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Conferring Resistance to Digital Disinformation:
The Inoculating Influence of Procedural News Knowledge

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Keywords: fake news; inoculation theory; native advertising; persuasion knowledge model; procedural news knowledge

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Abstract

Despite the pervasiveness of digital disinformation in society, little is known about the individual characteristics that make some users more susceptible to erroneous information uptake than others, effectively dividing the media audience into prone and resistant groups. This study identifies and tests procedural news knowledge as a consequential civic resource with the capacity to inoculate audiences from disinformation and close this “resistance gap.” Engaging the persuasion knowledge model, the study utilizes data from two national surveys to demonstrate that possessing working knowledge of how the news media operate aids in the identification and effects of fabricated news and native advertising.

Keywords: fake news; inoculation theory; native advertising; persuasion knowledge model; procedural news knowledge

Conferring Resistance to Digital Disinformation:
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Although not new, “fake news” exploded into the popular lexicon in 2016, most prominently during the US presidential election and also in connection with the Brexit referendum in the UK. Between January 2014 and January 2016, there was a 1,100% increase in the number of traceable online fabricated news stories, from approximately 500 to over 6,000 stories per month (Vargo, Guo, & Amazeen, 2018). Suffice it to say, digital disinformation is now pervasive in society; however, little is known about the individual characteristics of news consumers that make some users more susceptible to erroneous information uptake than others, effectively dividing the media audience into prone and resistant groups. Given that industry experts, journalists, and even members of the scientific community have difficulty identifying suspect content from authentic information (see Bohannon, 2015), how can the average citizen be expected to decipher fact from fiction?

To address this question, we identify and test a consequential civic resource called procedural news knowledge (PNK), which has the capacity to inoculate audiences from disinformation and close this “resistance gap.” We use inoculation theory (McGuire, 1964) and the persuasion knowledge model (Friestad & Wright, 1994) to examine how a more advanced understanding of the news may confer resistance to mediated disinformation efforts (McGrew, Ortega, Breakstone, & Wineburg, 2017). The study utilizes data from two national surveys to demonstrate how PNK not only serves as an antecedent to recognition of disinformation but also how it affects consequent coping responses. The analysis shows that possessing working knowledge of how the news media operate aids in the identification of fabricated news headlines and in mitigating the effects of native advertising, including liking, sharing, and

misunderstanding suspect content. Findings from the study extend the persuasion knowledge model by explicating the contributions of an important informational difference that facilitates recognition of covert persuasion as well as identifying coping mechanisms that define inoculation-induced resistance to disinformation.

“Fake News” or Disinformation?

The term “fake news” has been used and misused so frequently that its precise meaning has become muddled, depending on the context in which it is invoked (see Tandoc, Lim, & Ling, 2018). President Donald Trump wields the term to single out news organizations that publish critical reports of his policies or administration, while popular press accounts use fake news to mean fabricated stories or manipulated news content (e.g., *Politico*, 2018; Subramanian, 2017). A review of the literature by Tandoc et al. (2018) identified numerous varieties of problematic content and varying motivations for its creation and dissemination that align with work on deception more generally (Jackson & Jamieson, 2007). Fake news encompasses satirical news, news parody, news fabrication, photo manipulation, advertising that imitates news, and propaganda (Tandoc et al., 2018). However, although currently a trending term, “fake news” is *not* news. Thus, various groups recommend abandoning its use altogether and specifying “disinformation” instead (see European Commission, 2018; Wardle & Derakhshan, 2017). In this paper, we heed this recommendation and focus on two increasingly common types of disinformation used to deceive consumers: fabricated political news and native advertising within a digital news context.

Fabricated news stories are intentionally deceptive, contain little to no facticity, and may be driven by political motivations as well as financial incentives (Tandoc et al., 2018). During elections, fabricated news stories can take on the ugly cast of direct character attacks, but in the

guise of news. Some of the more notorious examples of disinformation from the 2016 US presidential election, for instance, implicated Hillary Clinton in breaking electoral laws, running a child sex ring out of a popular pizza parlor in Washington, DC, and selling weapons to the terrorist group ISIS (Holan, 2016). Such fabricated claims not only cast a dark cloud over the target's character but also pit voters who accept the information as true against those who are enraged by its creation and promulgation. Similar attempts to exacerbate political tensions and sow division surround false reports over "rigged" elections and attempts at voter suppression—a tactic used in the 2018 midterm elections (Lopez, 2018). The political consequences of this type of disinformation, then, can be highly corrosive.

In the sense that it is also deliberately deceptive, the practice of native advertising follows suit, particularly in online news environments. Native advertising is a type of covert marketing where an ad mimics—or seems "native" to—the platform on which it appears. While fabricated news stories are not based in fact, native advertisements are rooted in reality but obscure the bias and one-sidedness of the message. An evolution of the print advertorials of the analog era, native advertising has proliferated in the digital era (Einstein, 2016), appropriating the "look and feel of real news" (Tandoc et al., 2018, p. 147). Many legacy and digital-only news media not only host native advertising but create such content on behalf of advertisers (Gerth, 2017). While good for generating revenue, this trend has not been good for informed citizenship. A growing body of research reveals that when native ads appear on news websites, less than 1 in 4 adults are able to identify that what they are viewing is an advertisement rather than news content (Amazeen & Wojdynski, 2018; Wojdynski & Evans, 2016). Moreover, legitimate news sites that mask or make it difficult to determine the origin of their sponsored content contribute to audience perceptions of a "fake news" problem (Bradley, 2017).

