International Journal of Communication 17(2023), 560–582 1932–8036/20230005

Processing Vaccine Misinformation: Recall and Effects of Source Type on Claim Accuracy via Perceived Motivations and Credibility

MICHELLE A. AMAZEEN[1]
Boston University, USA

ARUNIMA KRISHNA
Boston University, USA

This study leverages the persuasion knowledge model (PKM) as a theoretical framework to examine how individuals process attempts at correcting measles, mumps, and rubella vaccine-related misinformation on Facebook. An experiment among U.S. adults (N = 760) manipulates concurrent misinformation and correction sources to assess effects on perceptions of motives, credibility, and accuracy. The results demonstrate how "source blindness" compromises the attempts to respond to misinformation. Perceived accuracy of misinformation was serially mediated by perceived source motives and credibility but only among those correctly remembering the source. The study concludes with a discussion of how the PKM could be reimagined as a model better suited for misinformation research.

Keywords: misinformation, corrections, fact-checking, persuasion knowledge model, experiment

With the growth of online misinformation over the last decade (Lewandowsky, Ecker, & Cook, 2017), special attention has been given to health misinformation (Krishna & Thompson, 2021), particularly the correction of inaccurate vaccine information (Bode & Vraga, 2015; Nyhan, Reifler, Richey, & Freed, 2014; Vraga & Bode, 2018). From the now-discredited Wakefield article linking the measles, mumps, and rubella (MMR) vaccine to autism (Godlee, Smith, & Marcovitch, 2011) to parents' concerns that vaccines are unsafe for their children (Benin, Wisler-Scher, Colson, Shapiro, & Holmboe, 2006), vaccines—particularly childhood vaccines—have been the subject of persistent misinformation campaigns. Given that misinformed publics about vaccines have been shown as the loudest and most strident voices in vaccine-related debates (Krishna, 2017), the need for effective strategies to correct vaccine misinformation is dire. The increasing

Michelle A. Amazeen: mamazeen@bu.edu
Arunima Krishna: krishna.arunima@gmail.com
Date submitted: 2022-04-18

[1]A previous version of this article was presented to the Mass Communication and Society Division of the Association for Education in Journalism and Mass Communication, August 2020, and was awarded first place. We thank James Cummings and the anonymous reviewers for their constructive feedback.

number of vaccine-preventable disease epidemics (Centers for Disease Control [CDC], n.d.), including the COVID-19 pandemic, further underscores the urgency of such research.

Various strategies of correcting online misinformation have received scrutiny in the academic literature. Research on "fact-checking"—journalistic attempts to verify and publicize the accuracy of claims circulating in the media—shows that these types of corrections can be conditionally effective at reducing misperceptions (van der Meer & Jin, 2020) with health misinformation being easier to correct than political or marketing misinformation (Walter & Murphy, 2018). Another strategy, called observational correction, involves seeing someone else on social media being corrected. Observing this practice has led to more accurate attitudes on various topics (Vraga & Bode, 2017). However, when it comes to correcting misinformation related to vaccines, the evidence has been mixed. Observational corrections have failed to influence misperceptions about the MMR vaccine (Bode & Vraga, 2015), and some corrections have even backfired (Pluviano, Watt, & Della Sala, 2017). More broadly, although corrective messages from expert sources such as the CDC have been shown to reduce vaccine misperceptions (Nyhan et al., 2014; van der Meer & Jin, 2020), they have not increased behavioral intent to vaccinate and may even reduce intent among some parents (Nyhan et al., 2014). One explanation, in part, may lie in the source of the corrections as vaccine skeptics distrust formal sources of vaccine-related information, particularly the CDC (Krishna, 2018). Moreover, the source of the original misinformation message may have greater influence (Sterrett et al., 2019; Swire, Berinsky, Lewandowsky, & Ecker, 2017; Walter & Tukachinsky, 2020). Thus, this study seeks to examine the effects of concurrent misinformation and correction messages from different sources on perceptions.

Despite a plethora of academic studies seeking to establish whether and when corrective messages are effective, there has been no generalized communication framework guiding these inquiries (Walter & Murphy, 2018). The present study adopts the persuasion knowledge model or PKM (Friestad & Wright, 1994), which explains how people's understanding of persuasion affects their ability to cope with attempts to influence. Although journalists insist that fact checks are intended to educate or inform rather than persuade people (Graves, 2016), scholars argue that fact-checking and corrections more broadly are a form of persuasion (Garrett & Weeks, 2013). Thus, drawing on the PKM allows theoretically driven predictions related to the PKM's three knowledge structures identified as influencing people's responses to persuasive attempts (Friestad & Wright, 1994). That is, understanding (1) individuals' perceptions of the source of a message (agent knowledge), (2) their preexisting experiences and attitudes about the message topic—such as vaccines—(topic knowledge), and (3) their perceptions of the motives or intent of a persuasive effort (persuasion knowledge) together should all influence how individuals respond to attempts to correct vaccine misinformation.

In presenting our explanatory framework of how individuals cope with mediated attempts at misinformation, we review the literature relevant to the PKM and source effects. We then explain an empirical study to test our framework and review the results. Our discussion considers theoretical and practical implications of findings and contemplates where the PKM falls short by attempting to reimagine it as a future model for misinformation research.

The PKM Framework

The PKM (Friestad & Wright, 1994) was originally theorized to explain how consumers understand and cope with marketers' persuasion attempts (Campbell & Kirmani, 2008). According to this framework, individuals draw on three knowledge structures to make sense of an attempt at persuasion: agent knowledge, topic knowledge, and persuasion knowledge (Friestad & Wright, 1994). The first structure, agent (i.e., source) knowledge, involves what one understands about the source of a message. As shown by decades of research (e.g., Hovland & Weiss, 1951), who the source of a message is influences how one responds. PKM-inspired research that focuses on what message receivers know about sources has examined how favorable perceptions of sources may influence persuasive outcomes (Ahluwalia & Burnkrant, 2004). Notably, to avoid overlap between the three PKM knowledge structures, careful delineation of the agent construct focuses only on the non-persuasion related attributes of a source. Thus, the perceived persuasiveness of a source is considered part of the persuasion-knowledge construct whereas perceived source credibility resides within the agent-knowledge construct of the PKM (Campbell & Kirmani, 2008).

The second structure of the framework, topic knowledge, considers all non-agent and non-persuasion related information that individuals may leverage in forming valid attitudes toward a message. By leveraging past experiences and expertise about a particular issue, individuals interpret message claims and then form their attitudes toward the content (Friestad & Wright, 1994). For example, a study by Miller and Sinclair (2009) examined how community members responded to messages about the coal industry based on their knowledge about coal itself and that industry more broadly. While scant research inspired by the PKM framework has focused on topic knowledge (Campbell & Kirmani, 2008), for the purpose of the present study, it is important to recognize the similarities this construct has with the phenomenon of motivated reasoning. According to extant literature, judgments about a message are influenced—or motivated—by the degree to which it aligns with an individual's preexisting attitudes toward a topic (Kunda, 1990). Yet, while motivated reasoning theoretically derives from the defense-motivated type of information processing guided by the desire to confirm the validity of prior attitudinal positions (Chaiken, Liberman, & Eagly, 1989), the PKM is less clear on motivations for processing. In coping with a persuasive attempt, consumers pursue goals that may include managing their cognitive resources, relationships, impressions others have of them, their own self-image, as well as pursuing "valid attitudes" about products, services, and persuasive tactics (Friestad & Wright, 1994, p. 6). Thus, in this study we operationalize topic knowledge as preexisting attitudes toward the issue at hand: the MMR vaccine.

