Political Communication

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/upcp20

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To cite this article: Sang Jung Kim, Isabel Iruani Villanueva & Kaiping Chen (2024) Going Beyond Affective Polarization: How Emotions and Identities are Used in Anti-Vaccination TikTok Videos, Political Communication, 41:4, 588-607, DOI: 10.1080/10584609.2023.2243852

To link to this article: https://doi.org/10.1080/10584609.2023.2243852

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POLITICAL COMMUNICATION
2024, VOL. 41, NO. 4, 588–607
https://doi.org/10.1080/10584609.2023.2243852

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Going Beyond Affective Polarization: How Emotions and Identities are Used in Anti-Vaccination TikTok Videos

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ABSTRACT

The rise of social media as a source of science and health information has brought challenges to informed citizenship and social trust due to the spread of misinformation, particularly anti-vaccination messages that incite hatred and discourage necessary health precautions. These messages often employ emotional appeals and identity cues. However, scholarship examining emotional appeals and identity cues in anti-vax messages is still at the nascent stage. Furthermore, most literature on emotions and identities on social media has focused on text-based platforms, despite the increasing popularity of interactive, multimodal platforms. To address these gaps, our paper analyzes recent TikTok anti-vax videos and incorporates the framework of multimodal frame processing, emotion-as-frames model, affective intelligence theory, and social identity theory. Our paper uncovers how different message modalities affect the impact of emotional narratives and identity cues on user engagement. We also investigate sociopolitical identity cues beyond partisan identities, expanding the current terrain of political communication. Our results demonstrate that audiences engage with emotional and identity cues in anti-vax videos differently based on distinct message modalities. We also found that identity cues related to interpersonal relationships (e.g. parental) and conspiracy groups were prevalent, in addition to partisan identity cues. These results offer new insights into sociopolitical identities beyond partisanship and highlight the importance of considering the multi-modal nature of video platforms. Overall, our paper sheds light on the complex relationship between emotions, identities, and message modalities on social media and provides important implications for addressing misinformation and improving science communication on digital platforms.

KEYWORDS

Emotion; identity; multimodality; anti-vax; TikTok; computational social science

Introduction

During the height of the COVID-19 pandemic, nearly half of all Americans relied on social media to follow news about the pandemic (Mitchell & Liedke, 2021). At the same time, anti-vax videos that hindered COVID-19 vaccinations efforts were widely shared on social media. Despite social media platforms' attempts to curb unsupported claims, anti-vax videos often contain misinformation (Basch et al., 2021). These misinformation posts tend to use emotions

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Supplemental data for this article can be accessed on the publisher's website at https://doi.org/10.1080/10584609.2023.2243852

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to increase virality (Germani et al., 2021) while using identity cues to attract users with similar worldviews and place blame on out-group members (Li & Su, 2020).

Despite the prevalence of emotional appeals and sociopolitical identity cues in anti-vax videos, several shortages exist in the scholarship on political communication processes in the digital age. First, research on understanding the role of various message modalities when examining emotions is underdeveloped. Most papers focus on texts when studying emotions, although misinformation has started to prevail on video-intensive platforms (Stecula & Pickup, 2021). Second, while many studies focus on examining partisanship when studying political communication on digital platforms, scholars have also noted the importance of investigating identity cues beyond partisanship (Chen et al., 2022). Specifically, controversial scientific issues such as vaccinations are often "wicked problems," or issues where tensions lie in partisanship and other socio-cultural value systems (Funtowicz & Ravetz, 1993).

Understanding how emotional appeals and identity cues in anti-vaccination videos drive social media engagement is essential since engagement behaviors, such as liking, commenting, or sharing posts, can be interpreted as motivational responses from audiences (Alhabash et al., 2019). For instance, the number of likes indicates the degree of audience acknowledgment and support of the content (Swani & Labrecque, 2020). By understanding the relationships between emotional appeals and identity cues in anti-vaccination videos and the number of likes, researchers can understand what features of anti-vaccination videos endorse support and acknowledgment of those anti-vaccination videos. Researchers can also understand what message features increase audiences' willingness to spread the content (by examining the number of shares), and what message features are associated with audiences' willingness to express their own thoughts (by examining the number of comments) (Swani & Labrecque, 2020).

Examining how multi-modal emotional cues and sociopolitical identities in anti-vaccination videos influence social media engagement will advance our understanding of what content features make audiences respond actively. To address current gaps in the literature, our paper investigates 1) how the impacts of discrete emotions and identity cues utilized in anti-vaccination TikTok videos on audiences' engagement are contingent on message modalities and 2) how sociopolitical identities other than partisanship are utilized in anti-vax videos to persuade audiences.

Our manuscript is organized as follows. We first draw from emotion-as-frames, affective intelligence, and social identity theories to develop our hypotheses regarding the relationship between emotions, identity cues, and social media engagement. Then, we examine how various message modalities might affect these associations by incorporating suggested theories with the framework of multimodal frame processing. We demonstrate how emotional appeals and identity cues could be extracted from different message modalities by integrating computer vision and automated textual analysis, and how identity dictionaries could be developed to capture sociopolitical identities beyond partisanship. We then present major findings, followed by the discussion and implications for studying misinformation and public engagement with science and political information in the contentious digital landscape.

Literature Review

Anti-Vaccination Narratives: Hesitancy Arguments, Misinformation, and Conspiracy Theories

Anti-vaccination narratives can be largely subdivided into (1) vaccine hesitancy arguments, (2) misinformation about vaccines, and (3) conspiracy theories about key actors related to vaccines (Maciuszek et al., 2021). Vaccine hesitancy arguments might not involve misinformation but rather express antagonistic attitudes toward vaccinations. Although these narratives do not contain false claims, they significantly hurt the trust in scientific communities (Maciuszek et al., 2021). Anti-vaccination misinformation includes incorrect information about vaccines. Anti-vaccination conspiracy theories are misinformation messages that explain negative events as results of secret acts by malevolent forces (Jolley et al., 2014). This paper encompasses these three types of anti-vaccine discourses, reflecting the diverse nature of anti-vax narratives. While vaccine hesitancy arguments, misinformation, and conspiracy theories might have distinct forms of narratives, these messages are all anti-science, impeding citizens' trust in science. The following sections theorize how the multimodal form of emotional cues and the sociopolitical identities in anti-vaccination videos are associated with citizens' engagement with messages.

