EPE remains negative. Thus, it seems clear that simply receiving a fact-check did not provide a boost in one's confidence they could detect truth in the political arena—in fact, simply receiving a fact-check appears to have harmed EPE. A person who receives a fact-check must also succeed at the truth-detection task, as indicated by increased accuracy in issue perceptions, to build confidence they can perform effectively in that domain. **H3** is supported.

Finally, all other experimental manipulations that were part of our broader experimental design failed to have effects on perceptual accuracy and EPE. Neither the party affiliation of the fictitious politician advancing the vaccine mandate (Democrat/Republican) nor the purported misinformation source (*ABC News, HuffPost, Breitbart, The Hill*) had main effects on EPE. We also explored the possibility of interactions in our EPE models, but none were significant at *p* < .05. In response to **RQ1** and **RQ2**, it seems attributions of partisan blame within misinformation content as well as the source of the misinformation has no effect on EPE.

Discussion

Our purpose was to determine whether fact-checks are as consequential to perceptions of truth surrounding a single political issue as they are to confidence in one's ability to discover the truth behind political issues in general. We found evidence that fact-checking misinformation improved perceptual accuracy with regard to the specific political issue discussed in our experimental stimuli. This finding is consistent with a considerable body of literature on misinformation correction (M. P. S. Chan et al., 2017; Walter & Murphy, 2018; Walter & Tukachinsky, 2019). Supplied with both political misinformation and a fact-check disputing that misinformation, individuals generally realign their perceptions to comport with a fact-check.

Mere exposure to a fact-check was not enough, however, to enhance EPE. In fact, we found that after accounting for accuracy in issue perceptions, the direct effect of merely receiving a fact-check on EPE was negative. This effect was small in magnitude, explaining little more than one percent of variance in EPE. Yet, what it is striking is that the direction of the effect was the opposite of what we predicted. This suggests that fact-checking misinformation generally decreased confidence in one's ability to detect political reality, even as it objectively improved perceptions of the reality surrounding the vaccine mandate issue discussed in the experiment.

One possible explanation for the differing effects of fact-checks on perceptual accuracy and EPE is that fact-checks, by their very nature, introduce incongruous claims that can prompt epistemic uncertainty that persists regardless of task performance. That is, when an individual is confronted with two contradictory portraits of the same issue—one painted in the context of misinformation and the other in the context of a fact-check—they may suddenly have reason to doubt their ability to detect political truth, even though they may perform well on the immediate truth-detection task. The fact-check may alert a person to the existence of political misinformation, raising doubts about their ability to perform within the truth-detection task domain while not necessarily undermining actual performance on the immediate task. Conversely, participants in the misinformation-only conditions may have experienced relative epistemic certainty simply because they were not presented with any conflicting claims. This might have led the misinformation-only group to possess higher EPE than the fact-check group, feeling more confident in their ability to detect political truth even though they objectively failed at the political truth-detection task.

Another way of viewing this explanation is through the lens of the Dunning–Kruger effect (Kruger & Dunning, 1999; see also Dunning, 2011). The Dunning–Kruger effect is a cognitive bias that occurs when individuals who are so incompetent at performing a task also do not possess the meta-cognitive ability to realize how incompetent they are. This causes individuals to systematically overestimate their ability to perform in the task domain in which they are incompetent. Similarly, individuals in our study who received only political misinformation reported more confidence in their ability to detect political truth than those who received the fact-check, even though participants who received only misinformation held wildly inaccurate perceptions of the issue at hand. In other words, individuals exposed only to misinformation

might not have the meta-information required to recognize they are ill-informed. The result is that the individual is unskilled at detecting political truth and unaware of it.

Importantly, while we found negative direct effects of fact-checking political misinformation on EPE, we discovered positive indirect effects via improved perceptual accuracy. This mediation effect suggests that, so long as individuals accept the reality depicted by a fact-check as the definitive truth and realign their perceptions to comport with a fact-check, a fact-check can serve as a successful enactive mastery experience that ultimately enhances confidence in one's overall ability to locate political truth (Bandura, 1977, 1982). One must not only perform, but *successfully* perform the cognitive task of detecting political truth, in other words, to build confidence they can perform effectively in the task domain. Otherwise, fact-checking misinformation appears to reduce confidence one can locate a definitive political reality.