Although native advertising often has the goal of creating favorable attitudes to increase sales of consumer products, the practice has also been used in political contexts. Iversen and Knudsen (2017) demonstrate how the use of native advertisements by political candidates in Norway reduced audience trust in political news. In the US, the digital-only news site, *Politico*, has recently taken a stand against misleading content by “undertaking an ambitious effort to identify and trace the origins of political disinformation and debunk it” (*Politico* Staff, 2018). However, *Politico* was identified as creating one of the most effective ads for Cambridge Analytica (the data mining company that took credit for delivering the White House to Donald Trump via its use of microtargeting) during the 2016 US presidential election: a native advertisement that listed “10 inconvenient truths about the Clinton Foundation” (Lewis & Hilder, 2018). Thus, seemingly legitimate news sources such as *Politico* often go to bat for their political advertisers (Wemple, 2013). In such confusing information spaces, the capacity to suss out legitimate news from commercial and political interests is arguably more important, and difficult, than ever—and is fast-becoming an important resource for effective citizenship.

Knowledge as an Inoculating Influence

Persuasion knowledge. The persuasion knowledge model (Friestad & Wright, 1994) offers a useful theoretical framework to understand how individuals recognize and process messages intended to influence. According to the model, persuasive attempts are affected by an individual’s knowledge in three areas—persuasion, agent, and topic—as well as by individual characteristics and message components (Friestad & Wright, 1994). For someone to be in a position to respond to a persuasive attempt, *recognition* of the persuasive episode must first occur. In the case of native advertising, the covert nature of native ads may make it difficult for individuals to recognize their persuasive intent and therefore draw from relevant cognitive

structures to effectively interpret their meaning (Amazeen & Wojdyski, 2018). Similarly, the resemblance of fabricated news to real news—in both format and content that appears believable—also makes persuasive recognition difficult.

Besides relying upon knowledge of what constitutes persuasion, individuals draw upon agent knowledge—the perceived characteristics, competencies, and objectives of the message communicator (Friestad & Wright, 1994). In the case of native advertising, the agent may be a mainstream news organization (Einstein, 2016). Traditionally, journalistic norms have dictated a separation between the business side of publishing (advertising) and the editorial content of journalism where one was not supposed to influence the other. However, a significant erosion of that separation in recent years (Gerth, 2017) means audiences are now confronted with content that appears to be journalistic in nature but is actually advertising, as when *The New York Times* published a piece on female incarceration that was really an ad for the Netflix series, “Orange Is the New Black” (Einstein, 2016). Thus, the evolving nature of online content likely affects how individuals are able to respond to what may appear to be information from a journalistic source or agent but is actually advertising.

In the persuasion knowledge model, topic knowledge entails what an individual knows about the subject matter of a message, which influences product or brand attitudes (Friestad & Wright, 1994). In the context of factual reporting, we would expect individuals to draw upon their common sense understanding of what constitutes news, i.e., unsponsored, fact-based reporting about politics, international developments, business, or other topics of public interest. News coverage that appears to serve a particular interest is considered biased (Vallone, Ross, & Lepper, 1985), while heavily branded articles are perceived as promotional (Van Reijmersdal, Neijens, & Smit, 2010).

Because the knowledge structures of persuasion, agent, and topic are not necessarily distinct (Campbell & Kirmani, 2008), individuals may draw upon multiple structures when making sense of what appears to be a news message. For instance, if readers encounter a *New York Times* story about female incarceration and notice the small “paid post” disclosure and then decide to ignore the article on account of it, they are likely drawing upon *topic knowledge* that objective news is not paid for by sponsors and *persuasion knowledge* that paid posts constitute advertising. Thus, whether drawing from agent, topic, or persuasion knowledge structures, successfully navigating the contemporary media environment is an increasingly complex task that requires a schema or cognitive framework for news to avoid manipulation.

Procedural news knowledge. Contextual factors that influence message processing have received considerable attention in research that uses the persuasion knowledge model. A promising area of model expansion includes the contributions of dispositional factors that serve as antecedents to persuasion recognition (Campbell & Kirmani, 2008). In the case of suspect digital content, the degree to which an individual understands how mainstream news organizations operate, for example, should facilitate their ability to parse news-related content from imposter content. Among other things, news literacy fosters an understanding of the vital role that news plays in society, the ability to identify or recognize what qualifies as news, and the capacity to critically assess information (Malik et al., 2013).

Empirical studies have demonstrated that those with higher levels of news media literacy know more about current events (Ashley, Maksl, & Craft, 2017) and are better able to critically evaluate news content (Vraga & Tully, 2016), as well as correctly judge the accuracy of online political posts (Kahne & Bowyer, 2017), than those lower in literacy. News literacy is also associated with a decreased likelihood of believing in online conspiracy theories (Craft, Ashley,

& Maksl, 2017) and correlates with a firm understanding of media industries, content, and effects (Maksl, Ashley, & Craft, 2015). Indeed, a vital element of news media literacy includes a developed understanding of professional news operations and procedures, which we call procedural news knowledge (PNK).

Though newly relevant in the era of digital disinformation, knowledge about mainstream media was identified in earlier research as a key determinant of story comprehension, perceptions of media credibility, and channel choice (see Robinson & Kohut, 1988; Robinson & Levy, 1986). In their studies of learning from television news, Robinson and Levy (1986) found news knowledge to have more predictive value than education, self-reported media use, and motivations for viewing in explaining news story comprehension. Becker, Whitney, and Collins (1980) also argued that public understanding of how the news media operate was a critical component of civic engagement and democratic participation.

Just as political sophisticates draw on an elaborated understanding of politics that facilitates the integration of new political information and organizes relationships among related concepts (Luskin, 1990), so a sophisticated understanding of the news should facilitate categorization of legitimate reports from false accounts. Because sophistication is characterized by cognitive complexity and domain expertise (Luskin, 1990), news experts—i.e., those who score high in PNK—should have more stored knowledge about what legitimate news production and reporting entails than non-experts and should be able to call on this knowledge when confronted with questionable information. In marshalling their expertise, news experts are more likely to accurately identify (and reject) fabricated news stories, articulate their rationale for doing so, and have more reasons for rejecting false information than non-experts. Therefore, we predict that:

H1: Higher levels of procedural news knowledge will improve the likelihood of accurately recognizing digital disinformation, including a) native advertising and b) fabricated news headlines.