The final structure of the PKM framework involves persuasion-related knowledge (Friestad & Wright, 1994). It contributes to how one responds to a persuasive attempt by allowing people to draw on their past encounters and expectations in dealing with influence. This includes their own understanding of how to sway others and their attitudes about the persuasive motives of sources and messages. Using this knowledge of persuasion helps individuals respond to influence attempts and achieve their own goals—such as learning or resistance—in a given situation (Friestad & Wright, 1994). A burgeoning area of PKM-related research over the last decade involves the ability of media consumers to distinguish, or "recognize" (Wojdynski & Evans, 2020), that a message has a persuasive intent and is not what was originally expected. For instance, the increasing use of covert advertising in contemporary media content has led to studies

examining the ability of consumers to recognize when digital news content is actually advertising (Amazeen & Muddiman, 2018) or that blogs are sponsored (van Reijmersdal et al., 2016).

According to the PKM, the critical element of an individual's persuasion knowledge is whether this "change of meaning" (Friestad & Wright, 1994, p. 13) takes place, where a message previously thought to be one thing—such as a news report or other piece of information—is then understood to be something else, such as an attempt at persuasion. Simply put, interpreting a source's actions as having persuasive intent leads to this change of meaning. This persuasion knowledge is activated by the accessibility and transparency of a source's motives (Amazeen & Wojdynski, 2019; Campbell & Kirmani, 2008; Wojdynski & Evans, 2020). Furthermore, studies show that on recognition of a persuasive attempt, people are more likely to process these messages differently by cognitively resisting them via counterarguing, which consequently leads to a refinement of attitudes (Amazeen & Muddiman, 2018; Amazeen & Wojdynski, 2019). It is precisely this change of meaning principle where the applicability of the PKM to a misinformation context becomes most apparent. We argue that a change of meaning should also take place in the context of misinformation—a marketplace of ideas—where people will then process a message differently as described above once they understand it is not accurate.

Source Motives and Credibility

As a component of persuasion knowledge, the perceived motives of a source can be an important signal for message receivers to consider and can affect source persuasiveness (Campbell & Kirmani, 2008; Friestad & Wright, 1994; Metzger & Flanagan, 2013). Although most people tend to believe others (Levine, 2014), sources understood as providing information that does not serve their own interests are seen as sincere, while sources perceived to have an incentive to offer information that is self-interested are perceived as biased and insincere (Eagly, Wood, & Chaiken, 1978). Indeed, when a source is perceived as having altruistic motives, their credibility is enhanced whereas perceptions of self-serving motives or suspicious intent detract from credibility (Rifon, Choi, Trimble, & Li, 2004). Altruism as a perceived source motive may be particularly important to understand in the case of anti-vaccine misinformation, much of which is disseminated through online social media, particularly Facebook, in the form of "vaccine injury" stories and narratives from parents, urging other parents—their peers—to "educate themselves" (Shelby & Ernst, 2013, p. 1795). If a source is wholly unfamiliar, however, motivations may be more difficult to determine as their degree of objectivity and ideological preferences are not known unless a heuristic cue is present, signaling a position (Weber, Dunaway, & Johnson, 2012). Such is the case when misinformation on Facebook is spread through sponsored (paid) posts from innocuous-sounding groups that obscure their ties to specific agendas or interests (Burki, 2020).

The perceived motives of a source are often used as a primary cue in determining source credibility (Metzger & Flanagan, 2013). Credible messengers are more influential than are those perceived as less credible (Hovland & Weiss, 1951; Metzger & Flanagan, 2013). While precise definitions vary, most scholars agree that credibility is defined as the believability of a source, which largely derives from perceptions of trustworthiness and expertise. Expertise is the perceived degree to which a source makes an accurate statement, while trustworthiness is the perceived willingness of a source to provide accurate information (Guillory & Geraci, 2013; Metzger & Flanagan, 2013). Between the two factors, it is

trustworthiness that is required; sources can still be perceived as credible even if they are not perceived as having expertise (Guillory & Geraci, 2013). For example, peer sources of messages can be more persuasive than non-peers or even experts if they are perceived as more trustworthy (Cantor, Alfonso, & Zillmann, 1976). Traditionally, peers—such as friends—are perceived as more trustworthy than official sources because they do not have a vested interest in influencing a message receiver (Fennis & Stroebe, 2016). Indeed, parents have been shown to turn to other parents (i.e., peers) as trustworthy sources of vaccine information over experts due to concerns about the latter's vested interests including financial incentives (Hilton, Petticrew, & Hunt, 2007), thus explaining the aforementioned preponderance of vaccine injury stories circulating among parents (Shelby & Ernst, 2013). Such messages are seemingly just parents trying to help other parents by warning them about the dangers of vaccines. Given the foregoing evidence, we predict the following (see Figure 1):

H1: *Exposure to a peer source of misinformation rather than a sponsored source will lead to (a) increased perceptions of source altruism and (b) source credibility resulting in (c) greater perceived misinformation claim accuracy.*

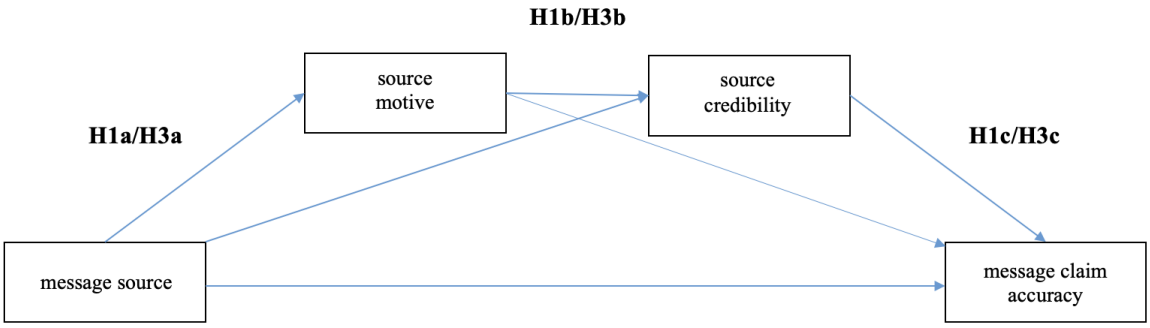

Figure 1. Serial mediation of perceived message claim accuracy via perceptions of source motivation and credibility.

Sources and Correcting Misinformation

Misinformation correction literature also provides insights about the effectiveness of different sources, especially regarding their trustworthiness and expertise, in misinformation correction situations. Although sources high in perceived credibility on both trustworthiness and expertise are ideally suited to debunk misperceptions (Lewandowsky et al., 2020; van der Meer & Jin, 2020; Vraga & Bode, 2017), scholars have examined the effectiveness of corrections from undisclosed sources (Vraga & Bode, 2018) and compared the success of corrections from strangers versus friends (Bode & Vraga, 2018). In particular, known, liked sources, such as friends, have been found as more influential in successfully correcting misinformation than those that are unknown (Weber et al., 2012) especially on social media (Margolin, Hannak, & Weber, 2018). Corrections from friends being more successful is unsurprising given they are generally perceived as being highly trustworthy and altruistic, if not expert, sources (Guillory & Geraci, 2013).

