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Navigating the maze: Deepfakes, cognitive ability, and social media news skepticism

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Abstract

The early apprehensions about how deepfakes (also deep fakes) could be weaponized for social and political purposes are now coming to pass. This study is one of the first to examine the social impact of deepfakes. Using an online survey sample in the United States, this study investigates the relationship between citizen concerns regarding deepfakes, exposure to deepfakes, inadvertent sharing of deepfakes, the cognitive ability of individuals, and social media news skepticism. Results suggest that deepfakes exposure and concerns are positively related to social media news skepticism. In contrast, those who frequently rely on social media as a news platform are less skeptical. Higher cognitive abled individuals are more skeptical of news on social media. The moderation findings suggest that among those who are more concerned about deepfakes, inadvertently sharing a deepfake is associated with heightened skepticism. However, these patterns are more pronounced among low than high cognitive individuals.

Keywords

Cognitive ability, deep fakes, disinformation, news skepticism, social media

Social media platforms have evolved from being a means to communicate personal news and information within one's social network to becoming the primary source of news information to its users, especially in highly connected democracies (Shearer and Mitchell, 2021). Platforms such as Facebook, Twitter, YouTube, and Instagram have made news more accessible to the public. However, recent research suggests that social

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media also hastens the spread of rumors, fake news, and disinformation, which work to undermine democratic ideals (Guess et al., 2019; Vargo et al., 2018). In the present day, the most novel and technologically superior form of fake news are deepfakes (also deep fakes). Deepfakes use machine-learning algorithms to create video and audio of real people doing and saying untrue things.

While the investigations into the effects and consequences of fake news are so far reactive and preliminary, empirical studies exploring the impact of deepfakes are even fewer in number. In one of the rare studies, Vaccari and Chadwick (2020) found that exposure to deepfakes increased uncertainty and reduced citizens' trust in the news on social media. While this endeavor provides essential insights into the effects of deepfakes' exposure, little is still understood about how individual cognitive abilities and user engagement with deepfakes is associated with social media news skepticism. These are critical answers that we need in order to understand how social media users process and engage with manipulative content on the web.

This study presents an analysis of primary data collected from an online survey panel of US citizens. It tests the relationships between (a) citizen concerns regarding deepfakes, (b) exposure to deepfakes, (c) inadvertent sharing of deepfakes, and (d) the cognitive ability of individuals and social media news skepticism. It also explores how the relationship between deepfakes concern and social media news skepticism is moderated by inadvertent sharing of deepfakes and cognitive ability. This study aims to expand the current theoretical understanding of the role of disinformation in media skepticism by offering a nuanced exploration of the effects of deepfakes on both the overall levels of social media news skepticism and how the impacts vary by inadvertent sharing and cognitive ability of individuals.

Deepfakes as a form of disinformation

We are now witnessing the use of deepfakes in political communication. For instance, in a state-level election campaign in India in February 2020, a political party claimed responsibility for spreading manipulated campaign deepfakes through public WhatsApp groups (Christopher, 2020). Apprehensions have been raised regarding the potential weaponization of such technologies to sabotage free and fair elections, incite fear and violence, undermine governments, and influence civic mistrust (Chesney and Citron, 2019).

Two main characteristics of deepfakes make it uniquely suited for perpetuating disinformation. First, like other forms of visual disinformation, deepfakes utilize the "realism heuristic" (Sundar, 2008) where social media users are more likely to trust images and audio (rather than text) as a more reliable depiction of the real world (see Vaccari and Chadwick, 2020). As technology progresses, the manipulated reality could be more convincing, amplifying the consequences of disinformation. The second characteristic is the potential to delegitimize factual content, usually referred to as exploiting "the liar's dividend" (Chesney and Citron, 2019: 1758). People, and especially politicians, can now plausibly deny the authenticity of factual content. For instance, some have argued that the audio evidence in the sexual assault "Access Hollywood" video may have been doctored (Dawsey et al., 2017). Such incidents are not restricted to technologically advanced democracies such as the United States. For instance, in 2018 in Gabon, Ali Bongo, the

president of the country, was away from the public eye for a few weeks citing health concerns. The government soon released a presidential video address to stop public speculation. However, suspicions arose that the president is dead, and the military soon launched a coup, citing that the video was a deepfake (Hao, 2019).

These instances highlight that not only do deepfakes risk the spread of disinformation within societies, but they can also cloud factual information and infuse information uncertainty among citizens. As Vaccari and Chadwick (2020) note, "deepfakes may cultivate the assumption among citizens that a basic ground of truth cannot be established" (p. 3). Experts also suggest that deepfakes can be used to prime citizens to turn ultra-skeptics and stop believing in authentic information, especially during electoral seasons (Chesney and Citron, 2019). Thus, political scholars need to pay attention to this rising form of disinformation and its consequences since it is already proving to be a threat in several societies.

Social Media News Skepticism

Media skepticism is defined as the "subjective feeling of alienation and mistrust toward mainstream news media" (Tsfati, 2003: 67). It is the degree to which citizens doubt and distrust the information presented by journalists and newsmakers (Cozzens and Contractor, 1987). As a concept, it is different from "media cynicism" because it does not incorporate the negative evaluation embedded in an understanding of media cynicism. Furthermore, unlike media cynicism, a certain amount of media skepticism is considered to be the sign of a vigilant and engaged citizenry (Tsfati, 2002). Media skepticism is related to the subjective opinion of the audience toward the media. It is not an evaluation of a specific media source (Tsfati, 2002).