Inoculation theory. Upon recognition of an attempt at influence, the persuasion knowledge model theorizes that individuals will employ coping mechanisms affecting both cognition and behavior (Friestad & Wright, 1994). Although coping responses are another understudied area of the persuasion knowledge model (Campbell & Kirmani, 2008), the literature shows that individuals often respond to persuasive attempts with resistance (Jacks & Cameron, 2003). Similarly, an implicit theoretical foundation underpinning media literacy is inoculation theory, which suggests that individuals can be informationally immunized from media-driven pressures to consume particular products or adopt certain behaviors (Eagle, 2007). Drawn from a medical analogy, inoculation theory (McGuire, 1964) would predict in the case of digital disinformation that, just as pre-exposure to a weakened virus can confer resistance to future viral attacks, so those with pre-existing news media literacy skills should be better able to recognize imposter content when confronted with it and reject its appeal.

A crucial mechanism in inoculation-induced resistance to influence is threat perception (Compton & Ivanov, 2012). Threat is defined as the recognition that one's beliefs may be vulnerable to forthcoming attacks (McGuire, 1964). Although early inoculation researchers assumed the presence of threat, studies have since demonstrated how and when threat matters. For instance, threat can be generated via *explicit* forewarnings that one's position will be challenged. When followed by preemptive refutations (exposure to the type of arguments that will be used to attack one's position, along with how to counterargue these attacks), resistance to influence is enhanced (Compton & Ivanov, 2012). However, the degree to which an explicit

warning can generate threat in the absence of refutational or supportive arguments has not been established. As internalized understanding of how the news media operate, PNK ought to foster resistance if high knowledge holders are warned about the presence of disinformation.

Furthermore, if PNK implicitly confers resistance to fake information owing to top of mind awareness of legitimate news practices and institutional arrangements, then when faced with the prospect of confronting disinformation, those with higher levels of PNK should experience higher perceptions of threat. Thus, we predict that:

H2: Higher levels of procedural news knowledge will be positively associated with native advertising threat perception.

Exposure to preemptive refutations has also been shown to motivate the production of counterarguments not included in the original forewarning (Ivanov et al., 2015). Counterarguing involves generating statements that contest a promoted position, advance alternative positions, or challenge the validity of the message source. In the case of native advertising, counterarguments may involve challenging the validity of the message's claims or derogating the publisher or message sponsor. If individuals are capable of generating unique counterarguments that both identify and rebut attacks (Compton & Ivanov, 2012), then motivated individuals (i.e., those with higher PNK) should be able to counterargue when simply warned about suspect content without the need for examples to guide their evaluation process. Moreover, since it is the *accessibility* of counterarguments that confer resistance (Miller & Baron, 1973), those most motivated to recognize fabricated content should also show a greater propensity to counterargue. On this basis, we predict that:

H3: When confronted with digital disinformation, news experts—individuals who have a broad base of procedural news knowledge—will offer more counterarguments than news novices.

Furthermore, how an individual cognitively elaborates a response to a message can be integral to affecting whether persuasion or resistance occurs. Positive thoughts in line with message arguments generally foster persuasion, while thoughts tinged with negative polarity tend to generate resistance (Cacioppo & Petty, 1981). Given that more counterarguing is predicted from those with high levels of PNK, it is expected that these same individuals will be *less likely* to exhibit behaviors consistent with persuasive effects. Therefore, we predict that:

H4: Procedural news knowledge will have an inverse relationship with persuasion.

Methods

To address these predictions, the study utilizes data from two national online surveys conducted with US respondents. The first was carried out via an experiment administered between February 13 and 27, 2018. Participants were recruited by Survey Sampling International (SSI) from a sample balanced by age, gender, ethnicity, and US Census Region. Among the 770 participants who completed the survey, the average age was 46, 56% were female, 67% identified as white, and 57% had at least some college education. The second survey was conducted between October 12 and 21, 2018 using the ProdegeMR market research panel, again within the US and balanced by demographics and place of residence. Among the 1,067 participants who completed the survey, the median age range was 45 to 54 (age was measured categorically), 50% were female, 68% identified as white, and 48% had at least some college education.

Participants in the first sample were randomly assigned to view one of two native advertisements: one had public policy implications (a political condition) and the other did not (a non-political condition). The stimulus for the political condition was an article titled “A Complex Flow of Energy,” sponsored by Chevron involving global energy consumption (Aston, n.d.). The stimulus for the non-political condition was titled “Grit & Grace,” sponsored by Cole Haan about ballet dancers (T Brand Studio, n.d.). Both stimuli were authentic digital native advertisements created by the *The New York Times*’ T Brand Studio (see Figure 1) with interactive features (e.g., embedded videos and the ability to click on charts for more information). Stimulus ads were selected from a pretest of six articles that were rated for their hard versus soft news orientation as well as readers’ understanding of and interest in the content. This stimulus presentation follows other studies of native advertising recognition (Amazeen & Wojdyski, 2018; Wojdyski & Evans, 2016).

-- Insert Figure 1 about here --

Our second test of procedural news knowledge as an inoculating influence assessed the ability of citizens to distinguish between fabricated and real political information. A series of five authentic and five made up political headlines were randomly presented to study participants, followed by three questions. First, participants were invited to rate the accuracy of the statements using a 4-point scale from “not at all accurate” to “very accurate.” They were then asked how likely they would be to “like” and “share” the story on social media, again using a 4-point scale from “not at all likely” to “very likely.” They were informed: “Feel free to use the web to search for answers if you'd like.” No time limit was imposed for answering the questions. This approach was modified from Wineburg et al. (2016) in which participants searched to verify claims about various topics in tests of civic online reasoning.