The Role of Emotion and Identity Cues in Social Media Engagement

Emotion-As-Frames Model and Affective Intelligence Theory

Anti-vaccination messages utilize emotions in their narratives to influence audiences (Germani et al., 2021). Emotions are defined as internal mental states representing the valenced evaluations of external or internal stimuli (Barrett et al., 2007). While most research on emotions focuses on individuals' emotions toward attitudinal objects, recent scholarship has started to understand how messages utilize emotional cues to generate emotional responses from audiences (Dukes et al., 2021). The emotion-as-frames model suggests that emotional cues in a message can serve as frames that appraise unique emotional patterns (Nabi, 2003) and influence individuals' judgment of the attitudinal object in the message. Affective intelligence theory (AIT) further postulates that emotions guide individuals' degree of attention and engagement with the message in an interactive fashion (Marcus et al., 2000).

According to AIT (Marcus et al., 2000), emotion can influence judgments and behaviors through two distinct routes – the disposition and surveillance systems. The disposition system, activated by anger and enthusiasm, prompts people to rely on their previously established heuristics and routines. Meanwhile, the surveillance system, activated by fear and anxiety, leads to a more effortful processing of information and a reconsideration of previous knowledge.

AIT research has focused on the role of three distinct emotions – anger, enthusiasm, and anxiety – all of which have been shown to increase participation on social media through these distinct processes (e.g., Heiss, 2021). Anger, resulting from the attribution of blame toward a specific person, may lead individuals to post more on social media as a means of emotional- or problem-focused coping to reduce anger (Heiss, 2021). Enthusiasm and other positive emotions lead to positive engagement on political posts, potentially because people

use social media for entertainment (Berger & Milkman, 2012; Heiss, 2021). Lastly, anxiety may also result in increased participation as people seek social support to reduce anxiety (Heiss, 2021).

While the effects of anger, anxiety, and enthusiasm have all been investigated extensively in AIT scholarship, additional discrete emotions such as sadness, disgust, and happiness have only recently been studied with respect to specific social media engagement behaviors (Choi et al., 2021). The findings on sadness have thus far been mixed. When combined with moral language, sadness was shown to be associated with a decrease in sharing social media posts, likely because sadness is a low-arousal emotion (Berger & Milkman, 2012; Brady et al., 2017). Contrarily, in a study on discrete emotions and engagement, sadness was associated with increased rates of sharing posts, a high engagement behavior (Choi et al., 2021). Increases in other emotions also had important implications for engagement behaviors. For instance, disgust leads to increased engagement for national news, while fear increases engagement for political and economic news (Choi et al., 2021). On the other hand, positive emotions increased engagement, but only through low-cost engagement behaviors (de León & Trilling, 2021)

Social media engagement may include low-cost behaviors, or actions that "require engagement and mobilization, but very little in terms of resources" (Bode, 2017, p. 2), such as viewing and liking, or higher cost behaviors, such as commenting and sharing (Choi et al., 2021). Scholars have found that discrete emotions influence these engagement behaviors differently. As argued by AIT (Marcus et al., 2000), discrete emotions result in separate behavioral pathways, which can map onto certain social media engagement behaviors. Previous social media engagement research suggests that increase in any type of emotional arousal increases engagement, but videos with stronger negative emotional cues are associated with high-cost engagement as individuals seek emotional- and problem-coping methods, and videos with stronger positive cues encourage low-cost engagement (e.g., liking) for individuals to express appreciation for entertainment (Heiss, 2021). Thus, we propose the following hypotheses:

H1: TikTok videos with stronger negative emotional cues (e.g., anger, fear) are associated with more engagement.

H2: TikTok videos with stronger positive emotional cues (e.g., happiness) are associated with more engagement.

Uncovering Identity Expressions on Social Media Engagement

The other key feature of misinformation messages on social media is their utilization of identity narratives. Well documented in political communication literature, partisanship influences individuals' attitudes and behaviors, and responses to misinformation (Kahan et al., 2007). However, highlighted by social identity theory (Tajfel, 1981), identities are multidimensional. Although most literature in political communication has focused on partisanship (e.g., Li & Su, 2020), other sociopolitical identities of individuals also shape their worldviews and behaviors.

In recent years, partisan identities have become increasingly aligned with their other sociocultural identities, such as religious, geographical, and ideological identities (Iyengar et al., 2019). For instance, recent anti-vaccine movements put relational identity, such as emphasizing oneself as a mother of children, at the center of narratives (Zadrozny & Nadi, 2019). While social identity focuses on maintaining the group status quo, the main motivation of relational identity is the well-being of one's caring interpersonal relationships (e.g., the well-being of one's child) (Sluss & Ashforth, 2007). For COVID-19, researchers found that priming relational identity helps reduce partisan polarization (Zeng, 2021).

Generational identities could also play a key role in COVID-19 vaccination beliefs, because GenZ are less likely to perceive the vaccine as dangerous compared to older generations (Wang et al., 2022). Additionally, researchers have found that religious (e.g., Goldberg et al., 2019), racial, and ethnic identities (e.g., Lane et al., 2022) influence attitudes toward politicized scientific issues. Despite these multifaceted identities, few studies have examined the impacts of these sociocultural identities when investigating contentious scientific issues. This study examines how these different sociocultural identities represented in anti-vaccination videos impact audiences' social media engagement at an *aggregate* level. By exploring how these various identity narratives can impact user engagement with politicized science topics, such as vaccinations, our study expands knowledge in political communication.

Identity cues embedded in messages are found to increase user engagement with social media content. When using social media, people tend to reduce the complexity of the presented information by using heuristics. Because identity cues serve as heuristics to interpret said information, engaging with information with relevant identity cues makes individuals feel "safe" and can increase engagement through likes, shares, and comments (Chen et al., 2022). Therefore, at an aggregate level, it is predictable that various sociopolitical identity cues would increase social media engagement. We propose the following hypothesis:

H3: Presence of identity cues in a TikTok video is associated with increased engagement with the video.

How Emotions and Identity Cues Interact to Influence Social Media Engagement

Affective polarization is one potential explanation for how identity cues and individuals' emotional attachments to these cues could collectively influence user engagement. Affective polarization refers to the phenomenon in which members of a political party view others in their political party more positively while judging others of opposing political parties more negatively (Iyengar et al., 2019) and is thought to be a result of a commitment to one's social group. As outgroup bias suggests, people tend to dislike individuals outside of their group, and thus they might generate negative content or comments toward the outgroup via social media. Language about the outgroup, often portraying anger and animosity, are shown to increase angry reactions and generate nearly twice as much engagement among audiences (Rathje et al., 2021). Political identities might be most likely to interact with emotions because of how salient the partisan identity is on social media (Rathje et al., 2021). The

partisan identity, together with emotions, will be especially effective in increasing engagement. Thus, we propose our fourth hypothesis as:

H4: Negative emotional cues and partisanship identity cues on social media will interact to increase engagement on the anti-vaccination TikTok videos.