Often associated with low levels of media trust, a certain degree of media skepticism is assumed to boost democracy by encouraging credible news engagement. In other words, individuals who exhibit media skepticism often question the accuracy of media content before they decide to believe the information. In general, skeptics do not merely believe any information they are exposed to until they have investigated the credibility of the information and found evidence to boost the authenticity of the information (Glick et al., 1989). However, heightened skepticism levels may turn into cynicism, which is associated with the rejection of information and news disengagement (Pinkleton et al., 2012; Yamamoto and Kushin, 2014).

Scholars investigating news consumption behavior have found an association between news use patterns and media skepticism (Tsfati and Cappella, 2003; Wanta and Hu, 1994). Tsfati and Cappella (2003) theorize that individuals turn to news to acquire accurate information about the world. Since they cannot attend to all the news happening around them, they have a motivation to ignore most stimuli. This utility maximization rationale has found empirical support. Scholars have found that those who are skeptical of mainstream media sources are less likely to consume news from such sources and prefer using alternate non-mainstream media sources (Tsfati and Cappella, 2003). Conversely, higher trust in traditional media sources is often associated with frequent news consumption from such sources (Tsfati, 2010). Studies based on cross-sectional surveys and longitudinal panels have reported a positive association between media use

and greater media trust and less skepticism. Hopmann et al. (2015: 792) found not only positive correlations between media use and trust, but also observed individual effects, where the use of different media types (television, radio, and newspapers) led to an increase in trust in these particular media.

While the social media news environment is somewhat dissimilar to conventional media, similar patterns have been observed. Goyanes (2020) found a positive association between news use of social media platforms and trust in the medium. Therefore, given the consistent finding in the literature suggesting a positive correlation between news use and media trust, it is expected that frequent news use of social media will be associated with less skepticism. As such, the following hypothesis is proposed:

H1. Social media news use will be negatively associated with social media news skepticism.

Deepfakes and social media news skepticism

To the best of our knowledge, no empirical study has reported the relationship between citizen concerns regarding disinformation and their social media news skepticism. Still, the trends from recent surveys support such a notion. A Pew Research survey found that most Americans distrust social media as a news platform and are concerned about the inaccuracy of news content on social media (Shearer and Grieco, 2019). Similarly, a study on news consumption behavior in 38 countries found that public concerns related to disinformation are associated with a decreased willingness to share news on social media (Clifford, 2019). Public concerns in the United States regarding disinformation are also higher than other sensitive issues, including terrorism, racism, and immigration (Mitchell et al., 2019). These public concerns are perhaps because of the users' inability to distinguish fact from fiction. A vast majority of the population still fails to distinguish credible information from disinformation (Wineburg et al., 2016), and good quality deepfakes are even more challenging to detect as fakes (Rossler et al., 2018). As such, those concerned about disinformation on social media are most likely to critically evaluate the online news environment. As such, the following hypothesis is proposed:

H2. Concerns regarding deepfakes will be positively associated with social media news skepticism.

Information credibility is the foundation of the trust of a trustor (who trusts) toward a trustee (who is trusted; Tsfati, 2003). It is challenging for a trustor to verify the character of the trustee (Seligman, 1997). In such situations, the basis of trust is the credibility of information already provided and the hope of its gainful utility (Coleman, 1990). However, when the provided information is not as credible, it can lead to distrust against the trustee. Previous work has mainly focused on using information credibility and distrust to explicate the relationship between users and news media (Coleman et al., 2012; Gaziano and McGrath, 1986). The research consensus suggests that those who have high perceived credibility are more likely to trust the media.

The issue of credibility and trust is especially relevant within the context of deepfakes and social media. The inability of users to identify the veracity of deepfakes can induce news distrust among social media users. Current empirical evidence suggests that frequent engagement with fake news is associated with lower media trust levels (Wasserman and Madrid-Morales, 2019). Vaccari and Chadwick (2020) also found that exposure to deepfakes is likely to induce uncertainty among social media users and reduce their overall trust in news from social media. Thus, similarly, we expect that exposure to manipulated deepfakes may reduce the perceived credibility of the social media news environment among users and increase their skepticism. Therefore, the following hypothesis is proposed:

H3. Exposure to deepfakes will be positively associated with social media news skepticism.

Recent literature on fake news suggests that age, political interest, political ideology, fear of missing out, and social media fatigue are positive predictors of fake news sharing behavior (Guess et al., 2019; Stefanone et al., 2019; Talwar et al., 2019). However, current frameworks have mostly focused on the intentional sharing of fake news. However, the effects of inadvertently sharing misinformation (i.e. without the knowledge of the information being untrue) are unknown, as is whether they are similar to or different from intentional sharing behavior. We anticipate that such a scenario is likely in the case of deepfakes when some of the artificial intelligence (AI)-generated videos are initially hard to detect as fakes.

As such, this study hypothesizes that user realization of inadvertent sharing of deepfakes would generate a bias against the social media information environment. This relationship can potentially be explained through two mechanisms. First, inadvertent sharing can stimulate mistrust to eschew similar mistakes in the future (see the dual-processing framework, Chaiken and Trope, 1999), and the developed distrust may transform into a general sense of social media news skepticism. Previous findings have reported that trust relationships are damaged when a truster deems a source not to be credible (Tsfati and Cappella, 2003). Thus, it is likely that mistrust in the social media news environment could be associated with increased skepticism levels.