Procedures

Sample 1. Following informed consent, participants were first asked about their news habits, interests, motivations, and knowledge. As part of research beyond the scope of the present study, some participants were then primed with a message about media literacy. All participants were then asked about their familiarity with and perceived threat of encountering native advertising. Afterwards, participants were asked to view a webpage from *The New York Times* and were randomly exposed to one of the two native ad stimuli. This was immediately followed by a thought-listing question asking participants what they were thinking when viewing the page. After a distractor task, participants were asked about the presence of advertising, perceived intent of the article, the dependent persuasion measures, and demographic information.

Sample 2. Participants were asked about their demographic information, news knowledge, interest in news and politics, political orientations, evaluations of political figures and parties, and fabricated news recognition. The fabricated headline recognition test was run as part of a larger experimental study about candidate fact-checks and political information veracity (not reported here). The news knowledge items were asked at the outset of the study, before the experimental stimuli, while the political news headline questions appeared at the very end. None of the experimental content overlapped with any of the news recognition headlines.

Measures

Procedural news knowledge. A composite measure of PNK was developed using items adapted from Robinson and Kohut (1988), Maksl et al. (2015), and the Reuters *Digital News Report* (Fletcher, 2018). PNK measures knowledge about the practices of institutions that produce news, editorial procedures that generate content, and distinctions between news gathering and advocacy. Unlike the knowledge structures dimension of Maksl et al.'s (2015)

news media literacy construct, the PNK measure does not assess one's understanding of the possible *effects* of news content on audiences.¹ The PNK measure included 10 multiple choice questions, each with one correct answer (see Appendix A). The composite measure was based on summing the correct number of responses to all 10 questions. Just 3% of respondents answered all 10 questions correctly, 27% answered eight or more correctly, and 73% answered at least half the items correctly ($M = 5.90$, $SD = 2.26$).

A subset of four items measuring PNK was used in the second study. The list of questions was shorter than in the first study due to space limitations, a desire to match items across the two surveys, and test a condensed version of the index for use in future research given that survey time is costly and respondent attention limited (question wordings are available from the authors). The Reuters *Digital News Report* (Fletcher, 2018) also utilized a four-item news literacy question battery. The PNK measure again included multiple choice questions, each with one correct answer. All four PNK questions were correctly answered by 13% of participants, 3 out of 4 questions were correctly answered by 32%, and 73% answered at least half the items correctly ($M = 2.26$, $SD = 1.10$).

Recognition of native advertising. Following other studies of native advertising (Amazeen & Wojdyski, 2018; Wojdyski & Evans, 2016), the ability to distinguish editorial

¹ We considered this a form of specialized knowledge that would require specific training in media education or research. By contrast, general knowledge about news practices and operations (i.e., PNK) typically develops *informally* through a process of media socialization and news exposure, without the need for specific training. Therefore, PNK is more likely to be evenly distributed throughout the population.

news content from commercial content was assessed using a two-step process. Participants were first asked whether they remembered seeing any advertising on the web page they just viewed. Affirmative responses (24%) were followed with a pair of open-ended questions asking for an explanation of where on the page they saw the stimulus ad as well as how they knew it was advertising. Responses were coded “1” for recognition of native advertising and “0” for lack of recognition. A pair of research assistants trained to identify answers that indicated recognition coded the responses independently (Krippendorff’s $\alpha = .88$). Consistent with other academic research on native advertising recognition in digital news contexts (Amazeen & Wojdyski, 2018), only 12% of participants identified the stimuli as sponsored, or commercial in nature.

Perceived accuracy of news headlines. This measure represents the average accuracy score across the 5 false headlines and 5 true headlines (reverse coded) on a 4-point scale where 1 = “not at all accurate” and 4 = “very accurate” ($M = 2.23$, $SD = 0.45$). See Appendix B for the headline wording.

Perceived threat. Following standard procedures from the inoculation literature (Compton & Ivanov, 2012), perceived threat of being confronted with a hidden persuasive attempt was assessed by asking participants: “How do you feel about the idea that you may encounter native advertising in the future?” The perceived threat measure was calculated from six bipolar adjective pairs that utilized 7-point response scales: nonthreatening/threatening, harmful/not harmful (reverse coded), not dangerous/dangerous, risky/not risky (reverse coded), calm/anxious, and not scary/scary. Averaged together, they formed a composite measure of threat perception (Cronbach’s $\alpha = .90$, $M = 3.98$, $SD = 1.39$), with a higher mean score representing greater perceived threat.

Counterarguing. Another dependent measure of resistance to disinformation, counterarguing in thought-listing questions (Cacioppo & Petty, 1981), was used to assess cognitive responses to the native advertising stimuli. Participants could list up to five comments about what they were thinking while viewing the native ad. Two trained research assistants independently coded the open-ended responses on polarity (Krippendorff's $\alpha = .83$). Unfavorable comments were those that were negative toward or challenged the validity of a referent ($M = 1.43$, $SD = 1.56$), such as "Paid posts are biased" or "This isn't an article, it's an ad for Chevron."

Persuasion. Measures of persuasion, derived from Wojdyski and Evans (2016), included propensity to engage with the content on social media (for all participants) and purchase intent (only for participants exposed to the native advertising stimulus). Each item used a 7-point scale where 1 = "extremely unlikely" and 7 = "extremely likely." Propensity to engage on social media is a composite measure based on two items: reported intention to "like" and share the native advertising article (Cronbach's $\alpha = .93$, $M = 3.16$, $SD = 1.92$). Purchase intent is also a composite measure encompassing likelihood of making a purchase from the native advertising article sponsor, either Chevron or Cole Haan, and likelihood of subscribing to *The New York Times* ($\alpha = .93$, $M = 3.20$, $SD = 1.77$). These measures were combined to form an overall composite assessment of persuasion ($\alpha = .87$, $M = 3.18$, $SD = 1.74$). A separate measure of persuasion was developed for participants exposed to the news headlines. This measure consisted of two items assessing propensity to engage on social media: reported intention to "like" and share the news headlines using a 4-point scale where 1 = "not at all likely" and 4 = "very likely" ($\alpha = .96$, $M = 1.78$, $SD = 0.81$).