Modalities as a Key Concept to Study How Users Engage with Videos

Multimodality in Computer-Mediated Communication

Scholars examining computer-mediated communication have increasingly emphasized the importance of studying how the effects of message frames differ through varying modes of message delivery, such as audio, image, and text (Benson, 2016; Herring, 2015). Despite the growing importance of considering multimodality when examining message effects, most researchers have examined framing effects on a single modality. Geise and Baden (2015) proposed an integrated framework of multimodal frame processing and emphasized the importance of understanding differential framing effects through various modalities in a message and addressing how audiences process visual and textual frames differently.

According to the framework, each modality serves distinct communicative functions, and the interplay of different message modalities in a multimodal message generates information that cannot be deduced by the capacity of a single modality alone. Framing analysis limited to a single modality is not able to 1) understand the meaning of multi-modal message packages and 2) capture interactions between different message modalities (ibid).

Understanding multi-modal frames in messages is especially important in examining computer-mediated communication (CMC) processes. One type of social media platform that is increasingly visible in the digital media environment is interactive multimodal platforms (i.e., IMPs): social media platforms that carry a convergence of message delivery modes for user-to-user interaction (Herring, 2015). While users of social media platforms such as Wikipedia and Twitter mainly utilize text for communication, interactive multimodal platforms, such as YouTube, allow users to share messages in various modalities (e.g., images, video, audio) in a single conversation (Herring, 2015). Increasing circulations of memes and videos on social media require scholars to examine the "multimodality of communicative interactions" in the digital age (Benson, 2016, p. 10). Therefore, to understand CMC in the current era, it is important to understand how the effects of message frames become diversified by various message modalities on these interactive multimodal platforms.

The Rise of Video-Based Platforms

TikTok is emerging as one of the most popular interactive multimodal platforms used by global audiences in the digital media environment. TikTok became increasingly problematic because of the impact of circulated misinformation related to COVID-19 anti-vaccination discourse; children as young as nine were exposed to these videos on TikTok (Grierson et al., 2021). Both the popularity of TikTok and the increasing concerns of prevalent anti-vaccination videos on TikTok targeting children and adolescents motivate

our paper to examine specific emotions embedded in anti-vaccination TikTok videos that could serve as frames and make users engage with the videos. Especially, 26-minute anti-vaccination video called "Plandemic" which contains narratives that satanic elites are leveraging from the virus to gain power became viral across multiple social media platforms, including TikTok, impacting a significant number of audiences (Frenkel et al., 2020).

As an interactive multimodal platform, emotions from the TikTok videos are delivered in a *multi-modal form* (Hautea et al., 2021). Therefore, to understand emotions embedded in TikTok videos, it is crucial to examine emotions in thumbnails, transcripts, and captions of videos. Although interactive multimodal platforms deliver emotional cues in a multi-modal form, emotional cues offered in a multi-modal format are largely underexplored.

How Modality Might Influence the Association Between Emotion and Identity Cues and User Engagement

While the emotion-as-frames model and AIT postulate how emotional cues can become frames associated with individuals' engagement, scholars have only recently started to investigate the effects of emotional frames delivered in different modalities (audio, image, text). Zhao et al. (2022) examined multi-modal expressions of emotions in online crowdfunding campaigns on a charity platform that helps people impacted by COVID-19. The study found that while the platform primarily used images containing happiness, the same platform mostly used texts containing fear to generate audience support. The study demonstrated how online platforms amplify distinct emotions in different modalities to persuade audiences.

Not only did the authors highlight how online charity platforms utilize distinct emotions, but Zhao et al. (2022) also examined how emotions in different message modalities generate different levels of persuasive effects on donors. They found that while sadness delivered in texts in crowdfunding campaigns hindered campaigns' financial performance, happiness in visuals did not have a significant impact on the performance. These results show how discrete emotions in different modalities generate different levels of persuasiveness in audiences.

Coronel et al. (2021), on the other hand, showed how individuals engage with identity cues embedded in visuals and text in interactive multimodal platforms. By conducting an eye-tracking experiment, the authors found that politically sophisticated individuals are more likely to focus on partisan identity expressed by text than gender identity portrayed in visuals when reading the profiles of politicians.

Joining this recent growing number of studies on computer-mediated communication that explored how emotional frames and identity cues might be delivered differently in various message modalities, we investigate how particular emotions or identity cues are used in a specific mode of message delivery (e.g., text, visuals, audio) in anti-vaccination TikTok videos. Extending current studies, we examine how the association between emotion, identity cues, and user engagement might differ based on the modality of the messages. Therefore, we posit the following research questions:

RQ1: How do relationships between emotions and user engagement on TikTok differ-based on the modality of the messages?

RQ2: How do relationships between identity cues and user engagement on TikTok differbased on the modality of the messages?

Data and Method

Data Collection

To collect anti-vaccination videos on TikTok, we gathered data through Junkipedia, a research tool created by Algorithmic Transparency Institute (Center for an Informed Public et al., 2021, p. 14). Junkipedia collects a sample of videos on TikTok (See Supplemental Material Appendix 7). We drew from keywords related to anti-vaccination discourses on Twitter (Muric et al., 2021), due to a lack of research on anti-vaccination discourses on TikTok. Using Junkipedia, we collected videos created from February 2021 to February 2022 using these keywords as part of their hashtags. As a result, we collected 6,862 videos containing anti-vaccination keywords (e.g., #abolishbigpharma, #arrestbillgates). Among the randomly sampled 100 videos, 75 videos (75%) held anti-vaccination perspectives, which aligns with the topic of our interest (see Supplemental Material Appendix I).

Measuring Emotions in a Multi-Modal Form

To analyze the multi-modal form of emotional appeals in anti-vaccination videos, we used three computational techniques: 1) automated face emotion recognition in video thumbnails, 2) the computer-assisted emotion dictionary to analyze the captions of the videos, and 3) the computer-assisted emotion dictionary to analyze the transcripts of the videos, which stemmed from auditory speech with Python packages. To extract facial expressions from video thumbnails, we first created thumbnails from the videos using MoviePy package. Then, we used two Python packages to extract emotions from video thumbnails: FER and Deep Face. To validate whether these packages can automatically capture individuals projecting certain facial emotional expressions, we randomly sampled around 140 thumbnails from each emotion category coded by FER and Deep Face, respectively. We then manually coded whether researchers agree with the emotion detected by these two packages. Based on our validation, we decided to proceed with the DeepFace software to capture emotions from thumbnails. Only the emotions of fear, anger, and happiness were included in analyses, as these three emotions showed high reliability when comparing the software and human coding (75%). For detailed discussions about these two packages and our validation, please refer to Appendix 2 in the Supplemental Material.