In the case of vaccine misinformation correction, however, the role of expertise in enhancing perceived credibility needs careful consideration. Although the CDC has been revealed as an effective expert source at correcting health misinformation in general (van der Meer & Jin, 2020; Vraga & Bode, 2017), the distrust of the CDC among anti-vaccine activists (Krishna, 2018) may limit its effectiveness as a correction source on vaccines. On the other hand, studies have affirmed the importance of other experts, that is, healthcare providers—doctors and nurses—in building parents' confidence in vaccines (Kennedy, LaVail, Nowak, Basket, & Landry, 2011). Furthermore, vaccine-hesitant individuals tend to trust their healthcare professionals more than they trust the CDC (Krishna, 2017). Based on this literature, the following hypotheses are posited related to sources of correction messages:

H2: Exposure to a correction message from a doctor will lead to greater perceived accuracy of the correction claim via increased perceptions of source altruism and credibility than corrections from (a) undisclosed sources, (b) friends, and (c) the CDC.

Source Blindness

Despite the importance that media literacy scholarship places on source knowledge (Hobbs, 2010), studies consistently find that most readers fail to notice the source of online news they consume. For instance, the Media Insight Project (2017) reported that only two in 10 people were able to remember the source of a news article they read, a finding largely consistent with other studies (Amazeen & Muddiman, 2018; Pearson, 2021). Pearson (2021) refers to this phenomenon as source blindness: "A state whereby individuals fail to consider source information when processing news content" (p. 3). While these findings may be evidence of a lack of reader motivation, an inability to cognitively process this type of information, or simply a means of coping with information overload (Metzger & Flanagan, 2013; Pearson, 2021), the implication of this–from the perspective of the PKM (Friestad & Wright, 1994)—is that without correctly remembering a message source, an individual's use of agent knowledge in coping with an attempt at persuasion (i.e., ascribing motive and credibility) will be compromised.

Some of the inconclusive findings in the corrections literature may be attributable to whether or how information sources were accounted for in experimental studies. For instance, although Pluviano and colleagues (2017) found no evidence that corrections are effective against vaccine misinformation, none of their tested corrections were attributed to any sources. Subsequent research indicated that sources are necessary for successful correction of misinformation (Vraga & Bode, 2018). In other studies, source manipulation checks were not reported (Swire et al., 2017; Wintersieck, 2017), so it is unclear whether participants even noticed the source of the corrections during the experiments. Although exposure is necessary for remembering (Southwell & Torres, 2006), it is not sufficient. Not only must individuals move beyond exposure and actually pay attention to a stimulus, but they must also have the ability and motivation to encode, store, and retrieve the information. Because people have a limited cognitive capacity, only those with greater motivation to process the information will do so (Lang, 2000). Thus, people who remember message sources are likely to be more engaged and will consequently enhance the probability of meeting the expectations of the previous hypotheses (see Figure 1):

H3: *Among those who correctly recall a misinformation source, a peer (friend) rather than a sponsored source will lead to (a) increased perceptions of source altruism and (b) source credibility resulting in (c) greater perceived misinformation claim accuracy.*

H4: *Among those who correctly recall a correction source, a correction from a doctor will lead to greater perceived accuracy of the correction claim via increased perceptions of source altruism and credibility than (a) an undisclosed source, (b) a friend, and (c) the CDC.*

Finally, although the extant literature suggests that misperceptions can be conditionally corrected (Nyhan et al., 2014; van der Meer & Jin, 2020), expected behavioral intentions do not necessarily follow (Nyhan et al., 2014; Swire et al., 2017). Some studies suggest that it is the perceived credibility of the source of the misinformation that has greater influence on consequent behaviors (Sterrett et al., 2019; Swire et al., 2017), while other research suggests that perceptions of message quality are more influential (Slater & Rouner, 1996). As the literature is lacking in addressing how each of the previously hypothesized constructs may concurrently correspond to misinformation beliefs and behavioral intentions, our final area of inquiry offers a research question:

RQ1: *Which factors are associated with (a) misinformation belief and (b) the likelihood of intention to vaccinate against MMR?*

Method

After Institutional Review Board approval, the study was administered from March 7 to March 10, 2020, among *N* = 769 Amazon Mechanical Turk (MTurk) workers, using the CloudResearch/Turk Prime interface. To qualify, participants had to reside in the United States and have a 95% approval rating on MTurk. They were paid $3.13 for completing the study, which took a median time of 14 minutes (*M* = 15.52, *SD* = 8.03). Although not representative of the U.S. population, MTurk workers are a suitable pool of participants when research is concerned with cognitive processes such as attention and attitudes, and this pool is comparable in quality with student samples or professional panels (Kees, Berry, Burton, & Sheehan, 2017).

From the initial sample of 769 participants, *N* = 760 usable surveys were yielded. Consistent with best practices, participants were excluded for completing the survey in less than five minutes, which was 50% faster than the median response time (Zhang & Conrad, 2014), and for responding to open-ended questions in ways consistent with "server-farm workers"—foreign workers, having little English proficiency and providing low-quality answers, spoofing their presence in the United States (Moss, 2018). The ensuing sample was mostly male (58%), with an average age of 38 years (*SD* = 11.48; see Appendix A for demographic details).[2] Similar to other studies that have examined childhood vaccine-related misinformation, the sample was not limited to parents (Pluviano et al., 2017) but open to all adult users of MTurk (Bode & Vraga, 2015; Kareklas et al., 2015) as the spread of MMR vaccine-related misinformation is

[2] All appendices are available here: https://www.dropbox.com/s/0m93su8geiqgq5c/Appendix.pdf?dl=0

not limited to parents, making the understanding of how others respond to these types of messages important as well.

Study Design

To address the research objectives, we conducted an experimental study involving a 2 (misinformation source: sponsored vs. friend) × 4 (correction source: undisclosed vs. friend vs. doctor vs. CDC) between-subjects design (see Table 1).[2] Participants were randomly assigned to one of the 11 conditions. For the first manipulation, participants were exposed to a Facebook post containing misinformation about vaccines from either a "friend" or from a (fictitious) sponsor, the Vaccine Awareness Group. Because a primary vector of misinformation on social media sites such as Facebook is sponsored posts from innocuous-sounding groups (Guess, Nyhan, & Reifler, 2017), this manipulation allows comparisons between a more credible source (a friend) and one that is less credible (a sponsored source). For the second manipulation, participants in the correction conditions were exposed to a correction message in the form of a Facebook reply to the original post from one of four different sources: an unidentified source, a friend, a physician, or the CDC. Past research indicates that these types of sources should elicit varying responses (Krishna, 2018; Nyhan et al., 2014; van der Meer & Jin, 2020).

Table 1. Study Design.

Condition	n	Misinfo Source		Correction Source			
		Sponsored	Friend	Unknown	Friend	Doctor	CDC
1	84	×		×			
2	78	×			×		
3	77	×				×	
4	81	×					×
5	83		×	×			
6	83		×		×		
7	76		×			×	
8	78		×				×
9	41	×					
10	40		×				
11	39						

[2]Although there were three off-set control groups—the two misinformation sources with no corrections and a condition with no misinformation—since they are not relevant to the present study, they are not mentioned further.

Stimuli

The misinformation stimulus was a fictitious Facebook post about a young boy who developed autism after receiving the MMR vaccine (see Appendix B, Figure B1), mirroring much vaccine-related misinformation on Facebook (Shelby & Ernst, 2013). Although participants were told the identification of the source of the post was obscured for privacy purposes, they were informed that the post was "sponsored by the Vaccine Awareness Group" or asked to imagine that the post "is from a friend of yours," a simplification of the process used by Kaiser, Keller, & Kleinen-von Königslöw (2021).