Control variables. Included in many of the analyses are controls for age ($M_{S1} = 45.75$, $SD_{S1} = 16.41$), gender (with female as the high value of 2, $M_{S1} = 1.57$, $SD_{S1} = 0.50$; $M_{S2} = 1.50$, $SD_{S2} = 0.50$), an education measure using an 8-point ordinal scale for sample 1 ($M_{S1} = 3.54$ [roughly some college/no degree/associate's degree], $SD_{S1} = 3.00$) and a 5-point ordinal scale for sample 2 ($M_{S2} = 4.00$ [college degree], $SD_{S2} = 1.02$), a 9-point ordinal measure of income ($M_{S1} = 4.25$ [49% reported an annual household income of less than \$50,000] $SD = 4.00_{S1}$), and ideology ($M_{S1} = 3.05$, $SD_{S1} = 1.07$; $M_{S2} = 3.13$, $SD_{S2} = 1.12$), where 1 = "very liberal" and 5 = "very conservative."

Frequency of news consumption is based upon a 6-point ordinal scale, "How often do you seek out the news?" (1 = every day, 2 = 3-5 days per week, 3 = 1-2 days per week, 4 = once every few weeks, 5 = less often, and 6 = never). The measure is reverse-coded so that lower numbers represent less frequent news consumption ($M_{S1} = 5.40$, $SD_{S1} = 1.02$). Interest in news and politics is measured using a 7-point Likert-type scale where 1 = "not at all" and 7 = "very interested" ($M_{S2} = 4.64$, $SD_{S2} = 1.80$). Perceived credibility of *The New York Times* is also used as a control measure, assessed with a 7-point Likert-type scale where 1 = "less credible" and 7 = "more credible" ($M_{S1} = 5.17$, $SD_{S1} = 1.79$).

In addition to these dispositional variables, controls are also used among sample 1 participants for two situational factors: political vs. non-political native advertising exposure and whether participants were primed about media literacy (reported elsewhere). For sample 2 participants exposed to news headlines, dummy variables were created to control for those who reported voting in the 2016 presidential election for either Clinton (37%), Trump (36%), or another candidate (7%).

Results

The first set of hypotheses (H1) predicted that higher levels of PNK would be positively related to successfully identifying two types of disinformation: a) native advertising and b) fabricated news stories. To examine H1a, a binomial logistic regression was conducted using SPSS v.24. The first model specified native advertising recognition as the dependent variable (DV) and the 10-item PNK measure as the independent variable (IV). A significant model indicates that PNK does influence native advertising recognition [$\chi^2(1, 680) = 40.88, p < .001$; Cox & Snell = .06, Nagelkerke = .11]. As shown in Table 1 (see Appendix C), even with controls for age, gender, education, income, ideology, frequency of news consumption, perceived credibility of the *Times*, priming, and native advertising context, the model was significant [$\chi^2(10, 671) = 69.59, p < .001$; Cox & Snell = .10, Nagelkerke = .18]. The PNK coefficient ($b = 0.38, \beta = 1.46; p < .001$) indicates that greater knowledge of how the news media operate increased the odds of native ad recognition. A significant coefficient for native advertising context suggests the odds of recognizing the political native ad (Chevron) as advertising were greater than for the non-political ad (Cole Haan) ($b = 0.67, \beta = 1.95; p < .001$). More frequent news consumption also increased the odds of native ad recognition ($b = 0.39, \beta = 1.47; p < .05$), as did a younger age ($b = -0.01, \beta = 0.98; p < .05$) and more liberal ideology ($b = -0.31, \beta = 0.73; p < .05$). Thus, H1a is supported.

For H1b, a second model using OLS regression with the perceived accuracy of fabricated news headlines as the DV and the 4-item PNK measure as the IV shows a significant relationship [$F(1, 882) = 75.89, p < .001, r^2 = .08$]. As indicated in Table 2 (see Appendix C), even with controls for age, gender, education, ideology, interest in news and politics, and dummy variables for voting for Trump, Clinton, or another candidate in the 2016 presidential election, the model remains significant [$F(9, 874) = 45.41, p < .001, r^2 = .32$]. The coefficient for PNK is significant

and negatively signed ($\beta = -0.19; p < .001$), indicating that as PNK decreased, the perceived accuracy of the headlines increased. In addition, age also has an inverse relationship with perceived accuracy ($\beta = -0.07; p < .05$), as does a liberal ideology ($\beta = 0.25; p < .001$), interest in news and politics ($\beta = -0.08; p < .05$), and voting for Clinton ($\beta = -0.17; p < .001$). Trump voters perceived the headlines as more accurate overall ($\beta = 0.16; p < .001$). Thus, the negative association between PNK and the perceived accuracy of fabricated news headlines supports H1b.

The second hypothesis (H2) predicted that PNK would be positively associated with native advertising threat perception. To test this prediction, an OLS regression model was specified with threat perception as the DV and the 10-item PNK measure as the IV. The model was significant [$F(1, 676) = 14.62, p < .001, r^2 = .02$], indicating PNK is associated with the perceived threat of being confronted with native advertising. The model remained significant with controls added for age, gender, education, income, ideology, frequency of news consumption, perceived credibility of the *Times*, priming, and native advertising context [$F(10, 667) = 4.20, p < .001, r^2 = .06$]. A statistically significant coefficient for PNK indicates that higher levels of PNK correspond to greater threat perception ($\beta = 0.11; p < .01$). Furthermore, those who found the *Times* less credible were more likely to have higher levels of threat perception ($\beta = -0.15; p < .001$), as were those who consumed news more frequently ($\beta = 0.10; p < .05$), and female respondents ($\beta = 0.08; p < .05$). H2 thus finds support.