Second, previous studies of "expression effects" have suggested that public expressions of opinions have the potential to change and crystallize self-beliefs (Schienker et al., 1994). Furthermore, sharing news and expressing opinions on social media may constitute a commitment to a specific public perception of the user (Cho et al., 2018), compelling them to ensure that their social media behavior is consistent with how they are perceived. These effects are enhanced in a social media environment because users are usually part of networks that provide social feedback (Ellison et al., 2014). When users share deepfakes, they risk destabilizing their self-categorization (Schienker et al., 1994) and hence, their social image within their networks. We thus anticipate that users would be critical of the platform as a news medium due to potential damages to their social image when they incidentally share deepfakes.

Based on the earlier arguments, the following hypothesis is proposed:

H4. Inadvertent sharing of deepfakes will be positively associated with social media news skepticism.

Beyond the direct effects of inadvertent sharing of deepfakes on social media news skepticism, it is also possible that such influence might have a varying impact depending on the levels of concerns citizens have regarding deepfakes.

A substantial body of research focusing on self-serving bias suggests that individuals differ by how they justify their failures and successes (Wortman et al., 1973; Zuckerman, 1979). Individuals are more likely to employ "internal attributions" and hold themselves responsible for their success, but use "external attributions" and blame external factors for their failures. Experts believe that individuals follow this attribution mechanism to bolster and protect their self-esteem (Blaine and Crocker, 1993). However, these attribution biases can differ based on individuals' involvement, which is understood as "a general level of interest in or concern about an issue" (Freedman, 1964: 290). Individuals with high involvement (and more concern) tend to employ greater external attributions for their failure as compared to those who have low involvement (Miller, 1976). In addition, highly involved individuals (vs lower involved individuals) also rate the sources lower on information credibility if they encounter belief-discrepant messages (Sereno, 1968).

Based on these considerations, we posit that those who have greater concerns regarding deepfakes would have a higher involvement than those who are not as concerned. When the highly concerned users accidentally share deepfakes, they would consider it as a failure, as their action would go against their psychological comfort. Based on the role of involvement in self-serving bias, we would expect these individuals to use external attributions and blame social media rather than attributing the accountability to themselves.

Due to a lack of existing disinformation research examining these relationships, a research question is proposed instead of a hypothesis:

RQ1. Does inadvertent deepfakes sharing behavior moderate the relationship between deepfakes concern and social media news skepticism?

Cognitive ability, deepfakes, and social media news skepticism

Previous findings have posited that most individuals would not prefer to apply their cognitive skills set in information evaluation assignments (Fiske and Taylor, 2013; Stanovich and West, 2000). The limited capacity model (Lang, 2000) argues that since individuals have limited cognitive capacity, they seldom process all facets of a message and instead focus on only a few salient features to encode the information. Similarly, evaluations of credibility are judged based on only a few salient aspects (Fogg, 2003). Nevertheless, some individuals may have higher cognitive abilities than others.

In the context of this study, cognitive ability is potentially an important factor to be considered in user evaluation of social media news skepticism. Recent disinformation research suggests that those with higher cognitive skills perform better in discerning fake news from real news (Pennycook and Rand, 2018), and those who generally believe in fake news are not skeptical of the content (Pennycook and Rand, 2019). Previous findings exploring cognitive ability have reported that cognitive ability is positively associated with effective information processing (Lodge and Hamill, 1986) and decision

making (Gonzalez et al., 2005). Ståhl and Van Prooijen (2018) also found that skepticism toward unfounded belief is contingent upon cognitive ability. The findings collectively suggest that high cognitive individuals are better in truth discernment and are generally skeptical of false content.

Scholars have argued that digital media do not so much transform the cognitive skills required to evaluate the authenticity of the information, but instead, the availability of sufficient information demands the need to effectively exercise individual cognitive skills set to navigate through the diverse content (Flanagin and Metzger, 2008; Metzger and Flanagin, 2013). Thus, it is possible that cognitively abled individuals can assess risk in the social media environment since they are better at truth discernment. Therefore, by extension, it is also likely that high cognitively abled individuals would demonstrate a greater degree of skepticism than those with lower cognitive abilities if they were to encounter false content. However, it is also true that user interaction with the media is almost always in a state of automaticity (Potter, 2004). Not surprisingly, empirical evidence suggests that most online users lack critical thinking and conscious awareness while navigating online news (Powers, 2014). Consequently, social media users who consume online information are at a greater risk of consuming and spreading disinformation than those who consume it offline. We expect that these risks are exacerbated in the case of deepfakes, which require even higher cognitive processing than most evaluative tasks, to adjudicate a video as doctored. Our reasoning is based on the literature on neural cognition, which has reported that real faces and face-like stimuli are processed relatively earlier in the human brain and are not a late re-interpretation cognitive phenomenon (Hadjikhani et al., 2009). Even when deepfakes are not perfect and just look close to real faces, it might be cognitively challenging to override the early evaluations made at the neural level (Smith, 2019). Thus, given the uncertainty of how cognitive ability would play a role in social media skepticism within the context of deepfakes, we propose the following research question:

RQ2. How is cognitive ability related to social media skepticism?