We believe these findings may have important implications for the political behavior of democratic citizens as well as practical import for developing fact-checks. The first implication is that receiving fact-checks may ultimately alter political information-seeking behavior. Recall that EPE is positively associated with seeking political information because high-EPE individuals are more likely to believe their searches will yield the truth (Farman et al., 2018; Pingree, 2011). It stands to reason that exposure to the competing versions of reality presented in misinformation and corrections, particularly repeated exposure over time, may lead individuals to increasingly doubt they can determine what is real in the political arena, eroding EPE to the extent they may avoid news and politics. This idea is supported by self-efficacy theory, which posits that repeated failures at enactive mastery experiences may result not only in declines in self-efficacy, but demotivate future task performance (Bandura, 1997). The possibility that competing versions of reality portrayed in misinformation and fact-checks erode EPE and thus news and political information-seeking would appear to us an outcome deserving of further experimental exploration.

We of course do not recommend journalists and professional fact-checkers abandon corrections because they may inhibit EPE. Ignorance to misinformation may be bliss, but the ill-informed make for poor citizens. What we would instead recommend is that journalists and media practitioners consider fact-checking effects that lie beyond correcting false beliefs and misperceptions linked to a single political issue. It may not be enough to definitively correct issue misperceptions. Fact-checks might also try to instill a belief in one's ability they can discover the truth behind any political issue. To that end, fact-checks that reduce cognitive effort and perceived task difficulty while also reinforcing perceived accomplishment in understanding fact-check content might lead to a successful enactive mastery experience that enhances EPE (Bandura, 1997). Brief fact-checks that highlight effortlessness in debunking false claims and that conclude with an easy quiz on the issue and claims discussed might be effective. A reward for answering the quiz correctly (e.g., access to free news articles) may build even more confidence one can successfully locate the truth amid conflicting claims about political reality.

Before concluding it is important to discuss a number of other avenues political misinformation researchers might explore in the context of fact-checking and EPE.

For instance, inoculating individuals against misinformation has been shown to be a successful strategy in reducing false beliefs and misperceptions in the past (van der Linden, Leiserowitz, et al., 2017; van der Linden, Maibach, et al., 2017), though it is unclear how inoculation would affect EPE. Possibly, reading a fact-check that results in a successful enactive mastery experience prior to misinformation exposure would result in the subsequent misinformation being processed through a high-efficacy filter, thereby mitigating misinformation effects. It is also possible that the content of fact-checks, including fact-check source, format, and tone, may improve issue perceptions (Young et al., 2018) as well as EPE. Furthermore, fact-check source, and whether or not individuals discredit the source as politically biased, may be as relevant to issue perceptions and EPE as it is to selective sharing of fact-checks (Shin & Thorson, 2017). Factors related to fact-check content may play a role in the ultimate success or failure of fact-checks serving as enactive mastery experiences.

Future studies could also replicate our initial findings in the lab and across issue topics. Replication in the lab across a variety of issues would provide evidence that the effects found in this study are not issue-dependent and would also eliminate possible shortcomings associated with the use of a quasi-experimental survey method that inherently lacks experimental control. In addition, while we made every attempt to clean our MTurk data, paying special attention to locating and omitting participants with suspect IP addresses, we cannot fully guarantee "imposter" participants were eliminated from the analysis. Researchers who rely on the MTurk participant pool find data quality to be on par with student samples (Sheehan, 2018), and, given our quality controls, we have no immediate reason to doubt our results on this basis. Again, we propose future studies replicate our results using a more focused experimental design in a lab setting and across issue topics to address these potential weaknesses. Such studies should of course include attention and manipulation checks, which we failed to implement here. Among other problems, the absence of these checks potentially introduces measurement error. For example, responses of inattentive "speeders" who took the survey quickly could easily introduce noise in the measures.[6] Without the necessary items, we cannot address this limitation.

One other possible study limitation lies in our decision to design our experimental stimuli to appear as real news sources (e.g., *ABC News*). This was a deliberate decision on our part, so we could examine relationships between perceptions of media slant and various cognitive and behavioral outcomes as part of our larger experimental investigation of misinformation processing. Admittedly, this could have confused participants, who believed they were reading an actual article from a reputable news source followed by a fact-check from a fictional source ("*NewsCheck*"). However, it is important to note that none of the source manipulations had any effect—directly or in interactions—on the focal outcomes: perceptual accuracy and EPE. Participants who thought they received misinformation from *Breitbart* reacted in the same way to the fact-check, on average, as did participants who thought the story was attributed to *ABC News.* Moreover, as we noted in our literature review, misinformation often adopts the appearance of real news—logos, mastheads, and so on (e.g., Funke,

2019)—suggesting the use of real sources does not necessarily pose a threat to the study's ecological validity. We also used *USA Today* as the source in our control group, when perhaps source should have been omitted altogether there. The control group was further limited by a small *n* and a topical context that may have inhibited EPE as posttest issue questions were irrelevant to the control stimulus.