To extract textual emotions from video captions, we applied the NRC dictionary to calculate the number of words associated with emotions (e.g., sadness, trust, fear) from TikTok video captions. Details of the NRC dictionary and its use in communication research are in Supplemental Material Appendix 9. To extract emotions from the speech in TikTok videos, we transcribed the videos with the automatic speech recognition tool provided by OpenAI based on the Whisper model and then applied the NRC dictionary to these video transcripts to calculate the frequency of each emotiTable 2onal-related word. The speech recognition software was validated by the authors using the word error rate (WER) method (Koenecke et al., 2020). A full description of the validation process on the two automated speech recognition software can be found in Supplemental Material Appendix 4.

We first examined how various emotions are used in anti-vax TikTok videos by estimating the number of videos associated with discrete emotions from video captions, transcripts, and thumbnails (Figure 1). The emotion of fear stood out in video captions, transcripts, and thumbnails.

Measuring Identities in TikTok Videos

To identify the frequency of various types of identity cues used in these TikTok videos, our research team combined deductive and inductive methods to construct a list of vocabularies signifying partisanships (e.g., Republicans, Democrats), socio-cultural identities (e.g., Asian, child, doctor) and different age groups (e.g., old, young, GenZ). We additionally included ideological identities separately from partisan identities. Ideological identities are identities based on value dimensions (e.g., stances on economy, abortion, LGBT rights) for which individuals generally lean more left (liberal) or right (conservative) but may not have partisan foundations (see examples in Supplemental Appendix 3, Table S6). An initial list of potential identities was gathered from the literature review on various socio-cultural identities. The researchers then developed a keyword dictionary related to sociopolitical identities, and the keyword dictionary was refined through three rounds of open group discussions with the researchers. Then, we counted the words associated with each identity in TikTok captions and transcripts, using the exact match approach. Thus, identities were

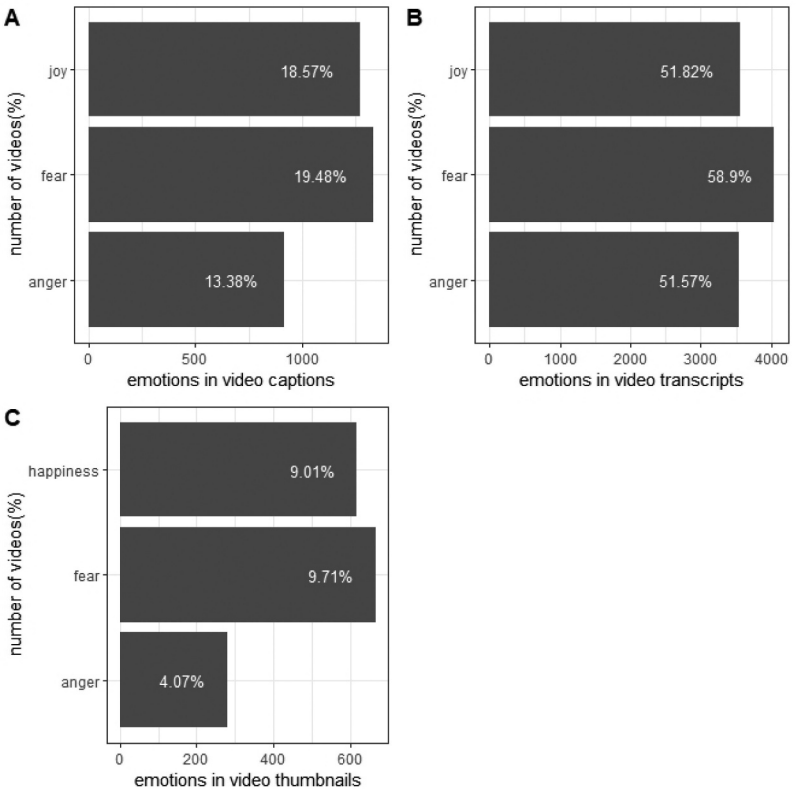

Figure 1. Count and percentages of videos that used fear, anger, and joy/happiness emotions in the video captions, transcripts, and thumbnails. *Note*. In Panel A, the bars show how many videos have words related to joy, fear, and anger in descriptions. The percentages show how many of the 6,862 videos have joy, fear, and anger in captions. In Panel B, the bars show how many videos have words related to joy, fear, and anger in video transcripts. The percentages show how many of the 6,862 videos have joy, fear, and anger. In Panel C, the bars show how many videos have facial expressions related to happiness, fear, and anger in video thumbnails. The percentages show how many of the 6,862 videos have happiness, fear, and anger.

analyzed for frequency and not for attitude or affect. A full description of the identity codebook development process can be found in Supplemental Material Appendix 3.

Table 1 reports the number of videos using various identity cues in the video captions and transcripts. Ideological identity cues were used more frequently than other identity cues in anti-vaccination video captions. Of the 6862 videos, 2534 (36.93%) used conservative identity cues in the video captions. Conspiracy cues and relational identity cues appeared at a lesser rate, with 869 (12.66%) and 701 (10.22%) videos, respectively. While partisan identity only appeared in 9% of video captions, it is important to recall that sociocultural identities are often seen as proxies for partisan identities (e.g., religion, geographic, racial). In other words, while partisan identity may not be frequent, the other prevalent identities may be used as substitutes for partisan identities without directly stating political affiliation. In the video transcripts, the most common identity cue is relational identity, with 1243 (18.11%) videos containing relational identity cues, among which 424 were maternal identity cues. These results, including the prevalence of relational identity cues (which cuts across partisan lines), emphasize the need to investigate identities aside from partisanship in anti-vaccination videos on TikTok.

Measuring TikTok Video Engagement

To measure TikTok video engagement, we used three indices: number of shares, number of comments, and number of likes. Table S11 in the Supplemental Material shows the correlation between the dependent variables. A hypothesis is accepted if an independent variable is significantly associated with all of the three engagement variables.

Analyses

To investigate H1 and H2, we calculated the number of emotions associated with TikTok thumbnails, captions, and transcripts using R. To investigate H3 and H4, we calculated the number of identity words associated with TikTok captions and transcripts. For all hypotheses, we checked the distributions of the dependent variables (i.e., shares, comments, likes, and views of videos). The distributions suggest the presence of over-dispersion in our data, and therefore we conducted the Negative Binomial Regression to model how the use of emotions and identities in

Table 1. Number of videos with identity vocabulary in the caption/transcript.