Given the earlier goal of examining the moderating role of inadvertent deepfakes sharing behavior on deepfakes concern and social media news skepticism, it is logical to inquire as to whether cognitive ability interacts with this process. Prior findings in self-serving bias suggest that locus of control and self-esteem—two critical correlates of cognitive ability—explicate how attribution is externalized (Campbell and Sedikides, 1999).

Locus of control refers to the degree to which individuals' sense that they have control over the events that affect their lives (Phares, 1976). Individuals with an external locus of control perceive the outcomes in their lives as a result of external factors as compared to those with an internal locus of control who feel that they control the events in their lives (Rotter, 1966). Those with an external locus are also more anxious and stressed as compared to those with an internal locus (Abouserie, 1994). Prior findings in self-serving bias suggest that those with an external locus of control are also more likely to exhibit higher self-threat and greater self-serving biases (Campbell and Sedikides, 1999). They are thus more likely to externalize their failures as compared to individuals with an internal locus of control.

There is evidence that lower cognitive ability is strongly correlated with an external locus of control (Findley and Cooper, 1983; Hattrup et al., 2005). Individuals with an external locus of control are more likely to be low in confidence about their own abilities and to believe that reinforcements are determined by luck or fate (O'Brien, 1984). This would imply that low-cognition individuals are more likely to externalize their failure than to internalize it. Consequently, if they inadvertently share deepfakes, they would be more likely to externalize the blame and demonstrate social media skepticism.

However, the contradictory likelihood is also possible. It has also been found that individuals with high self-esteem are likely to show increased self-serving biases as compared to those with lower self-esteem (Campbell and Sedikides, 1999). Since high cognitive individuals usually possess higher self-esteem (Jaquish and Ripple, 1981; Simon and Simon, 1975), it is likely that they would externalize the blame and exhibit greater skepticism toward social media (self-serving bias) when they share deepfakes as compared to those with lower cognitive ability.

Thus, within the presented framework, cognitive ability may not only directly influence social media news skepticism, as proposed earlier, but it can also be relevant through indirect routes of inadvertent deepfakes sharing and concern. Accordingly, the following research question is proposed:

RQ3. Does cognitive ability moderate the conditional influence of inadvertent deepfakes sharing behavior in the relationship between deepfakes concern and social media news skepticism?

Method

Sample

This study collected survey responses from an online US national survey panel administered by the market research firm Qualtrics Inc. For a more representative sample, the frame was matched to the population parameters using age and gender distribution. The survey was conducted in February 2020 through an online survey questionnaire focusing on respondents' media habits and political behavior. The total collected sample comprised 1244 responses, which were then filtered for individuals who were aware of deepfakes.

The participants were provided with a definition of deepfakes and asked whether they were aware of deepfakes before the survey (Supplemental Appendix A1). Keeping with the focus of this study, the rest of the analysis focuses only on respondents who were familiar with deepfakes prior to the survey. A total of 764 respondents (61.4%) were aware of deepfakes and formed the primary dataset for this study.

The analysis presented here was replicated for the unfiltered sample ($N = 1244$). The findings were consistent with the results presented here (check Supplemental Appendix A2 to A4).

Measures

Dependent variable. *Social media news skepticism* ($M = 5.45$; $SD = 1.24$, Cronbach's $\alpha = .78$) was measured by asking participants to rate their agreement on seven-point scale

(1 = strongly disagree to 7 = strongly agree), with three statements assessing credibility and trust on the news on social media: (a) you cannot trust the news stories people share on social media, (b) too often credible news information is mixed up with misinformation on social media, and (c) you should not rely on social media for news information. Similar measures on news credibility and trust to gauge media skepticism have been established in previous literature (Tsfati and Cappella, 2003; Vraga and Tully, 2021).

Independent variables. *Social media news use* ($M = 3.54$; $SD = 1.57$) was measured by asking respondents how often (1 = never to 5 = daily) do they use social media sites to get news about social, political, or public affairs?

Deepfakes concern ($M = 3.62$; $SD = 1.20$; Spearman-Brown (SB) coefficient = .91, $r = .84$) was created as an index averaging the responses of two items asking the respondents, "how concerned (1 = not at all to 5 = extremely) are you regarding the use and trend of deepfakes online (in general)" and more specifically "political deepfakes (deepfakes focusing on political leaders and parties)."

Deepfakes exposure ($M = 2.79$; $SD = 1.43$, SB coefficient = .92, $r = .85$) was created as an index averaging the responses of two items asking the respondents how frequently (1 = never to 5 = always) do they come across deepfakes on (a) social media sites and (b) the Internet (other than social media sites).

Inadvertent deepfakes sharing (39.1% said yes, 1 = yes, 0 = no) was measured based on an item asking the participants if they had "ever shared a deepfake without realizing that it was fake and that you later found out that it was made up."

Cognitive ability ($M = 5.14$; $SD = 2.85$, $\alpha = .80$) was assessed using a 10-item wordsum test. The wordsum test was first developed by Thorndike (1942). This test measures verbal ability and has reportedly shared the most variance with general intelligence. It has been frequently used in literature to assess the cognitive ability of individuals (Brandt and Crawford, 2016; Ganzach et al., 2019). Others have also used it as a measure of cognitive ability in research using large national databases (see the American National Election Study). Wechsler (1958) supports the validity of vocabulary tests as a measure of cognitive ability and states,

> contrary to lay opinion, the size of a man's vocabulary is not only an index of his schooling but also an excellent measure of his general cognitive ability. Its excellence as a test of cognitive ability may stem from the fact that the number of words a man knows is at once a measure of his learning ability, his fund of verbal information and the general range of his ideas. (p. 84)

Controls. Demographic variables including age ($M = 44.31$; $SD = 16.40$), gender (57% males), education ($M = 5.95$, $SD = 1.23$; 1 = no formal education to 8 = doctoral degree), income ($M = 6.51$, $SD = 3.45$; 1 = less than US$1000 to 11 = more than US$20,000), and race (82% Whites) were used as controls.