Alternate stimuli contained not only the misinformation post but also a comment that served to correct the misinformation post (see Appendix B, Figures B2a–B2d for representative sample). In other words, participants in the correction conditions also saw the fictitious Facebook post about the boy who developed autism, but the stimulus they saw included a comment added to the original misinformation post. The comment was in the form of a narrative that challenged the link between the MMR vaccine and autism and was from one of four different sources: a friend, a physician, the CDC, or an unidentified source.[4] As with the misinformation message, the identity of the correction source was obscured. In the undisclosed conditions, the source's identity was not provided at all. In the friend conditions, participants were asked to imagine that the comment "is from a friend of yours." In the other two correction source conditions, the identity of the source was revealed as coming from either a doctor or the CDC.

Procedure

After obtaining their informed consent, all participants were asked about their media consumption habits and attitudes toward various topics. To disguise the purpose of the study, several societal issues were asked about including childhood vaccines, climate change, gun control, immigration, and unemployment. Participants were then asked to view a Facebook post and directed: "Read this carefully as you will be asked to answer questions about the topic, authors, and any comments." After exposure to one of the stimuli outlined earlier, participants were asked source recognition questions and about perceptions of the misinformation and correction sources as well as perceived accuracy of claims. The study concluded with demographic questions, a debriefing, and a thank-you to the participants for their time.

Measures

Credibility

A three-item measure of credibility asked participants to describe how well each item described the author of or commenter on the Facebook post (Appelman & Sundar, 2016). Using a 7-point Likert-type scale (1 = describes very poorly; 7 = describes very well), participants assessed the author on being accurate, authentic, and believable, which were averaged together to form a composite measure of the credibility of

[4] As part of a separate project, the correction format was manipulated to include two types of narratives (Krishna & Amazeen, 2022). These conditions were combined, and an indicator variable was used to hold constant the type of correction in all relevant analyses.

the misinformation source (Cronbach's α = .93, M = 3.20, SD = 1.90) and the correction source (α = .97, M = 5.53, SD = 1.59).

Source Motive

A four-item measure of altruistic motives asked participants how much they agreed with statements about the motivations of the author of or commenter on the Facebook post (Rifon et al., 2004). Using a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree), participants assessed the degree to which the author cared about people, had a genuine concern about the welfare of people, cared about getting health information to people, and made a claim because morally it was the right thing to do. These items were averaged to form a composite measure of the altruistic motives of the misinformation source (α = .87, M = 3.87, SD = 1.54) and the correction source (α = .86, M = 5.55, SD = 1.16), with higher numbers indicating greater perceived altruism.

Claim Accuracy

Perceptions about claim accuracy were measured with a single item asking participants how accurate a claim was, using a 4-point scale with 1 = very inaccurate, 2 = somewhat inaccurate, 3 = somewhat accurate, and 4 = very accurate (Stecula, Kuru, & Jamieson, 2020). The measure was employed to assess perceived accuracy of the misinformation claim (M = 1.68, SD = 0.96) and the correction claim (M = 3.31, SD = 0.87).

Intent to Vaccinate

Using a bipolar 7-point scale (1 = extremely unlikely, 7 = extremely likely), participants were asked how likely they were to vaccinate their children (or any future children) against MMR (M = 6.12, SD = 1.62).

Source Recall

To assess misinformation source recall, a closed-ended aided recall measure (Zinkhan, Locander, & Leigh, 1986) asked if participants remembered which of the five options indicated the author of the Facebook post. Overall, 53% of the participants correctly identified the misinformation source, with 63% correctly identifying the source in the friend condition and 42% in the Vaccine Awareness Group condition [X^2 (5, 640) = 246.83, p < .001].

As a measure of correction source recall, participants were asked which of the five options indicated who left the comment on the Facebook post. Overall, 68% of the participants correctly recalled the correction source [X^2 (15, 640) = 1035.72, p < .001], with 85% correct identification in the doctor condition, 86% in the CDC condition, 69% in the unidentified condition, and weakest recall (33%) in the friend condition.

Control Variables

A dummy variable was used to control for the two narrative correction formats.

Results

H1 predicted that exposure to a peer source of misinformation—a friend—rather than a sponsored source would lead to greater perceptions of claim accuracy that would be serially mediated through increased perceptions of altruistic motives and greater perceived source credibility. To address this expectation, a mediation analysis using Hayes' (2018) SPSS PROCESS v.3 macro (model 6) was employed with the misinformation source (sponsored = 0 vs. friend = 1) as the independent variable, misinformation claim accuracy as the dependent variable, mediators of source motives and source credibility, and correction type covariate. No significant effects between misinformation sources were revealed, indicating no support for H1.

However, when respecifying the model among only those who correctly remembered the misinformation source (H3), exposure to misinformation from a friend rather than an unfamiliar source did result in (a) greater perceived altruism (b = 0.42, SE = 0.16, p < .01) but not (b) credibility or (c) claim accuracy. Thus, there is direct support for H3a. Moreover, the model provides evidence of the effects of a misinformation source on perceived misinformation accuracy via two indirect pathways (see Figure 2). Recalling the misinformation source was a friend led to greater perceptions of altruism, which led to a greater likelihood of perceiving the claim as accurate. Bias-corrected bootstrapping with 10,000 samples indicates this effect is significant (b = 0.03, boot SE = 0.02) within a 95% confidence interval (0.00, 0.07). A second indirect pathway among those recalling the misinformation source was a friend was greater perceptions of altruism, which increased perceived credibility, ultimately leading to a greater likelihood of perceiving the claim as accurate. Bias-corrected bootstrapping with 10,000 samples indicates this effect is significant (b = 0.11, boot SE = 0.04) within a 95% confidence interval (0.03, 0.19).

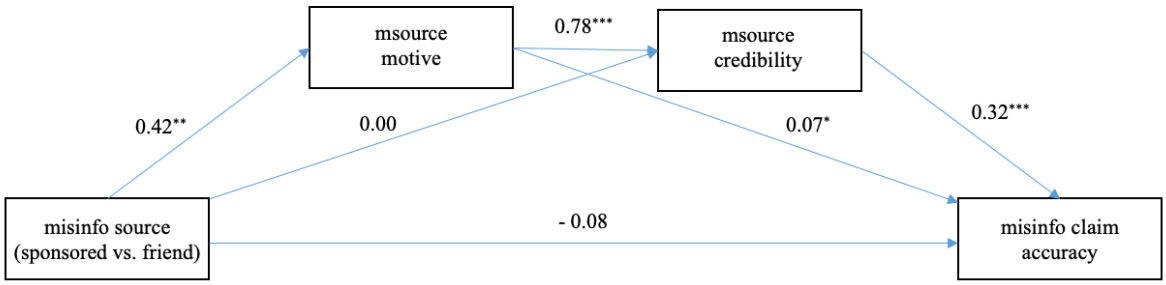

Figure 2. Serial mediation of perceived misinformation claim accuracy via perceptions of source motivation and credibility.

Note. n = 394, r^2 = 0.49, p < .001; $^{*}p$ < .05, $^{**}p$ < .01, $^{***}p$ < .001.

H2 predicted that exposure to a correction message from a doctor would lead to greater perceived claim accuracy via increased perceptions of source altruism and credibility than (a) undisclosed sources, (b) friends, and (c) the CDC. A mediation analysis (model 6) was employed with doctors as the referent category of the correction source multicategorical independent variable, correction claim accuracy as the dependent variable, mediators of source motives and source credibility, and narrative correction type as a covariate.

Exposure to a correction from a doctor rather than other sources did not result in greater perceived altruism, credibility, or claim accuracy. Thus, hypotheses H2a–c were not supported.