The relationship between PNK and propensity to counterargue was the focus of H3. Because the outcome variable is overdispersed, we estimated a negative binomial regression model with the number of counterarguments related to the native advertising stimuli as the DV and the 10-item PNK measure as the IV. Controls were included for recognition of native advertising, age, gender, education, income, ideology, frequency of news consumption,

perceived credibility of the *Times*, priming, and native advertising context. A statistically significant model indicates that PNK influences the propensity to counterargue when confronted with native advertising [LR χ^2 (11) = 61.18, $p < .001$, Pearson $\chi^2 = 665.47$, residual df = 668, dispersion statistic = 1.00]. A significant coefficient for PNK ($b = 0.11$, $\beta = 1.12$; $p < .001$) indicates that participants with greater levels of news knowledge were more likely to counterargue when viewing native advertising than participants who had less knowledge about news media operations. Female participants were also more likely to counterargue ($b = 0.25$, $\beta = 1.28$; $p < .001$), as were those exposed to the political native ad ($b = 0.20$, $\beta = 1.22$; $p < .05$) and those who evaluated the *Times* as lower in credibility ($b = -0.09$, $\beta = 0.91$; $p < .001$). These results support H3.

The last hypothesis (H4) examines whether PNK confers resistance to persuasion. The first test of this prediction is among participants exposed to the native advertising stimulus. An OLS regression was estimated with the composite measure of persuasion as the DV and the 10-item PNK measure as the IV. A significant model indicates that PNK affects the degree of persuasion [$F(1, 677) = 63.13$, $p < .001$, $r^2 = .09$]. The model remained significant after adding controls for recognition of native advertising, age, gender, education, income, ideology, frequency of news consumption, perceived credibility of the *Times*, priming, and native advertising context [$F(11, 667) = 18.91$, $p < .001$, $r^2 = .24$]. A negatively signed coefficient for PNK ($\beta = -0.28$; $p < .001$) indicates an inverse relationship between PNK and persuasion. That is, participants with lower levels of news knowledge found the native ad more persuasive than those with higher levels. A similar inverse relationship emerged for age ($\beta = -0.22$; $p < .001$), suggesting that younger participants found the stimulus more persuasive than older participants. Those who considered the *Times* more credible ($\beta = 0.31$; $p < .001$) and those who consumed

news more frequently ($\beta = 0.12$; $p < .01$) also found the stimulus more persuasive. These results support H4.

A second test of H4 was performed on participants exposed to the news headlines. Another OLS regression was estimated with the 2-item social media engagement measure of persuasion as the DV and the 4-item PNK measure as the IV. A significant model indicates that PNK affects the degree of persuasion [$F(1, 808) = 57.97$, $p < .001$, $r^2 = .07$]. Adding controls for age, gender, education, ideology, interest in news/politics, and dummy variables for voting in the 2016 presidential election, the model remains significant [$F(9, 800) = 20.05$, $p < .001$, $r^2 = .18$]. The coefficient for PNK is significant and negatively signed ($\beta = -0.25$; $p < .001$), indicating that as PNK decreased, the likelihood of engaging with the news headlines on social media increased. Age ($\beta = -0.17$; $p < .001$) and gender ($\beta = -0.07$; $p < .05$) are inversely related, indicating that participants who were older males were less likely to engage with the headlines. Participants who reported voting for Trump in the 2016 election ($\beta = 0.22$; $p < .001$) and who expressed a greater interest in news and politics ($\beta = 0.14$; $p < .001$) were more likely to “like” and share the news headlines. Thus, there is strong support for H4.

Discussion

Despite polls finding that people are generally confident in their ability to recognize “fake news” (Barthel, Mitchell, & Holcomb, 2016), recent studies—at least among student populations—contradict these beliefs (Wineburg et al., 2016). The present study, among the first to investigate these questions in nationally distributed *non*-student populations, searched for evidence that PNK facilitates resistance to disinformation such as native advertising and fabricated news headlines. Consistent with past research on news media literacy more broadly (Vraga & Tully, 2016), our results show that news expertise significantly influences how

individuals evaluate online information. This was particularly true in political contexts. What divides individuals recognizing legitimate journalism from fabricated news and commercialized content is an understanding of how the news media operate.

Empirical evidence of PNK as a dispositional antecedent that facilitates recognition of an attempt at influence is one contribution this study makes to the persuasion knowledge literature. Participants with greater levels of PNK were not only more likely to recognize native advertising and fabricated news headlines, they were also more *cognitively resilient* in their capacity to respond via counterarguments. In multiple tests, news knowledge was shown to facilitate resistance to suspect content. Our results show, moreover, that those with greater levels of PNK experienced higher levels of perceived threat over the prospect of encountering disinformation, lending theoretical support to the inoculation-conferring properties of media knowledge holding. Though developed for health-related contexts (McGuire, 1964), inoculation theory can be gainfully applied to address questionable content masquerading as news.

As with other types of media literacy, PNK is not an explicit forewarning mechanism as is commonly employed in the inoculation literature (e.g., Compton & Ivanov, 2012). Rather, it appears to function as an *implicit* forewarning mechanism, or cognitive resource, against different forms of covert persuasion and media disinformation. The analysis here positioned PNK as an antecedent or dispositional variable in place well before exposure to disinformation. As a structure in long term memory, PNK likely develops over time through a lengthy process of informal media socialization and (at least among some students and industry professionals) more formal news training. Ongoing applied research efforts such as those sponsored by the American Press Institute (Rosenstiel & Elizabeth, 2018) seem to be converging around the idea that explicitly describing the editorial process to news audiences—teaching them while informing—

is key to building news fluency and regaining media trust. Fundamentally, such efforts are driven by a shared conviction about the value of PNK to news audiences.