Motivational controls such as mainstream media trust ($M = 3.40$; $SD = 1.11$, min–max = 1–5), political trust ($M = 4.40$; $SD = 1.96$, min–max = 1–7), political interest ($M = 3.77$; $SD = 1.09$, min–max = 1–5), political efficacy ($M = 5.46$; $SD = 1.33$, min–max = 1–7), and traditional media news use ($M = 3.30$; $SD = 1.15$, min–max = 1–5) were also incorporated.[1] Details are included in Supplemental Appendix A5.

The correlation between the variables of interest in this study is included in Table 1.

Table 1. Correlation among all the variables under study.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Age	–														
2	Gender (f)	−.080*	–													
3	Education	−.023	−.235**	–												
4	Income	−.095**	−.181**	.360**	–											
5	Race (w)	.193**	−.106**	.226**	.060	–										
6	Mainstream media trust	−.183**	−.197**	.328**	.246**	.140**	–									
7	Political trust	−.260**	−.179**	.197**	.219**	.094**	.503**	–								
8	Political interest	.015	−.221**	.288**	.148**	.099**	.365**	.285**	–							
9	Political efficacy	.026	−.243**	.296**	.184**	.125**	.395**	.383**	.612**	–						
10	Social media news use	−.366**	.019	.116**	.154**	−.001	.302**	.264**	.138**	.178**	–					
11	Traditional media news use	.084*	−.248**	.331**	.247**	.177**	.460**	.390**	.392**	.382**	.255**	–				
12	Deepfakes concern	.012	−.074*	.293**	.117**	.157**	.406**	.192**	.317**	.371**	.086*	.324**	–			
13	Deepfakes exposure	−.398**	−.146**	.279**	.266**	.067	.465**	.467**	.296**	.296**	.387**	.360**	.304**	–		
14	Inadvertent DF sharing	−.364**	−.154**	.227**	.228**	.012	.346**	.415**	.264**	.157**	.267**	.279**	.177**	.612**	–	
15	Cognitive ability	.452**	.148**	−.177**	−.274**	.023	−.376**	−.489**	−.191**	−.122**	−.304**	−.279**	−.112**	−.579**	−.606**	–
16	SM news skepticism	.201**	−.125**	.203**	.083*	.214**	.162**	.077*	.212**	.385**	−.117**	.211**	.408**	.134**	.026	.091*

DF = deepfakes; SM = social media; $N = 764$.
*$p < .05$; **$p < .01$.

Analysis

Hierarchical regression analyses were conducted to examine the questions posed in this study. This approach would allow us to evaluate the effect of predictor variables after controlling for demographics and motivational controls. The models were designed to include demographic and motivational controls in the first two blocks, the predictor variables of interest in the third block, and an interaction term to explore the two-way moderation effect (*RQ1*) in the fourth block. Social media news skepticism was the dependent variable in all the models.[2]

A three-way moderated moderation model using the Hayes PROCESS macro (Hayes, 2017) was applied to investigate the moderating role of cognitive ability (*RQ3*). The conceptual model is presented in Figure 1.

Results

The regression analysis presented in Table 2 suggest that among the control variables, those who are older ($\beta = .178$, $p < .001$), had higher education ($\beta = .156$, $p < .001$), and greater political efficacy ($\beta = .387$, $p < .001$) were more likely to exhibit skepticism of social media news content.

H1 predicted that social media news use would be negatively associated with social media news skepticism. The results support the hypothesis, suggesting that those who frequently use social media platforms for news consumption were less likely to be skeptical of the news content they encountered ($\beta = -.166$, $p < .001$).

Furthermore, concerns regarding deepfakes ($\beta = .276$, $p < .001$) and online exposure to deepfakes ($\beta = .143$, $p < .01$) were positively associated with social media news skepticism, thereby supporting H2 and H3. We can infer that individuals who were concerned with the propagation of deepfakes and are more frequently exposed to deepfakes were more likely to exhibit distrust in the news they found through social media platforms. These findings are consistent with recent literature where engagement with fake news is associated with distrust in the news (Wasserman and Madrid-Morales, 2019).

However, inadvertent sharing of deepfakes (i.e. when users do not realize the deepfakes to be untrue and share them inadvertently) was found to be a non-predictor of social media news skepticism ($\beta = .025$, $p = .56$). Thus, H4 is not supported.

The first research question (RQ1) examined how the inadvertent sharing of deepfakes might moderate the relationship between the levels of deepfakes concern and social media news skepticism. The interaction of inadvertent sharing of deepfakes and deepfakes concern was found to be statistically significant and positive ($\beta = .705$, $p < .001$). As seen in the interaction plotted in Figure 2, at lower levels of deepfakes concern, inadvertent sharing was associated with lower levels of social media news skepticism. In contrast, at higher levels of deepfakes concern, a reverse pattern was observed where inadvertent sharing of deepfakes was associated with the relatively the highest levels of social media news skepticism.