Identity	Number of video captions	Number of video transcripts
Conservative	2534 (36.93%)	409 (5.96%)
Conspiracy	869 (12.66%)	165 (2.40%)
Vaccine Injured	812 (11.83%)	125 (1.82%)
Relational	701 (1.22%)	1243 (18.11%)
Geographical	695 (1.13%)	867 (12.63%)
Republican	545 (7.94%)	118 (1.72%)
National	468 (6.82%)	683 (9.95%)
Liberal	284 (4.14%)	17 (.25%)
Professional	237 (3.45%)	656 (9.56%)
Democrat	154 (2.24%)	193 (2.81%)

N = 6862; For a full list of identities and their frequencies, please refer to Supplemental Material Appendix 3.

videos is associated with the engagement of videos, controlling for the clustering effect of videos coming from the same channel, or account. To test H4, we aggregated the frequency of anger and disgust cues in each video into a negative emotion variable and we combined the Republican and Democrat partisan cues into a single partisan cue variable. Then, we added the interaction effect between the aggregated negative emotions and the combined partisan cues to our Negative Binomial Regression model.

Table 2 presents the negative binomial models that were performed on each type of user engagement with emotion and identity variables as independent variables. We also added the video channel as a random intercept, accounting for the effect of the source of the video. It is important to account for the channel since channels have differing number of subscribers that might influence engagement with their videos. There were a total of 1088 unique channels posting a total of 6862 videos. 221 of these channels have more than one video in this dataset. For the emotion variables, we included negative emotions with trust-related emotions since previous literature on conspiracy theories and anti-vax discourses found that negative emotions and trust are most related to these discourses. For identity variables, we inductively included the most frequently appeared identities in video captions, given that multi-dimensional identities are not yet examined by other researchers. We included column e^{β} for interpreting coefficients.

Results

Emotions in Anti-Vax TikTok Videos and Social Media Engagement

H1 is Partially Supported

As Table 2 shows, use of negative emotional cues (anger, fear) is associated with different directions in user engagement. While using anger in thumbnails and video transcripts was associated with a decrease in comments and likes, use of fear is associated with more shares and likes in the videos. In terms of the association between use of positive emotional cues (e.g., joy) and user engagement, we found no statistically significant association. Thus, **H2 was not supported**.

Identity Cues in Anti-Vax TikTok Videos and Social Media Engagement

Our results provide mixed evidence for H3 (Table 2). We found that using liberal identity is associated with many more shares, comments, and likes (ranging from 52% to 200% increase). However, using conservative identity in video captions is associated with 10% fewer shares and likes. When it comes to the use of relational identity and user engagement, we found that there is a negative association – using relational identity cues is associated with fewer shares, comments, and likes (ranging from 40% to 70% decrease). One unexpected but noteworthy finding is the negative association between using conspiracy-related identity cues (e.g., #depopulation, #redpill) and user engagement. Although most of these TikTok videos use anti-vaccination narratives, when their caption and transcripts are filled with conspiracy terms, they received near 70% fewer shares, comments, and likes.

Table 2. Emotion, identity, and engagement with TikTok videos: Results from negative binomial regressions for different modalities, main effects.

	Number of shares		*Number of comments*		*Number of likes*	
	β	e^{β}	β	e^{β}	β	e^{β}
Intercept						
	4.93***	138.52	5.16***	174.89	7.98***	2926.34
Human face detected						
	−0.13	0.88	0.15*	1.16	0.01	1.01
Anger						
Thumbnails	0.00	1.00	0.00**	0.99	−0.01***	0.99
Captions	−0.09	0.91	−0.06	0.94	−0.27***	−0.76
Transcripts	−0.06	0.94	0.02	1.02	0.00	1.00
Fear						
Thumbnails	0.00	1.00	0.00	1.00	0.01	1.00
Captions	0.18*	1.19	−0.09	0.91	0.28***	1.32
Transcripts	0.16***	1.17	0.02	1.02	0.02	1.02
Joy						
Thumbnails	0.00	1.00	0.00	1.00	0.00	1.00
Captions	−0.03	0.97	−0.08	0.92	−0.02	0.98
Transcripts	−0.03	0.97	−0.02	0.98	−0.03	0.97
Conservative Identity						
Captions	−0.09*	0.91	−0.01	0.99	−0.13***	0.88
Transcripts	0.11	1.11	0.11	1.11	0.09	1.09
Liberal Identity						
Captions	0.42**	1.52	0.89***	2.42	1.10***	3.02
Transcripts	−0.37	0.69	1.15*	3.15	1.20*	3.32
Relational Identity						
Captions	−0.54***	0.58	−0.29***	−0.29	−0.25***	0.78
Transcripts	−0.04	0.96	0.05	1.05	0.11**	1.12
Vaccine Injured Identity						
Captions	−1.84***	0.16	−2.08***	0.13	−2.38***	0.09
Transcripts	0.05	1.05	0.59**	1.80	0.10	1.11
Conspiracy Identity						
Captions	−0.98***	0.37	−1.13***	0.32	−1.37***	0.25
Transcripts	−0.48*	0.62	−0.59***	0.55	−0.67***	0.51
Partisan Identity						
Captions	0.21***	1.24	0.21***	1.24	0.14***	1.15
Transcripts	−0.41***	0.66	−0.25**	0.78	−0.30***	0.74
Pseudo R squared (conditional)	*.66*		*.56*		*.70*	

N = 6862; *p < .1, **p < .05, ***p < .001.

The Role of Modality on User Engagement with TikTok Videos

This part reports findings on how modality affects the association between emotion and identity usage and user engagement with these anti-vax TikTok videos (RQ1 & RQ2).

Message modalities diversify the effects of emotional appeals on user engagement. As an interactive multimodal platform, emotions in TikTok videos are utilized in various message modalities to persuade audiences. Thus, to understand how discrete emotions are utilized in different message modalities and generate different levels of user engagement, we examined (1) emotions used in the video captions, 2) emotions used in video transcripts, and (3)

Table 3. Emotion, identity, and engagement with TikTok videos: Results from negative binomial regressions for different modalities, interaction effects.