By respecifying the model only among those who correctly remembered the correction source (H4), exposure to a correction from a doctor rather than any of the other sources did not directly result in greater perceived (a) altruism. However, there were differences in (b) credibility: An undisclosed correction source was perceived as more credible than a doctor (b = 0.31, SE = 0.16, p < .05). Doctors were not perceived as more credible than friends or the CDC. While there were no direct effects of correction source on (c) claim accuracy, the model does indicate indirect effects of correction source on perceived correction claim accuracy via perceived credibility. Recalling the correction source was undisclosed led to greater perceptions of source credibility (compared with a doctor), which led to greater likelihood of perceiving the claim as accurate. Bias-corrected bootstrapping with 10,000 samples indicates this effect is significant (b = 0.05, boot SE = 0.03) within a 95% confidence interval (0.00, 0.11).

Finally, to examine which factors correspond to belief in misinformation (RQ1a) and one's intent to vaccinate children for MMR (RQ1b), ordinary least squares (OLS) regressions were specified among participants who correctly remembered the sources (see Table 2). In Model 1, the perceived misinformation claim accuracy was the dependent variable.[3] Using a hierarchical method, the misinformation source and dummy variables for the correction sources (0 = no, 1 = yes) were entered in the first step. Perceived motives of the misinformation and correction sources, perceived credibility of the misinformation and correction sources, and perceived accuracy of the correction claim were entered in step 2. Covariates were entered in step 3: Attitudes toward childhood vaccines, ideology, age, and narrative correction type. The model was significant [F (13, 219) = 23.48, p < .001], explaining more than half of the variance in perceived misinformation accuracy (r^2 = 0.58). Most explanatory was credibility of the misinformation source (β = 0.54, SE = 0.04, p < .001), with those perceiving it as more credible being more likely to perceive the message as accurate. Other factors associated with belief in the misinformation included prior negative attitudes toward the MMR vaccine (β = −0.17, SE = 0.03, p < .01) and increasing age (β = 0.10, SE = 0.00, p < .05).

[3]As the distributions of the claim accuracy variables were skewed, we reran the regressions with the log-transformed versions of the variables. The results were not meaningfully different.

Table 2. OLS Regression of Source Attributes on Misinformation Belief and Intent to Vaccinate Against MMR Among Participants Who Correctly Remembered Sources.

	Model 1	Model 2
	Misinformation Belief	Intent to Vaccinate
	β (*SE*)	β (*SE*)
Misinformation source	0.00 (0.09)	−0.01 (0.14)
Friend correction source	−0.01 (0.13)	0.10 (0.20)$^{+}$
Undisclosed correction source	0.06 (0.11)	0.11 (0.17)$^{+}$
CDC correction source	−0.09 (0.11)	0.03 (0.17)
Misinfo source motives	0.02 (0.04)	−0.09 (0.06)
Correction source motives	−0.11 (0.15)$^{+}$	0.00 (0.08)
Misinfo source credibility	0.54 (0.04)***	0.06 (0.06)
Correction source credibility	−0.05 (0.04)	0.14 (0.06)*
Misinfo belief	—	−0.35 (0.11)***
Correction belief	−0.01 (0.06)	0.15 (0.09)*
Favorable vaccine attitudes	−0.17 (0.03)**	0.35 (0.06)***
Ideology	0.06 (0.04)	0.00 (0.06)
Age	0.10 (0.00)*	0.09 (0.01)$^{+}$
Correction narrative	0.06 (0.09)	−0.06 (0.13)
Constant	1.64 (0.39)	3.32 (0.63)
F	23.48***	18.34***
R^2	.58	.54
n	233	232

Note. $^{***}p < .001$, $^{**}p < .01$, $^{*}p < .05$, $^{+}p < .10$.

Intent to vaccinate for MMR was the dependent variable in Model 2. All other variables were the same as in the previous model, with the addition of perceived misinformation claim accuracy as another independent variable. The model was significant [F (14, 218) = 18.34, $p < .001$], explaining more than half the variance in intent to vaccinate against MMR ($r^2 = 0.54$). Equally explanatory were prior attitudes toward the MMR vaccine (β = 0.35, *SE* = 0.06, $p < .001$)—with those having more favorable prior attitudes more likely to intend to vaccinate—as well as perceived accuracy of the misinformation claim (β = −0.35, *SE* = 0.11, $p < .001$), with people who perceived the misinformation claim as less accurate being more likely to intend to vaccinate. Other variables positively corresponding to intent to vaccinate against MMR included greater perceived accuracy of the correction claim (β = 0.15, *SE* = 0.09, $p < .05$) and greater perceived credibility of the correction source (β = 0.14, *SE* = 0.06, $p < .05$).

Discussion

This study sought to examine the effects of coinciding misinformation and correction messages from different sources on perceptions of motivation and credibility as well as on perceived accuracy. Leveraging the framework of the PKM (Friestad & Wright, 1994), the results show the promise of simultaneously considering topic knowledge, persuasion knowledge, and agent—or source—knowledge in organizing an

explanatory framework of how individuals cope with mediated attempts at misinformation. Concurrently, the limitations of the PKM—addressed below—require reimagining how a framework could be modified to better suit the context of misinformation. Nonetheless, the results clearly demonstrate the important role of encoding the initial message sources in shaping how individuals engage with, recall, and are affected by misinformation—a process incongruous with the architecture of social media (Pearson, 2021).

The primary focus of our study has been on the theoretical process of what happens before recognizing (or not) that a mediated message is incorrect. Consistent with the PKM (Friestad & Wright, 1994) and proponents of media literacy (Hobbs, 2010), our results underscore the importance of source knowledge. We extend the work of Pearson (2021)—who showed what is likely to cause source blindness online—by demonstrating *how* source blindness compromises attempts to cope with misinformation. It was only among participants who were able to correctly remember the source of the misinformation when processing the healthcare claim on the Facebook post that there were statistical differences in the perceived motivations and credibility between a post presented as from a friend versus that by the Vaccine Awareness Group. It may be that the source-blind individuals were less engaged with the content (Pennycook & Rand, 2019) or were primarily motivated by other knowledge structures associated with the PKM such as topic knowledge. While the PKM is unclear about when each knowledge structure will be most influential, the primacy of relying on prior attitudes toward a topic is consistent with the literature on motivated reasoning (Kunda, 1990). Nonetheless, these findings suggest that while prior vaccine attitudes did correspond to belief in the misinformation message, it was the perceived credibility of the misinformation source that was more influential.

For those who did correctly remember the misinformation source, friends were perceived as more altruistic and more credible, leading to increased perceptions of claim accuracy as predicted by H3. Moreover, the credibility of the misinformation source had significantly more correspondence to the belief of misinformation than did correction sources. Taken with studies that indicate (1) who shares a message is more influential than the origins of the message (Sterrett et al., 2019), (2) that messages on social media are more likely to be accepted when shared by friends (Margolin et al., 2018), and (3) that the source of misinformation has more influence than correction sources (Swire et al., 2017), this finding underscores an important reason why misinformation spreads on social media: It comes from friends. It also reinforces why the gatekeeping responsibilities of social platforms are so urgent, particularly for influential accounts that traffic in disinformation.

Accurately recalling the correction source did not support the expected differences between doctors, undisclosed sources, friends, and the CDC. No significant differences emerged on perceived motives. It was also surprising that, compared with a doctor, the undisclosed source had an indirect positive effect on perceived correction claim accuracy via greater perceived source credibility. Because the source was not disclosed, it is likely their motives were unclear, and participants thus had to rely on other cues in the message to form their evaluations (Eagly & Chaiken, 1993; Weber et al., 2012) or fall back on truth bias—the propensity to believe people are honest (Levine, 2014). While other research has indicated that disclosing a source increases the likelihood of successful corrections (Vraga & Bode, 2018), the present results may differ because the study involves narratives, both in the misinformation as well as the correction claims. That the correction message was in the form of a personal story may have enhanced participant

identification with the source (Slater, 2002) as evidenced by the greater credibility. Furthermore, in other contexts, unknown groups have been found more persuasive than political candidates because they were perceived as more credible (Weber et al., 2012).