It is inferred that the citizens who are less concerned by deepfakes have higher levels of trust in the news on social media. As such, when those individuals encounter deepfakes during their engagement on social media, they are less likely to be critical of such

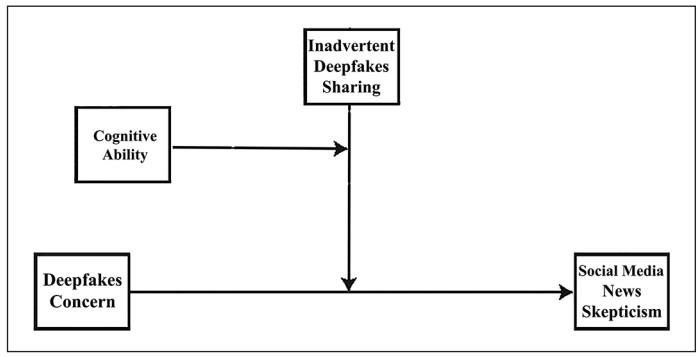

Figure 1. The conceptual framework: three-way interaction effect of inadvertent deep fakes sharing (M) and cognitive ability (W) on the relationship between concerns regarding deep fakes (X) and social media news skepticism (Y).

Table 2. Predicting social media news skepticism.

	Social media news skepticism
Step 1: Demographic controls	β
Age	.178***
Gender (female)	−.055
Education	.156***
Income	.024
Race (White)	.141***
ΔR^2	10.7%
Step 2: Motivational controls	
Mainstream media trust	.035
Political trust	−.065
Political interest	−.068
Political efficacy	.387***
Traditional media news use	.042
ΔR^2	11.3%
Step 3: Independent variables	
Social media news use	−.166***
Deepfakes concerns	.276***
Deepfakes exposure	.143**
Inadvertent deepfakes sharing	.025
Cognitive ability	.145**
ΔR^2	10.4%
Step 4: Two-way moderation effect	
Deepfakes concern × inadvertent deepfakes sharing	.705***
ΔR^2	3.1%
Total R^2	35.5%

Cell entries are final-entry OLS standardized beta (β) coefficients. $N = 762$.
**$p < .01$; ***$p < .001$.

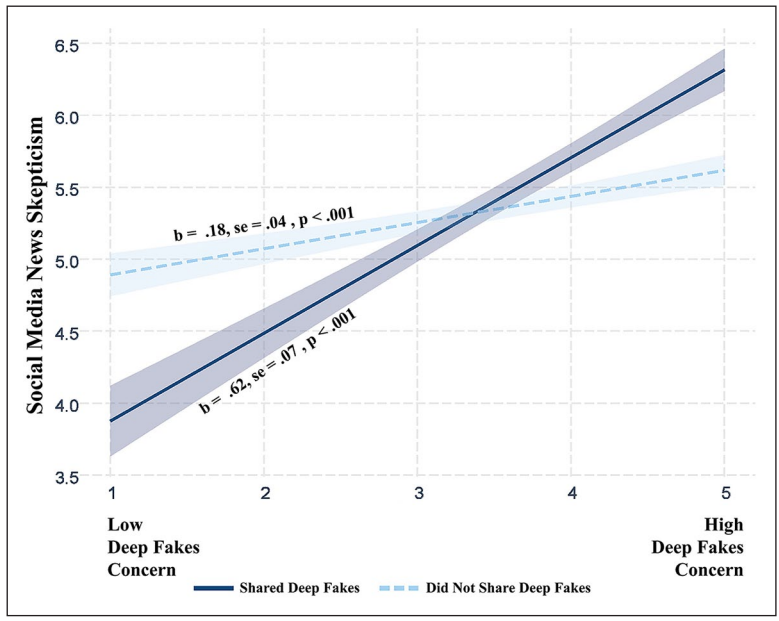

Figure 2. Visualization of the interaction effect of deepfakes concern and inadvertent sharing of deepfakes on social media news skepticism. All covariates are set to mean value.

content and are more vulnerable to accidentally sharing them. In contrast, those who are more concerned with the spread of deepfakes—but end up inadvertently sharing a deepfake—will perhaps become more skeptical of information on social media than any other group of citizens.

The next research question examined the relationship between cognitive ability and skepticism (RQ2). Cognitive ability was positively related ($\beta = .145$, $p < .01$) to social media news skepticism, thereby suggesting that those who are more cognitively abled are more critical and skeptical of the news content they find on social media.

The final research question (RQ3) examined how inadvertent sharing and cognitive ability moderate the relationship between deepfakes concern and social media news skepticism. The overall three-way interaction model accounted for 37.20% of the total variance (Table 3). The findings reveal a statistically significant and negative interaction among deepfakes concern, inadvertent sharing of deepfakes, and cognitive ability ($B = -.083$, $SE = .030$, $p < .001$). The details of the test of conditional interaction of deepfakes concern and accidental sharing at different levels of cognitive ability are presented in Table 4. The relationship is plotted in Figure 3.

A formal analysis of the conditional effect of deepfakes concern on social media news skepticism as a function of inadvertent deepfakes sharing and cognitive ability suggested that the effects are only significant for individuals with cognitive ability below 6.10 (58.79% of the sample). For the high cognitive ability group (above 6.10, 41.21% of the sample), the interaction effects were insignificant (as suggested in Table 4 and Figure 3). However, statistical differences are observed in the average levels ($Mean = 5.14$, $effect = .276$, $p < .01$) of

Table 3. Three-way interactive relationships among deepfakes concern, inadvertent deepfakes sharing, and cognitive ability.