	Number of shares		*Number of comments*		*Number of likes*	
	β	e^{β}	β	e^{β}	β	e^{β}
Intercept						
	4.94***	139.13	5.15***	172.86	7.98***	2916.76
Human face detected						
	−0.13	0.87	0.16*	1.17	0.01	1.01
Anger						
Thumbnails	0.00	1.00	0.00*	1.00	−0.01***	0.99
Captions	−0.04	0.96	−0.03	0.97	−0.25**	0.78
Transcripts	−0.07	0.94	0.02	1.02	0.00	1.00
Fear						
Thumbnails	0.00	1.00	0.00	1.00	0.00	1.00
Captions	0.17*	1.18	0.09	1.09	0.27***	1.31
Transcripts	0.16***	1.17	0.02	1.03	0.02	1.02
Joy						
Thumbnails	0.00	1.00	0.00	1.00	0.00	1.00
Captions	−0.03	0.97	−0.08	0.92	−0.02	0.98
Transcripts	−0.03	0.97	−0.02	0.98	−0.03	0.97
Conservative Identity						
Captions	−0.08*	0.92	−0.01	0.99	−0.12***	0.88
Transcripts	0.06	1.07	0.10	1.10	0.07	1.07
Liberal Identity						
Captions	0.41**	1.51	0.89***	2.43	1.11***	3.02
Transcripts	−0.35	0.71	1.16*	3.20	1.19*	3.28
Relational Identity						
Captions	−0.54***	0.58	−0.28***	0.75	−0.25***	0.78
Transcripts	−0.04	0.96	0.05	1.05	0.11**	1.12
Vaccine Injured Identity						
Captions	−1.84***	0.16	−2.07***	0.13	−2.38***	0.09
Transcripts	0.06	1.06	0.58**	1.79	0.10	1.11
Conspiracy Identity						
Captions	−0.98***	0.37	−1.13***	0.32	−1.27***	0.05
Transcripts	−0.50**	0.61	−0.59***	0.56	−0.67***	0.51
Partisan Identity						
Captions	0.25***	1.28	0.23***	1.26	0.15***	1.16
Transcripts	−0.44***	0.64	−0.16	0.85	−0.26*	0.77
Affective Polarization						
Partisan identity* anger in video thumbnails	−0.01*	0.99	−0.01*	0.99	−0.01**	0.99
Partisan identity* anger in video captions	−0.30*	0.74	−0.21	0.81	−0.15	0.86
Partisan identity* anger in video transcripts	0.03	1.03	−0.01	0.99	0.00	1.00
Pseudo R squared (conditional)	.66		.56		.70	

N = 6862; *$p < .1$, **$p < .05$, ***$p < .001$.

emotions visualized in video thumbnails. One noteworthy finding is that the same emotion used in different message modalities has contradicting effects on user engagement (Table 2).

Message modalities diversify the effects of emotional cues on user engagement. While there is no association between the use of anger in transcripts and the number of shares, likes, and comments the videos received, a one-unit increase in using anger-related words in the video captions is associated with 24% fewer likes on these videos. Similarly, the impact of fear-related emotions on user engagement is also contingent on the modality of where fear is used. Using fear in thumbnails is not statistically significant for user engagement, yet, using fear in video captions and transcripts increased the number of shares by nearly 20% and the number of likes by 32%. This finding highlights the importance of understanding the role of varying message modalities when examining the effects of emotional appeals in multimodal messages to uncover the heterogeneity in how publics engage with these messages.

Message modalities diversify the effects of identity cues on user engagement. Our regression results (Table 2) also demonstrate contradicting effects of identity cues in different message modalities on user engagement. For example, the use of partisan cues in video captions increases the number of shares by 24% but decreases the number of shares by 34% in transcripts. Because video transcripts represent verbal expressions of TikTok videos, results indicate that identity cues work differently depending on the modality. While identity cues in video captions encourage audiences to share videos, identity cues delivered verbally could backfire and limit the sharing of videos.

Interaction between emotions and identity cues on user engagement based on various message modalities. The regression results that added the interaction effects to capture affective polarization (Table 3) demonstrated that although partisan cues increased user engagement, when anger-related words were combined with partisan cues in TikTok video captions, it decreases the impact of partisan cues on users' sharing of these videos by 26%. The interaction effect between partisan identity cues and the anger-related emotions is not statistically or substantively significant with different types of user engagement when they are used in thumbnails or transcripts. The result was contrary to H4, and therefore H4 was not supported.

Discussion and Conclusion

This paper addresses how emotions and identity cues are utilized in anti-vaccination videos and their impact on audience engagement from a much less understood social media platform, TikTok. By taking a multi-modal approach to examining emotions from visual and textual information in these anti-vax videos, we found that anti-vax videos use fear and trust-related emotions much more frequently compared to other emotions. This echoes literature that exhibits how conspiracy theories utilize fear appeals which foment distrust among social groups (Bale, 2007). We also found that the impact of emotional appeals and identity cues in anti-vax videos on audience engagement is contingent on different message modalities. Our results showed that anger and fear-related appeals delivered in different message modalities could generate different levels of audience engagement. Examining modality brings a new understanding of the relationship between emotional appeals and engagement in misinformation messages, which differs from a traditional emphasis on fear and trust (Bale, 2007). In terms of the use of identity cues, we found that conservative identities were utilized most frequently in the captions of anti-vax videos. This finding

aligns with literature which shows that using outgroup cues increases user engagement on social media (Chen et al., 2020; Rathje et al., 2021). Our findings also extend existing theories, which are elaborated below.

Contributions to Affective Intelligence and Social Identity Theories

Echoing previous research on AIT and social media engagement (e.g., Heiss, 2021), we find that discrete emotions represented in TikTok videos influence distinct social media engagement behaviors. We add to the AIT literature by examining the influence of additional emotions that have been examined minimally in empirical work, such as sadness (Choi et al., 2021), surprise, disgust, and trust. AIT suggests that anger, anxiety, and enthusiasm are likely to increase engagement behaviors online because individuals seek to resolve their highly emotional state by using posting, sharing, liking, as emotional- and problem- coping mechanisms (Heiss, 2021). Our findings also suggest that this may also be true of fear, which increased the number of shares and likes when present in video captions or transcripts. However, the use of positive emotions in these videos is not significantly associated with sharing and commenting, and no discernable change in liking. Therefore, certain emotion cues in videos does make a difference for users and should thus be used strategically for increasing engagement.

Utilizing particular social identities can have a significant impact on distinct engagement behaviors. In line with the previous research on partisan identities, we find that partisan and liberal identity cues in the video captions were most likely to increase likes, shares, and comments. Out-group language, such as liberal language, may increase engagement as people seek to express their discontent with the out-group (Rathje et al., 2021). However, our findings suggest that the presence of partisan identity cues and negative emotions might backfire on engagement. Our findings show that affective polarization may decrease engagement on social media, contrary to previous work (e.g., Rathje et al., 2021).