While our study admittedly has a number of shortcomings, it also demonstrates new and unique effects of fact-checking on EPE. Intriguingly, we find that fact-checking can simultaneously enhance accuracy in an individual's perceptions about a specific political issue while diminishing confidence in their ability to perceive the truth behind political issues in general—a finding we attribute to fact-checks introducing epistemic uncertainty through the presentation of claims that directly conflict with claims presented in misinformation. Those who can cut through the uncertainty of dueling claims and align their perceptions with the reality portrayed in a fact-check have an opportunity to improve confidence in their political truth-detection ability, but they appear to be the exception not the rule. We do recognize that misinformation exposure "in the wild" on social media sites such as Facebook may be infrequent and that such exposure may be heavily concentrated among only particular groups of information consumers (Guess et al., 2018). Nevertheless, we view our results to be significant in the context of an increasingly turbulent political information environment in which misinformation, rumor, and "fake news" have the potential to undermine electoral processes and the behavior of democratic citizens (Allcott & Gentzkow, 2017; Lazer et al., 2018).

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Notes

1. Methodologically, the MTurk participant pool presents advantages over college student samples. For instance, MTurk samples are more reflective, though still not representative of the U.S. population (Berinsky et al., 2012; Sheehan, 2018). There is also evidence MTurk participants also tend to be at least as attentive as college student participants when taking studies (Buhrmester et al., 2018).
2. We used simple rules of thumb from VanVoorhis and Morgan (2007) to determine an appropriate sample size. Based on guidelines provided by VanVoorhis and Morgan, our goal was to achieve at least 50 valid observations per cell of our experimental design after accounting for attrition, duplicate responses, and responses produced from suspect IPs. At

least 50 observations per cell is also recommended by Bentley (2018) and Simmons et al. (2013).

3. It is possible participants with non-U.S. IP addresses may have signed up for MTurk in the United States but were traveling abroad at the time of the survey. However, we still considered these observations suspect and opted to exclude them from analysis.

4. We checked whether excluding participants at the 1st and 99th, 5th and 95th, and 10th and 90th percentiles of the survey duration variable would reveal systematic differences in completion times among remaining participants. We found only one difference in time to completion by condition after excluding respondents at the 1st and 99th percentiles ($\chi^2_{16} = 29.32$, $p = .02$). However, no differences emerged if we excluded participants at the 5th and 95th ($\chi^2_{16} = 10.60$, $p = .83$) or 10th and 90th ($\chi^2_{16} = 21.02$, $p = .18$) percentiles. In our final sample ($N = 1,139$), participants took between 2.68 and 49.17 min to complete the study ($M = 11.75$ min). The average time was roughly the same amount of time it took us to complete the study.

5. A 2018 survey of 1,400 Americans found that *ABC News* is perceived to be relatively neutral, while *Breitbart* and *HuffPost* (formerly *The Huffington Post*) are viewed as biased toward conservatives and liberals, respectively (Knight Foundation, 2018). *The Hill* began as a print publication and is considered a niche political source that may be less known to the average citizen.

6. We do find it reassuring that the average amount of time participants took to complete the study (11.75 min) was roughly equivalent to the time it took us to carefully complete the study. Furthermore, we estimated the models shown in Table 1 omitting participants at the 5th and 95th percentile of the study duration variable. These individuals might be considered "speeders" who took our study extremely quickly or "idlers" who for whatever reason delayed their response. Importantly, when we omit these participants, our main results hold. In the second EPE model, the standardized coefficient for the fact-check variable when we leave speeders and idlers in these data and simply control for duration is $\beta = -.121$, $p = .001$ compared with $\beta = -.117$, $p = .002$ if we throw out speeders and idlers. Thus, we are satisfied that "speeding" alone, for example, did not seriously harm the results, though study duration alone of course does not ensure participants paid attention throughout the study.

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