As with any research, certain limitations need acknowledgement. First, our data relied on survey evidence rather than an experimental design, so strong causal inferences would be premature. Further research using factorial designs would strengthen the case for these effects. Direct comparisons of how PNK performs relative to other dimensions of the broader news media literacy construct would also add to this study's findings. With the influence of PNK in resisting disinformation established, different message characteristics could be explored to assess which types of news content or ways of presenting news facilitate or undermine resistance at varying levels of news knowledge. Subsequent research might also investigate the extent to which PNK is enduring or subject to decay, particularly if knowledge about the press was recently acquired, and how much news knowledge needs to be attained for PNK to have salutary effects.

Even so, the findings reported here should be welcome news for media educators, researchers, and policy makers concerned with the public's ability to contend with digital disinformation and suggest that additional educational campaigns to inform citizens about mainstream news media operations could yield significant benefits. Although this study can only be regarded as an initial demonstration of PNK's inoculating influence, the results show cognitive and informational benefits from possessing working knowledge of mainstream media operations in both the identification of fabricated news and mitigation of covert persuasion. Among other benefits, holding a high level of PNK functions as a vital resource protecting the individual from the almost daily "bullshit tornados" (Jacobs, 2017) increasingly swirling about the contemporary news landscape.

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Figure 1. Native Advertising Treatment Stimuli (political vs. non-political)

The top screenshot displays a native advertisement on The New York Times website. The header includes 'The New York Times' logo and 'PAID POST' label. The main headline reads: "How Our Energy Needs Are Changing, In A Series Of Interactive Charts". Below the headline is a descriptive paragraph: "More so than ever before, the United States is powered by a diverse mix of energy sources. The interactive diagrams that follow explore the past, present and future of this complex system. The first maps out the composition of our primary sources of energy — from crude oil to solar power — and their different uses. The second visualization explains how those energy sources have diversified since the 1700s. The final diagram shifts to a global view, to show how — despite growing domestic energy production — rising demand overseas is intensifying competition for all types of energy." Three interactive chart options are listed: "What Kinds Of Energy We Use And What We Use It For", "When Key Energy Sources Entered The Mix And How They've Evolved", and "Where Global Demand Is Highest And How It Will Grow". The selected chart, "U.S. Energy Production, 1960-2011", is a stacked area chart showing energy production from 1960 to 2011. The y-axis represents energy production in quadrillion BTUs, ranging from 50 to 100. The x-axis represents years. The chart shows a steady increase in total energy production over time, with a significant portion being imports (grey striped area). The legend includes: Imports, Nuclear, Biomass, Hydropower, and Other Renewable. A text box on the left states: "The United States consumes just shy of 100 quadrillion BTUs, or quads, of energy every year — more than twice the amount in 1960. Total domestic energy production has surged in recent years, but to meet total demand, imports continue to fill a sizeable gap, shown by the grey-striped area. The challenge of meeting future demand is driving the development of a diverse mix of conventional and alternative energy technologies."

The bottom screenshot shows another native advertisement on The New York Times website. The header includes 'The New York Times' logo and 'PAID POST' label. The author is identified as 'COLE HAAN'. The text begins with: "Indeed, dancing requires — and often exceeds — the physical demands of a many professional sports. 'They're running, jumping, turning, stretching, lifting, lowering, rolling,'" says Marika Molnar, director of physical therapy for New York City Ballet, who has been with the company for more than 30 years. 'They are in amazing shape.'" A quote from Gretchen Smith, 26, who joined NYCB as member of the corps de ballet in 2006, follows: "It's a really crazy balance between artistry and athleticism," says Gretchen Smith, 26, who joined NYCB as member of the corps de ballet in 2006. "People are slowly recognizing it, but we really do want to be acknowledged as athletes." A section titled "PUSHING IT TO THE LIMITS" contains the text: "After watching these athletes move and learning how they prepare, it's easy to believe that the human body is limitless. But its limits are real, and pushing any body to those limits will inevitably result in pain." A quote from Megan follows: "I don't remember the last time I woke up and felt fantastic," Megan says. "There's pain every day." A photograph of a ballerina, Megal Fairchild, is shown on the right side of the article. The caption below the photo reads: "Megal Fairchild, Principal Dancer, New York City Ballet".

Note: Rather than static screen shots, participants viewed live webpages, both of which were interactive in nature.

Supplemental Files

Appendix A: Procedural News Knowledge Questions

Q1. In what section does a newspaper's editorial staff endorse candidates and express their opinions about current issues?

- On the front page (15.4%)
- On the editorial page (61.7%)
- In the business section (4.8%)
- In a special weekly advertising section (5.0%)
- Mainstream newspapers don't endorse candidates or take issue stands (13.1%)

Q2. How long is a typical nightly newscast on the three main broadcast networks (ABC, CBS, and NBC)?

- 15 minutes (5.4%)
- 30 minutes (54.1%)
- 1 hour (36.6%)
- 90 minutes (2.4%)
- 2 hours (1.6%)

Q3. Do television anchors generally go out and report news stories on their own, or do they mostly present stories that others produce for them?

- Mostly report stories on their own (10.6%)
- Mostly report stories that others produce for them (63.2%)
- Equally report on their own and present stories that others produce for them (26.2%)

Q4. Which of the following newspapers is generally regarded as the national "newspaper of record," providing a "first draft" of history?

- USA Today (19.8%)
- The Chicago Tribune* (3.9%)
- The New York Times* (43.9%)
- The Washington Post* (29.4%)
- The Los Angeles Times* (2.9%)

Q5. Which of the following best describes a press release?