Different from most literature in political and science communication that focuses on studying polarization of science through partisan identity cues (e.g., Hart et al., 2020), our paper highlights that when it comes to studying wicked issues related to science (e.g., vaccination), it is vital to uncover other types of identity cues to understand how these wicked issues are communicated on digital platforms. For instance, the conservative, relational, vaccine injury, and conspiracy identities are all important identities in the anti-vaccination narratives on TikTok. While these identities were linked to significant decreases in likes, shares, comments, and views, their obvious presence on TikTok is important in understanding of the multidimensionality of social identity discourses in the anti-vaccination movement.

Importance of Multi-Modality in Studying Video as Data

Our paper joins a small but growing scholarship that investigates the role of message modalities in studying video as data in the digital age. Although scholars in computer-mediated communication increasingly focus on the role of message modalities on user engagement, the differential effects of modalities are less understood (Basch et al., 2021). The integrated framework of multimodal frame processing postulates the importance of understanding how audiences process messages differently when delivered in various

modalities (Geise & Baden, 2015). This framework is useful in the current digital environment since many interactive multimodal platforms carry diverse communication modes (Herring, 2015).

While AIT and social identity theories explicate how discrete emotions and social identities influence social media engagement, studies utilizing AIT and social identity theories mainly examine how emotions and social identity cues endorse social media engagement in text-based communication. By examining how emotions and identities are displayed in different message modalities in TikTok videos endorsing different levels of engagement, our study advances AIT and social identity theories by incorporating multimodal frame processing.For instance, our results showed that the effect of anger appeals on audience engagement is contingent on different message modalities, which extends existing scholarship that demonstrates anger appeals in ads lead to more user engagement (Vargo & Hopp, 2020). We found that anger appeals in video transcripts are not associated with more audience engagement. However, anger appeals in video thumbnails and captions are associated with fewer comments and likes. This differing pattern on the role of emotion on user engagement by various modalities offers new knowledge about user behaviors on digital platforms. Also, we found that while use of certain identity cues (e.g., partisan cues) in video captions endorse audiences to share and like videos, these identity cues in videos manifested in transcripts could backfire and restrain the sharing of videos.

Our paper also provides a methodological contribution to applying computational social science in (political) communication studies. With misinformation spreading on social media in multimodal formats (Peng et al., 2023), it is critical for future research to evaluate how computational methods might complement human labors as content analysis often goes beyond the newspaper or social media text dataset our field has studied. Moreover, topics such as misinformation bring emotional costs to human coders (Steiger et al., 2021). Our paper offers a starting point for validating a variety of computational tools in multimodality analysis, from investigating how dataset collected from third-party vendors represent the whole universe of the platform content, to demonstrating the validity of facial emotion detection tools compared to human coders, to validating the accuracy of various automated speech recognition systems including the recent OpenAI Whisper.

Generalizability of Our Findings and Future Work

This paper has examined how emotion and identity cues in various modalities affect user engagement with anti-vax videos. We highlight how our findings become generalizable and suggest potential future work. First, this paper focused on English-speaking videos. As anti-vax movements are global, it will be fruitful for future work to examine how our findings might hold true in other non-English speaking anti-vax videos. As a first step, we examined emotional appeals and identity cues in German and French-speaking videos delivered in different message modalities (see Supplemental Material Appendix 6).

Also, while Southwick et al. (2021) demonstrated that most videos related to COVID-19 vaccines use humor to evoke positive emotions from audiences including both pro-vax and anti-vax videos on TikTok, our study found that for anti-vaccination videos, fear appeals stood out in thumbnails, captions, and transcripts. Lewis and Grantham (2022) classified #CovidVaccine content on TikTok by pro-vax, anti-vax, and neutral videos and found that while pro-vax and neutral videos mostly

utilized humor to persuade audiences, anti-vax videos projected a mix of rants and sarcasm and used appeals that provoke anxiety from audiences. Our study took an additional step to understand how emotional appeals in TikTok anti-vax videos are delivered in various modalities to persuade audiences.

Third, this paper examines the case of TikTok to study the anti-vax topic because it is a platform used by many parental groups and young audiences in communicating science and health issues, which are understudied yet crucial in political and science communication. TikTok, compared to other digital platforms, is unique in terms of not only its audience base that is largely between 18 to 25 years old (Dean, 2022) but also its short and entertainment-centered video format. This could be why we observed the rise of parental and more generally relational narratives on this platform in addition to partisan identity cues. It will be fruitful for future research to compare the frequency of emotion and identity cues on other platforms such as YouTube to uncover how these attitudinal and sentiment-based cues are used in different modalities to communicate hesitancy arguments, misinformation, and conspiracy theories.

Because TikTok is an entertainment-centered video platform unique to other social media, TikTok anti-vaccination videos often project satirical humor to persuade or entertain audiences (Lewis & Grantham, 2022). Therefore, it will be important in the future to capture how videos construct satire by utilizing various emotional cues in different message modalities.

Finally, like other digital platforms, TikTok also uses black-box algorithms that challenge researchers to untangle the algorithmic influence on user engagement from the constructs researchers aim to study (Freiling et al., 2021). The role of bots and deepfakes on these video-oriented platforms is also largely unknown, which opens exciting future venues for studying misinformation across digital spaces.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

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Data Availability Statement

Our anonymized dataset and the analysis scripts are deposited at https://doi.org/10.7910/DVN/U6FIQW. We also included an instruction Read Me document about how to reproduce our findings.

Open scholarship

This article has earned the Center for Open Science badge for Open Data. The data are openly accessible at re3data.org

References

Alhabash, S., Almutairi, N., Lou, C., & Kim, W. (2019). Pathways to virality: Psychophysiological responses preceding likes, shares, comments, and status updates on Facebook. *Media Psychology*, *22*(2), 196–216. https://doi.org/10.1080/15213269.2017.1416296

Bale, J. M. (2007). Political paranoia *v*. political realism: On distinguishing between bogus conspiracy theories and genuine conspiratorial politics. *Patterns of Prejudice*, *41*(1), 45–60. https://doi.org/10.1080/00313220601118751

Barrett, L. F., Mesquita, B., Ochsner, K. N., & Gross, J. J. (2007). The experience of emotion. *Annual Review of Psychology*, *58*(1), 373–403. https://doi.org/10.1146/annurev.psych.58.110405.085709

Basch, C. H., Meleo-Erwin, Z., Fera, J., Jaime, C., & Basch, C. E. (2021). A global pandemic in the time of viral memes: COVID-19 vaccine misinformation and disinformation on TikTok. *Human Vaccines & Immunotherapeutics*, *17*(8), 2373–2377. https://doi.org/10.1080/21645515.2021.1894896

Benson, P. (2016). *The discourse of YouTube*: Multimodal text in a global context. Routledge.