Three-way interaction model	*B*	*SE*	LLCI	ULCI
Interaction term				
Deepfakes concern × inadvertent deepfakes sharing × cognitive ability	−0.083	.030	−.142	−.025***
Total R^2	37.20%			

LLCI: lower level of confidence interval; SE: standard error; ULCI: upper level of confidence interval. Analyses performed using the PROCESS macro for SPSS (Model 3; Hayes, 2017). $N = 762$; ***Denotes statistically significant relationships where $p < .001$. Model includes all the variables found in Table 2 and the necessary two-way interactions.

Table 4. Test of conditional "deepfakes concern x inadvertent deepfakes sharing" interaction at levels of cognitive ability.

Cognitive ability levels	Effect	*F*
Low (−*1 SD* = 2.29)	.514	28.62***
Medium (*Mean* = 5.14)	.276	10.42**
High (+*1 SD* = 7.98)	.039	00.08

SD: standard deviation.
$N = 762$.
**$p < .01$; ***$p < .001$.

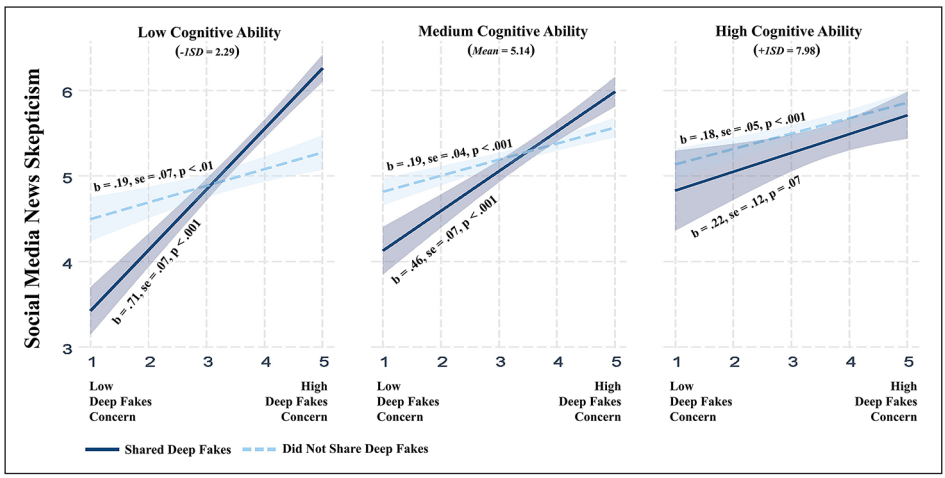

Figure 3. Visualization of the interaction effect of the conditional effect of deepfakes concern on social media news skepticism as a function of inadvertent deepfakes sharing and cognitive ability. All covariates are set to mean value.

cognitive abilities with more pronounced effects in the low (*–1SD*=2.29, *effect*=.514, $p < .001$) cognitive abilities condition. That is, the moderation effects of deepfakes concern and inadvertent sharing are more amplified in low cognitive condition.

Discussion

The findings of this study suggest that frequent exposure to deepfakes and civic concerns regarding deepfakes are positively related to social media news skepticism. In contrast, those who frequently rely on social media as a news platform were reported to be more trustful of the medium. The moderation findings suggest that among those who were more concerned about deepfakes, inadvertently sharing deepfakes were associated with heightened skepticism, but these patterns were more pronounced for the low cognitive group.

The findings are expectant in light of the effect of disinformation on social media platforms: both exposures to and concerns regarding deepfakes are related to social media news skepticism. These findings are consistent with Vaccari and Chadwick (2020), who found that exposure to deepfakes reduced trust in social media news. We infer that when citizens are exposed to deepfakes, it induces uncertainty and raises their skepticism about the news content they find on social media. One can portend that social media users would then be more likely to think and reason independently about the content they encounter. Such news skepticism is a harbinger of a politically aware and engaged citizenry (Tsfati, 2003). While this is encouraging, given the rise of disinformation on social media platforms, one should be cautious in evaluating the positive benefits.

Those who are more concerned about deepfakes but do inadvertently share deepfakes, their levels of social media news skepticism are the highest, relative to others. This finding potentially identifies a resistance mechanism in effect that protects them from sharing deepfakes in the future. While such a mechanism would protect them from the toxic effects of disinformation, it may also lead to detrimental outcomes. If social media users are often skeptical of accurate news, it may diminish some of the news exposure's positive products. Consumers are then likely to eschew a productive information environment. This may not be a cause of concern for those who primarily rely on social media news platforms as a news source (recall H1). Nevertheless, it can invalidate the benefits of incidental exposure to news content on social media for others.

Recent evidence has confirmed that accidental encounters with news on social media can translate into cognitive elaboration (Oeldorf-Hirsch, 2018), encourage political engagement (Kim et al., 2013), and reduce online political inequality (Valeriani and Vaccari, 2016). However, if individuals turn antipathic to social media news content, any positive effects of incidental news exposure would be limited, especially for those who primarily do not rely on social media for their news consumption. Future research endeavors should empirically explore how heightened news skepticism can develop into cynicism and can inhibit the benefits of accidental exposure to news on social media.