While the tested correction messages seem to have little relationship with belief in the misinformation claim, our results indicate that they do correspond to the intended likelihood to vaccinate children for MMR. Although prior attitudes toward the MMR vaccine and belief in the misinformation had equally strong correspondence with intended vaccine uptake, the perceived credibility of the correction source as well as belief in the correction claim were also influential. In this way, corrections from credible sources may serve to reinforce healthy beliefs and increase prosocial behaviors such as vaccine uptake. Future research is needed to disentangle why a misinformation source influences misinformation belief but not vaccination intent, while a correction source influences vaccination intent but not misinformation belief.

Another theoretical advancement offered by this study is demonstrating the benefits of an organizing framework rather than relying on piecemeal mechanisms to examine how people process misinformation. Although the discussion, thus far, has been primarily on source knowledge, our results show how the other two knowledge structures in the PKM (Friestad & Wright, 1994) also contribute to a more complex understanding of processing misinformation. For instance, our findings indicate that an individual's prior attitudes toward childhood vaccines—topic knowledge—also had a significant correspondence to the perceived accuracy of misinformation. Moreover, our results also show that when processing misinformation, people draw on their perceptions of a source's motives—what the PKM refers to as persuasion knowledge (Friestad & Wright, 1994). H3 demonstrated that compared with a fictitious interest group, recognized friends were perceived as being more altruistically motivated, which led to greater perceived credibility, thereby increasing the likelihood that the misinformation claim was perceived as accurate. Thus, all three knowledge structures of the PKM are important considerations in how people process misinformation.

Our results suggest benefits and limitations of appropriating the PKM (Friestad & Wright, 1994) for misinformation research. First, a receiver must attend to a message to such an extent that they are able to correctly recall the source. But the PKM is theoretically ambiguous in terms of what motivates information processing including: managing cognitive resources, relationships, impressions others have, self-image, as well as pursuing "valid attitudes" about products, services, and persuasive tactics (Friestad & Wright, 1994, p. 6). Given the lack of empirical research on this aspect of the PKM as well as its ambiguity, this is one area where the model may fall short in its direct applicability to whether and how people process messages in misinformation contexts. Thus, a model for misinformation research should consider the information processing literature (Chaiken et al., 1989; Petty & Cacioppo, 1986) to examine the conditions under which different types of motivations (e.g., accuracy, defensive, impression) take primacy as well as public relations literature that considers when people are motivated to problem solve (Krishna, 2021).

Our results show that message receivers who correctly recall an identified source are then able to ascertain their perceived motives and generate how much credibility they want to ascribe to the source. These factors mediate the degree to which someone perceives the misinformation message as accurate. Leveraging Friestad and Wright's (1994) change of meaning principle, we argue that it is during this process where a change of meaning should take place: People will interpret a message differently once they suspect

it is not accurate. Studies engaging the PKM framework have shown that experiencing a change in the meaning of a message often leads to resistance, as indicated by greater levels of cognitive counterarguing and modified persuasive outcomes (Amazeen & Wojdynski, 2019; Wojdynski & Evans, 2020). Future research is warranted to investigate whether cognitive coping strategies, such as counterarguing, contribute to this resistance to misinformation or whether other mechanisms are involved. In addition, other consequences of recognizing misinformation merit scrutiny such as ensuing attitudes, beliefs, and likelihood to amplify a message.

In reimagining the PKM as a model for misinformation research, additional modifications are necessary beyond information processing motivations. Because the PKM was developed before the use of the Internet was widely adopted, it makes assumptions that may no longer be true. Particularly in social media, there are often multiple sources of messages to consider, which adds to the cognitive complexity of processing the information (Metzger & Flanagan, 2013). In this same way, social media users sometimes encounter online posts that are accompanied by a correction and thus need to consider the motives and credibility of multiple sources (Walter & Tukachinsky, 2020). Furthermore, although the PKM articulates that persuasion knowledge involves considerations of what people think of message tactics such as incorporating testimonials or guilt appeals (Campbell & Kirmani, 2008; Friestad & Wright, 1994), it does not theorize how these message elements may facilitate or hinder the processing of content. This is an area of importance in the context of misinformation as researchers seek to determine how factors such as emotional appeals (Weeks, 2015) or fluency of retractions (Walter & Murphy, 2018) affect the correction of misinformation. Of course, this is not a comprehensive list of how the PKM is deficient nor what should be included in a model for misinformation research. Many other elements besides situational characteristics (i.e., processing motivation) and message factors warrant consideration in a conceptual framework for investigating the correction of misperceptions.

As with any research, there are limitations. Notably, the study focused on only one topic of misinformation—that the MMR vaccine causes autism—a claim that is primarily applicable to parents considering whether to vaccinate their children, among which less than 30% tend to display vaccine hesitancy (Elfein, 2019). Thus, for the vast majority of Americans, the claim that the MMR vaccine causes autism is one that is obviously false. Future research should test the process used in this study on topics of broader interest to general populations, such as the COVID-19 pandemic, climate change, or claims that have less scientific consensus.

Another important limitation is that although the analyses here sought to compare source types previously employed in the extant literature, there are some elements of artificiality. The CDC is a widely known source that provides statements on health-related issues but not necessarily to individual users. Moreover, while doctors have posted publicly on social media, the friend manipulation was purely hypothetical—participants knew their "friend" did not actually write the treatment messages. Indeed, the use of friend manipulations has been a limitation in other misinformation-related studies (Vraga & Bode, 2018) but also has been successfully used in research elsewhere involving media consumption (Kaiser et al., 2021). The lower recognition of friends when used as a correction rather than as a source of misinformation may have diluted the correction results but may also signal a limitation on the types of content (healthcare) that friends are able to correct. At the same time, it is possible that while the friend

manipulation was relatively successful in the misinformation conditions, it was less so in the correction conditions because participants were asked to remember the source of a comment rather than who posted the original Facebook message. Future research is warranted to better isolate the effects of friends as correction sources.

Slight differences between the experimental stimuli should also be acknowledged. The CDC comment included an account name, image, and a verified check mark whereas the other correction sources did not. It is possible that these differences influenced participants' perceived source credibility. Moreover, the undisclosed source did not include any instructions indicating that their comment had been obscured thus omitting a potential priming effect that also could have impacted source credibility.

Finally, while consensus on the best measures of source credibility is elusive (Roberts, 2010), there is general agreement that expertise and trustworthiness are primary dimensions (Guillory & Geraci, 2013). Although our measure of credibility did not have these items, instead employing items on perceived accuracy, authenticity, and believability (Appelman & Sundar, 2016), strong correspondence has been found between perceptions of message and source credibility (Roberts, 2010). Nevertheless, future research warrants replicating these results specifically using perceived expertise and trustworthiness to operationalize source credibility.

Despite these limitations, the results reported in this study offer valuable insights for theory building and practice. Without social media facilitating a more mindful user experience that encourages thoughtful engagement, attempts to reduce misinformation will flounder.