- A short news piece written or produced by a reporter (17.2%)
- A written statement or short video about a newsworthy event given out to reporters by an official or public relations specialist (69.1%)
- An opinion piece written by a syndicated columnist (8.0%)
- A paid advertisement that appears in newspapers and on news websites with the label "paid advertisement" (5.8%)

Q6. Most news websites prioritize the stories and columns that are most popular, or trending, with users rather than simply structure the news page according to what the editors think are the most important stories.

- True (84.3%)
- False (15.7%)

Q7. The most important information in a news story generally appears at what point in the story?

- In the first paragraph, in what is traditionally called the "lead" (67.0%)
- In the third paragraph, after the introduction to the story, in what is traditionally called the "nut graf" (11.4%)
- At the maximum narrative arc of the story, where the writer decides it should be (14.0%)
- At the end of the story, in the form of a summary (7.7%)

Q8. Most media outlets in the United States are:

- For-profit businesses (66.9%)
- Owned by the government (7.8%)
- Non-profit businesses (7.6%)
- Don't know (17.7%)

Q9. Which of the following U.S. news outlets does NOT depend primarily on advertising for financial support?

- FOX News (9.4%)
- PBS (52.4%)
- The New York Times* (5.7%)
- Time Magazine* (3.5%)
- Don't know (28.9%)

Q10. When it comes to reporting the news, the main difference between websites like Google News and a website like CNN.com is that:

- Google doesn't have reporters who gather information, while CNN does. (40.3%)
- Google focuses on national news, while CNN focuses on local news. (6.3%)
- Google has more editors than CNN does. (5.7%)
- Google charges money for the news, while CNN does not. (4.2%)
- Don't know (43.5%)

Appendix B: News Headline Questions

To the best of your knowledge, how accurate is the following story [RANDOMIZE]:

Not at all accurate = 1 Not very accurate = 2 Somewhat accurate = 3 Very accurate = 4

Q1. Pope Francis endorsed Donald Trump for president during the 2016 presidential campaign. [FALSE]

Q2. In the summer of 2018, President Donald Trump donated his entire \$400,000 annual salary for rebuilding military cemeteries. [FALSE]

Q3. Before Colin Kaepernick became famous for kneeling at NFL games, former quarterback Tim Tebow took a knee during the National Anthem before playing in a Denver Bronco's game to protest the right of women to an abortion. [FALSE]

Q4. During the Persian Gulf War in 1991, Donald Trump sent his own plane to the Middle East to transport 200 Marines who had become stranded. [FALSE]

Q5. During the 2016 presidential campaign, an FBI agent suspected in Hillary Clinton's email leaks was found dead in an apparent murder-suicide. [FALSE]

Q6. In February 2017, President Trump reversed an Obama-era regulation that made it easier to block the sale of firearms to people with mental illnesses. [TRUE]

Q7. During his first 100 days in office, President Trump made, on average, 4.9 false or misleading claims a day, according to the *Washington Post*; now he averages over 7.5 false or misleading claims a day. [TRUE]

Q8. In an address to the United Nations in September 2018, President Trump bragged to assembled diplomats that, "In less than two years, my [presidential] administration has accomplished more than almost any administration in the history of our country." World leaders assembled for his speech laughed in response. [TRUE]

Q9. After his summit meeting with North Korean leader Kim Jong-un in June 2018, President Trump said that some of North Korea's beaches could make great locations for condos, and that "you could have the best hotels in the world right there." [TRUE]

Q10. After his visit to North Korea, President Trump was shown in a propaganda video saluting a North Korean general – footage, according to news analysts, that will likely be used by the regime as "proof" that the American president defers to the North Korean military. [TRUE]

Note: Based upon procedures by Pennycook, G., & Rand D.G. (2018). Lazy, not biased: Susceptibility to partisan fake news is better explained by lack of reasoning than by motivated reasoning. *Cognition*. doi: 10.1016/j.cognition.2018.06.011.

Appendix C: Regression Tables

Table 1. Binomial Logistic Regression of Procedural News Knowledge Predicting Native Advertising Recognition

	Native Advertising	
	<i>b</i> (SE)	β
Procedural News Knowledge ⁺	0.38 (0.07) ^{***}	1.46
Age	- 0.01 (0.01) [*]	0.98
Female	0.42 (0.25)	1.52
Education	0.11 (0.09)	1.12
Ideology	- 0.31 (0.02) ^{**}	0.73
Income	- 0.01 (0.05)	0.99
News consumption	0.39 (0.19) [*]	1.47
<i>NYT</i> credibility	- 0.03 (0.08)	0.97
Priming	- 0.09 (0.36)	0.92
NA context	0.67 (0.25) ^{**}	1.95
Constant	- 6.09 (1.42)	
X^2	69.59	
Nagelkerke R^2	.18	
<i>N</i>	681	

Note: ^{***} $p < .001$; ^{**} $p < .01$; ^{*} $p < .05$; ⁺10-item measure; Ideology: 1 = very liberal, 5 = very conservative

Table 2. OLS Regression of Procedural News Knowledge and Perceived Accuracy of Fabricated Fake News Headlines

	News Headlines	
	<i>b</i> (SE)	β
Procedural News Knowledge ⁺	- 0.08 (0.01) ^{***}	- 0.19
Age	- 0.02 (0.01) [*]	- 0.07
Female	0.01 (0.03)	0.01
Education	- 0.01 (0.01)	- 0.02
Ideology	0.10 (0.01) ^{***}	0.25
News/political interest	- 0.02 (0.01) ^{**}	- 0.08
Trump voter	0.15 (0.04) ^{***}	0.16
Clinton voter	- 0.16 (0.04) ^{***}	- 0.17
Other voter	- 0.11 (0.06)	- 0.06
Constant	2.29 (0.08)	
<i>F</i>	45.41	
<i>R</i> ²	.32	
<i>N</i>	883	

Note: ^{***} $p < .001$; ^{**} $p < .01$; ^{*} $p < .05$; ⁺4-item measure; Ideology: 1 = very liberal, 5 = very conservative