While these findings highlight the need to pay attention to heightened news skepticism, this study also finds that the observed relationships are contingent upon individuals' cognitive ability. High cognitive individuals are more skeptical of news content on social media. The results are suggestive of recent evidence where cognitive ability is associated with better truth discernment (Pennycook and Rand, 2018) and weaker belief of false content

(Ståhl and Van Prooijen, 2018). Cognitively abled individuals are more successful in making risk assessments and filtering what knowledge is relevant in deciding how to place their trust (Zmerli and Van der Meer, 2017). Even within the sample used here, high cognitive individuals were less likely to be exposed to and inadvertently share deepfakes (see Supplemental Appendix A6 and A7 for findings). Thus, there is some evidence that cognitive ability can buffer against the manipulative nature of deepfakes.

Beyond the direct effects, the moderated moderation results suggest that the three-way effects were only significant for low- to mid-cognitive abilities (below 6.10, $M = 5.14$; min–max = 1–10). These findings can be understood through self-threat patterns in self-serving bias (Campbell and Sedikides, 1999). Individuals with lower cognitive ability and greater concern might experience more significant levels of self-threat after inadvertently sharing deepfakes. A heightened skepticism of social media, perhaps an emotional response, would be a device of self-protection, especially in an online social setting where sharing can be considered vital self-expression. Self-threat is known to accentuate defensive strategies in public settings (Campbell and Sedikides, 1999). As such, concerned low cognitive individuals, who usually have an external locus of control (Findley and Cooper, 1983; Hattrup et al., 2005), might externalize the blame attribution to social media. A positive outcome would be that low cognitive individuals may better judge the risks associated with exposure to and sharing of deepfakes in the future. However, a negative consequence could be that the heightened skepticism transforms into a generalized cynicism against news. On the contrary, higher cognitive individuals are found to show more restraint in skepticism even when they inadvertently share deepfakes. This is perhaps because individuals with an internal locus of control, albeit high cognitive individuals, are known to exhibit greater self-reliance (Cravens and Worchel, 1977) and react to stressful situations with behavioral reactions rather than demonstrating emotional responses (Anderson et al., 1977). As such, it is likely that individuals with higher cognition doubt their own ability to discern deepfakes rather than attributing the blame to social media platforms.

The results presented in this study highlight how civic behavior and attitude surrounding deepfakes influence social media news skepticism. It is essential to acknowledge that the nature of the data used in this study limits definite causal inferences.

First, it is plausible that those with higher social media news skepticism are more likely to be exposed to deepfakes (maybe they are better at recognizing deepfakes) and are more concerned with deepfakes. However, it is less plausible that those with higher skepticism will be more likely to share deepfakes inadvertently. A post hoc predictive analysis, with other variables under study, held constant, found that social media news skepticism was an insignificant predictor of deepfakes sharing behavior. Future scholars should expand the analytical framework with longitudinal data for definite causal inferences. Second, this study uses self-reported measures of deepfakes exposure and sharing, and in common with all survey studies, it limits the inferences we can draw. However, the validity of the findings is enhanced by the consistency in reported patterns in user engagement with deepfakes (Vaccari and Chadwick, 2020) and other forms of disinformation (Pennycook and Rand, 2018). Third, this study has not explored the platform differences in social media news skepticism, and it is plausible that citizens are more skeptical of specific social media platforms than others (e.g. Facebook vs Instagram). Fourth, the findings are based on a sample that was aware of deepfakes.

While our findings replicate across both samples, it is difficult to speculate about the perspectives (on deepfakes exposure and sharing) of the subset of people who were unaware of deepfake prior to the survey. Future work could explore these research questions in more detail.

In summary, this study is one of the first to assess how attitude and behavior surrounding deepfakes influence skepticism toward news on social media. Exposure and inadvertent sharing among the more concerned individuals can heighten skepticism. This study also finds that the cognitive ability of social media users varyingly influences the role deepfakes might play, and builds upon the understanding of how individuals ascertain and react to the veracity of disinformation. The findings warrant the need to pay more attention to the social and political impact of deepfakes in our effort to recognize and restrict the impact of online disinformation.

There are two main policy implications of this work. The first is concerning content moderation on social media platforms. Social media platforms could integrate mini-games or related tasks focused on discerning deepfakes from reality to help inoculate users from future disinformation. Recent evidence suggests that playing spot the misinformation games (e.g. *Bad News*) can significantly improve users' ability to spot misinformation techniques in the future (Basol et al., 2020). In addition, social media platforms have begun to flag misleading content, and suspend accounts that share manipulated media (Graham, 2020). Other digital literacy interventions could redirect users attempting to read or share flagged posts to credible reports of the same information with a "see why" feature.

The second is with regard to electoral guidelines for political campaigns. The findings suggest that engaging with deepfakes could potentially harm low cognitive voters. In the long term, a potential media cynicism could lead to a politically disengaged citizenry. Thus, it is recommended that governments worldwide institute and enforce restrictions for political messages that employ deepfakes. We recommend further experiments with social interventions as a potential way to counter the negative influences of deepfakes, and to inform future policy efforts from technology platforms and governments alike.

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Supplemental material

Supplemental material for this article is available online.

Notes

1. The pattern of the findings reported here (H1– H4 and RQ1–RQ3) replicate even when controlling for partisanship, social network size, and social network heterogeneity.
2. The tolerance and variance inflation factor (VIF) values for all models exploring the main effects are within acceptable limits.

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