References

Ahluwalia, R., & Burnkrant, R. E. (2004). Answering questions about questions: A persuasion knowledge perspective for understanding the effects of rhetorical questions. *Journal of Consumer Research, 31*(1), 26–42. doi:10.1086/383421

Amazeen, M. A., & Muddiman, A. R. (2018). Saving media or trading on trust? The effects of native advertising on audience perceptions of legacy and online news publishers. *Digital Journalism, 6*(2), 176–195. doi:10.1080/21670811.2017.1293488

Amazeen, M. A., & Wojdynski, B. W. (2019). Reducing native advertising deception: Revisiting the antecedents and consequences of persuasion knowledge in digital news contexts. *Mass Communication and Society, 22*(2), 222–247. doi:10.1080/15205436.2018.1530792

Appelman, A., & Sundar, S. S. (2016). Measuring message credibility: Construction and validation of an exclusive scale. *Journalism & Mass Communication Quarterly, 93*(1), 59–79. doi:10.1177/1077699015606057

Benin, A. L., Wisler-Scher, D. J., Colson, E., Shapiro, E. D., & Holmboe, E. S. (2006). Qualitative analysis of mothers' decision-making about vaccines for infants. *Pediatrics, 117*(5), 1532–1541. doi:10.1542/peds.2005-1728

Bode, L., & Vraga, E. K. (2015). In related news, that was wrong: The correction of misinformation through related stories functionality in social media. *Journal of Communication, 65*(4), 619–638. doi:10.1111/jcom.12166

Bode, L., & Vraga, E. K. (2018). See something, say something: Correction of global health misinformation on social media. *Health Communication, 33*(9), 1131–1140. doi:10.1080/10410236.2017.1331312

Burki, T. (2020). The online anti-vaccine movement in the age of COVID-19. *The Lancet Digital Health, 2*(10), e504–e505. doi:10.1016/S2589-7500(20)30227-2

Campbell, M. C., & Kirmani, A. (2008). I know what you're doing and why you're doing it. In C. P. Haugtvedt, P. Herr, & F. R. Kardes (Eds.), *The handbook of consumer psychology* (pp. 549–573). New York, NY: Lawrence Erlbaum.

Cantor, J. R., Alfonso, H., & Zillmann, D. (1976). The persuasive effectiveness of the peer appeal and a communicator's first-hand experience. *Communication Research, 3*(3), 293–310. doi:10.1177/009365027600300304

Centers for Disease Control. (n.d.). *Measles cases and outbreaks*. Retrieved from http://www.cdc.gov/measles/cases-outbreaks.html

Chaiken, S., Liberman, A., & Eagly, A. H. (1989). Heuristic and systematic information processing within and beyond the persuasion context. In J. S. Uleman & J. A. Bargh (Eds.), *Unintended thought* (pp. 212–252). New York, NY: Guilford.

Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes.* Belmont, CA: Wadsworth Group/Thompson Learning.

Eagly, A. H., Wood, W., & Chaiken, S. (1978). Causal inferences about communicators and their effect on opinion change. *Journal of Personality and Social Psychology, 36*(4), 424–435. doi:10.1037/0022-3514.36.4.424

Elfein, J. (2019, December 18). *Percentage of adults in the U.S. who supported the universal immunization of children as of 2019, by age*. Statista. Retrieved from https://www.statista.com/statistics/1084819/universal-immunization-support-us-by-age/

Fennis, B. M., & Stroebe, W. (2016). *The psychology of advertising*. New York, NY: Routledge.

Friestad, M., & Wright, P. (1994). The persuasion knowledge model: How people cope with persuasion attempts. *Journal of Consumer Research, 21*(June), 1–31. doi:10.1086/209380

Garrett, R. K., & Weeks, B. E. (2013). The promise and peril of real-time corrections to political misperceptions. In *Proceedings of the 2013 conference on Computer Supported Cooperative Work (CSCW '13)* (pp. 1047–1058). New York, NY: Association for Computing Machinery. doi:10.1145/2441776.2441895

Godlee, F., Smith, J., & Marcovitch, H. (2011). Wakefield's article linking MMR vaccine and autism was fraudulent. *BMJ, 342*, c7452. doi:10.1136/bmj.c7452

Graves, L. (2016). *Deciding what's true: The fact-checking movement in American journalism*. New York, NY: Columbia University Press.

Guess, A., Nyhan, B., & Reifler, J. (2017). *Selective exposure to misinformation: Evidence from the consumption of fake news during the 2016 U.S. presidential election*. Arlington, VA: American Press Institute.

Guillory, J. J., & Geraci, L. (2013). Correcting erroneous inferences in memory: The role of source credibility. *Journal of Applied Research in Memory and Cognition, 2*(4), 201–209. doi:10.1016/j.jarmac.2013.10.001

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis*. New York, NY: Guilford Press.

Hilton, S., Petticrew, M., & Hunt, K. (2007). Parents' champions vs. vested interests: Who do parents believe about MMR? *BMC Public Health, 7*(1), 1–8. doi:10.1186/1471-2458-7-42

Hobbs, R. (2010). *Digital and media literacy: A plan of action*. Washington, DC: The Aspen Institute.

Hovland, C. I., & Weiss, W. (1951). The influence of source credibility on communication effectiveness. *Public Opinion Quarterly, 15*(4), 635–650. doi:10.1086/266350

Kaiser, J., Keller, T. R., & Kleinen-von Königslöw, K. (2021). Incidental news exposure on facebook as a social experience: The influence of recommender and media cues on news selection. *Communication Research, 48*(1), 77–99. doi:10.1177/0093650218803529

Kareklas, I., Muehling, D. D., & Weber, T. J. (2015). Reexamining health messages in the digital age: A fresh look at source credibility effects. *Journal of Advertising*, *44*(2), 88–104. doi:10.1080/00913367.2015.1018461

Kees, J., Berry, C., Burton, S., & Sheehan, K. (2017). An analysis of data quality: Professional panels, student subject pools, and Amazon's Mechanical Turk. *Journal of Advertising, 46*(1), 141–155. doi:10.1080/00913367.2016.1269304

Kennedy, A., LaVail, K., Nowak, G., Basket, M., & Landry, S. (2011). Confidence about vaccines in the U.S. *Health Affairs, 30*(6), 1151–1159. doi:10.1377/hlthaff.2011.0396

Krishna, A. (2017). Motivation with misinformation: Conceptualizing lacuna individuals and publics as knowledge deficient, issue-negative activists. *Journal of Public Relations Research, 29*(4), 176–193. doi:10.1080/1062726X.2017.1363047

Krishna, A. (2018). Poison or prevention? Understanding the linkages between vaccine-negative individuals' knowledge deficiency, motivations, and communication behaviors. *Health Communication, 33*(9), 1088–1096. doi:10.1080/10410236.2017.1331307

Krishna, A. (2021). Lacuna publics: Advancing a typology of disinformation-susceptible publics using the motivation-attitude-knowledge framework. *Journal of Public Relations Research, 33*(2), 63–85. doi:10.1080/1062726X.2021.1944155

Krishna, A., & Amazeen, M. A. (2022). Narrative counters: Understanding the efficacy of narratives in combatting anecdote-based vaccine misinformation. *Public Relations Review, 48*(5), 1–15.

Krishna, A., & Thompson, T. (2021). Misinformation about health: A review of health communication and misinformation scholarship. *American Behavioral Scientist, 65*(2), 316–332. doi:10.1177/0002764219878223

Kunda, Z. (1990). The case for motivated reasoning. *Psychological Bulletin, 108*(3), 480–498. doi:10.1037/0033-2909.108.3.480

Lang, A. (2000). The limited capacity model of mediated message processing. *Journal of Communication, 50*(1), 46–70. doi:10.1111/j.1460-2466.2000.tb02833.x

Levine, T. R. (2014). Truth-Default Theory (TDT): A theory of human deception and deception detection. *Journal of Language and Social Psychology, 33*(4), 378–392. doi:10.1177/0261927X14535916

Lewandowsky, S., Cook, J., Ecker, U. K. H., Albarracín, D., Amazeen, M. A., Kendeou, P., . . . Zaragoza, M. S. (2020). *The debunking handbook 2020*. Retrieved from https://sks.to/db2020

Lewandowsky, S., Ecker, U. K. H., & Cook, J. (2017). Beyond misinformation: Understanding and coping with the "post-truth" era. *Journal of Applied Research in Memory and Cognition, 6*(4), 353–369. doi:10.1016/j.jarmac.2017.07.008

Margolin, D. B., Hannak, A., & Weber, I. (2018). Political fact-checking on Twitter: When do corrections have an effect? *Political Communication, 35*(2), 196–219. doi:10.1080/10584609.2017.1334018

Media Insight Project. (2017). *"Who shared it?": How Americans decide what news to trust on social media*. Retrieved from https://apnorc.org/projects/who-shared-it-how-americans-decide-what-news-to-trust-on-social-media/

Metzger, M. J., & Flanagan, A. J., (2013). Credibility and trust of information in online environments. *Journal of Pragmatics, 59*(Part B), 210–220. doi:10.1016/j.pragma.2013.07.012

Miller, B., & Sinclair, J. (2009). Community stakeholder responses to advocacy advertising. *Journal of Advertising, 38*(2), 37–51. Retrieved from http://www.jstor.org/stable/27749634

Moss, A. (2018). *After the bot scare: Understanding what's been happening with data collection on MTurk and how to stop it*. CloudResearch. Retrieved from https://www.cloudresearch.com/resources/blog/after-the-bot-scare-understanding-whats-been-happening-with-data-collection-on-mturk-and-how-to-stop-it/

Nyhan, B., Reifler, J., Richey, S., & Freed, G. L. (2014). Effective messages in vaccine promotion: A randomized trial. *Pediatrics, 133*(4), e835–e842. doi:10.1542/peds.2013-2365

Pearson, G. (2021). Sources on social media: Information context collapse and volume of content as predictors of source blindness. *New Media & Society, 23*(5), 1181–1199. doi:10.1177/1461444820910505

Pennycook, G., & Rand, D. G. (2019). Lazy, not biased: Susceptibility to partisan fake news is better explained by lack of reasoning than by motivated reasoning. *Cognition, 188*, 39–50. doi:10.1016/j.cognition.2018.06.011

Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 19, pp. 123–205). New York, NY: Academic Press.

Pluviano, S., Watt, C., & Della Sala, S. (2017). Misinformation lingers in memory: Failure of three pro-vaccination strategies. *PLoS One, 12*(7), e0181640. doi:10.1371/journal.pone.0181640

Rifon, N. J., Choi, S. M., Trimble, C. S., & Li, H. (2004). Congruence effects in sponsorship: The mediating role of sponsor credibility and consumer attributions of sponsor motive. *Journal of Advertising, 33*(1), 30–42. doi:10.1080/00913367.2004.10639151

Roberts, C. (2010). Correlations among variables in message and messenger credibility scales. *American Behavioral Scientist, 54*(1), 43–56. doi:10.1177/0002764210376310

Shelby, A., & Ernst, K. (2013). Story and science: How providers and parents can utilize storytelling to combat anti-vaccine misinformation. *Human Vaccines & Immunotherapeutics, 9*(8), 1795–1801. doi:10.4161/hv.24828

Slater, M. D. (2002). Entertainment education and the persuasive impact of narratives. In M. C. Green, J. J. Strange, & T. C. Brock (Eds.), *Narrative impact: Social and cognitive foundations* (pp. 157–181). Hillsdale, NJ: Lawrence Erlbaum Associates.

Slater, M. D., & Rouner, D. (1996). How message evaluation and source attributes may influence credibility assessment and belief change. *Journalism & Mass Communication Quarterly*, *73*(4), 974–991. doi:10.1177/107769909607300415

Southwell, B. G., & Torres, A. (2006). Connecting interpersonal and mass communication: Science news exposure, perceived ability to understand science, and conversation. *Communication Monographs, 73*(3), 334–350. doi:10.1080/03637750600889518

Stecula, D. A., Kuru, O., & Jamieson, K. H. (2020). How trust in experts and media use affect acceptance of common anti-vaccination claims. *The Harvard Kennedy School Misinformation Review*. doi:10.37016/mr-2020-007

Sterrett, D., Malato, D., Benz, J., Kantor, L., Tompson, T., Rosenstiel, T., . . . Loker, K. (2019). Who shared it?: Deciding what news to trust on social media. *Digital Journalism, 7*(6), 783–801. doi:10.1080/21670811.2019.1623702

Swire, B., Berinsky, A. J., Lewandowsky, S., & Ecker, U. K. H. (2017). Processing political misinformation: Comprehending the Trump phenomenon. *Royal Society Open Science, 4*, 608021. doi:10.1098/rsos.160802

van der Meer, T. G., & Jin, Y. (2020). Seeking formula for misinformation treatment in public health crises: The effects of corrective information type and source. *Health Communication, 35*(5), 560–575. doi:10.1080/10410236.2019.1573295

van Reijmersdal, E. A., Fransen, M. L., van Noort, G., Opree, S. J., Vandeberg, L., Reusch, S., . . . Boerman, S. C. (2016). Effects of disclosing sponsored content in blogs: How the use of resistance strategies mediates effects on persuasion. *American Behavioral Scientist, 60*(12), 1458–1474. doi:10.1177/0002764216660141

Vraga, E. K., & Bode, L. (2017). Using expert sources to correct health misinformation in social media. *Science Communication, 39*(5), 621–645. doi:10.1177/1075547017731776

Vraga, E. K., & Bode, L. (2018). I do not believe you: How providing a source corrects health misperceptions across social media platforms. *Information, Communication & Society, 21*(10), 1337–1353. doi:10.1080/1369118X.2017.1313883

Walter, N., & Murphy, S. T. (2018). How to unring the bell: A meta-analytic approach to correction of misinformation. *Communication Monographs, 85*(3), 423–441. doi:10.1080/03637751.2018.1467564

Walter, N., & Tukachinsky, R. (2020). A meta-analytic examination of the continued influence of misinformation in the face of correction. *Communication Research, 47*(2), 155–177. doi:10.1177/0093650219854600

Weber, C., Dunaway, J., & Johnson, T. (2012). It's all in the name: Source cue ambiguity and the persuasive appeal of campaign ads. *Political Behavior, 34*, 561–584. doi:10.1007/s11109-011-9172-y

Weeks, B. E. (2015). Emotions, partisanship, and misperceptions: How anger and anxiety moderate the effect of partisan bias on susceptibility to political misinformation. *Journal of Communication, 65*(4), 699–719. doi:10.1111/jcom.12164

Wintersieck, A. L. (2017). Debating the truth: The impact of fact-checking during electoral debates. *American Politics Research, 45*(2), 304–331. doi:10.1177/1532673X16686555

Wojdynski, B. W., & Evans, N. J. (2020). The covert advertising recognition and effects (CARE) model. *International Journal of Advertising, 39*(1), 4–31. doi:10.1080/02650487.2019.1658438

Zhang, C., & Conrad, F. G. (2014). Speeding in web surveys. *Survey Research Methods, 8*(2), 127–135. doi:10.18148/srm/2014.v8i2.5453

Zinkhan, G. M., Locander, W. B., & Leigh, J. H. (1986). Dimensional relationships of aided recall and recognition. *Journal of Advertising, 15*(1), 38–46. doi:10.1080/00913367.1986.10672987