Berger, J., & Milkman, K. L. (2012). What makes online content viral? *Journal of Marketing Research*, *49*(2), 192–205. https://doi.org/10.1509/jmr.10.0353

Bode, L. (2017). Gateway political behaviors: The frequency and consequences of low-cost political engagement on social media. *Social Media+ Society*, *3*(4), 2056305117743349. https://doi.org/10.1177/2056305117743349

Brady, W. J., Wills, J. A., Jost, J. T., Tucker, J. A., & Van Bavel, J. J. (2017). Emotion shapes the diffusion of moralized content in social networks. *Proceedings of the National Academy of Sciences*, *114*(28), 7313–7318. https://doi.org/10.1073/pnas.1618923114

Center for an Informed Public, Digital Forensic Research Lab, Graphika, & Stanford Internet Observatory. (2021). The long fuse: Misinformation and the 2020 election. *Stanford Digital Repository: Election Integrity Partnership. v1.3.0*

Chen, K., Chen, A., Zhang, J., Meng, J., & Shen, C. (2020). Conspiracy and debunking narratives about COVID-19 origin on Chinese social media: How it started and who is to blame. *Harvard Kennedy School (HKS) Misinformation Review*. https://doi.org/10.37016/mr-2020-50

Chen, K., Jin, Y., & Shao, A. (2022). Science factionalism: How group identity language affects public engagement with misinformation and debunking narratives on a popular Q&A platform in China. *Social Media + Society*, *8*(1), 20563051221077019. https://doi.org/10.1177/205630512210770

Choi, J., Lee, S. Y., & Ji, S. W. (2021). Engagement in emotional news on social media: Intensity and type of emotions. *Journalism & Mass Communication Quarterly*, *98*(4), 1017–1040. https://doi.org/10.1177/1077699020959718

Coronel, J. C., Moore, R. C., & deBuys, B. (2021). Do gender cues from images supersede partisan cues conveyed via text? Eye movements reveal political stereotyping in multimodal information environments. *Political Communication*, *38*(3), 281–304. https://doi.org/10.1080/10584609.2020.1763530

Dean, B. (2022). *TikTok user statistics*. BackLinko.
de León, E., & Trilling, D. (2021). A sadness bias in political news sharing? The role of discrete emotions in the engagement and dissemination of political news on Facebook. *Social Media+ Society*, *7*(4), 20563051211059710. https://doi.org/10.1177/20563051211059710
Dukes, D., Abrams, K., Adolphs, R., Ahmed, M. E., Beatty, A., Berridge, K. C., … Sander, D. (2021). The rise of affectivism. *Nature Human Behaviour*, *5*(7), 816–820. https://doi.org/10.1038/s41562-021-01130-8
Freiling, I., Krause, N. M., Scheufele, D. A., & Brossard, D. (2021). Believing and sharing misinformation, fact-checks, and accurate information on social media: The role of anxiety during COVID-19. *New Media & Society*, *25*(1), 141–162. https://doi.org/10.1177/14614448211011451
Frenkel, S., Decker, B., & Alba, D. (May 21, 2020). How the 'Plandemic' movie and its falsehoods spread widely online. *The New York Times*.
Funtowicz, S. O., & Ravetz, J. R. (1993). Science for the post-normal age. *Futures*, *25*(7), 739–755. https://doi.org/10.1016/0016-3287(93)90022-L
Geise, S., & Baden, C. (2015). Putting the image back into the frame: Modeling the linkage between visual communication and frame-processing theory. *Communication Theory*, *25*(1), 46–69. https://doi.org/10.1111/comt.12048
Germani, F., Biller-Andorno, N., & Lavorgna, L. (2021). The anti-vaccination infodemic on social media: A behavioral analysis. *PloS One*, *16*(3), e0247642. https://doi.org/10.1371/journal.pone.0247642
Goldberg, M. H., Gustafson, A., Ballew, M. T., Rosenthal, S. A., & Leiserowitz, A. (2019). A social identity approach to engaging Christians in the issue of climate change. *Science: Advanced Materials and Devices*, *41*(4), 442–463. https://doi.org/10.1177/1075547019860847
Grierson, J., Milmo, D., & Farah, H. (2021, October 8). Revealed: Anti-vaccine TikTok videos being viewed by children as young as nine. *The Guardian*, https://www.theguardian.com/technology/2021/oct/08/revealed-anti-vaccine-tiktok-videos-viewed-children-as-young-as-nine-covid
Hart, P. S., Chinn, S., & Soroka, S. (2020). Politicization and polarization in COVID-19 news coverage. *Science Communication*, *42*(5), 679–697. https://doi.org/10.1177/1075547020950735
Hautea, S., Parks, P., Takahashi, B., & Zeng, J. (2021). Showing they care (or don't): Affective publics and ambivalent climate activism on TikTok. *Social Media+ Society*, *7*(2), 20563051211012344. https://doi.org/10.1177/20563051211012344
Heiss, R. (2021). The affective foundation of political opinion expression on social media: A panel analysis. *International Journal of Public Opinion Research*, *33*(1), 57–75. https://doi.org/10.1093/ijpor/edaa009
Herring, S. C. (2015). New frontiers in interactive multimodal communication. In A. Georgopoulou & T. Spilloti (Eds.), *The Routledge handbook of language and digital communication* (pp. 412–416). Routledge.
Iyengar, S., Lelkes, Y., Levendusky, M., Malhotra, N., & Westwood, S. J. (2019). The origins and consequences of affective polarization in the United States. *Annual Review of Political Science*, *22*(1), 129–146. https://doi.org/10.1146/annurev-polisci-051117-073034
Jolley, D., Douglas, K. M., & Tripp, R. (2014). The effects of anti-vaccine conspiracy theories on vaccination intentions. *PloS One*, *9*(2), e89177. https://doi.org/10.1371/journal.pone.0089177
Kahan, D. M., Braman, D., Gastil, J., Slovic, P., & Mertz, C. K. (2007). Culture and identity protective cognition: Explaining the white-male effect in risk perception. *Journal of Empirical Legal Studies*, *4*(3), 465–505. https://doi.org/10.1111/j.1740-1461.2007.00097.x
Koenecke, A., Nam, A., Lake, E., Nudell, J., Quartey, M., Mengesha, Z., Toups, C., Rickford, J. R., Jurafsky, D., & Goel, S. (2020). Racial disparities in automated speech recognition. *Proceedings of the National Academy of Sciences*, 117(14), 7684–7689.
Lane, D. S., Do, K., & Molina-Rogers, N. (2022). Testing inequality and identity accounts of racial gaps in political expression on social media. *Political Communication*, *39*(1), 79–97. https://doi.org/10.1080/10584609.2021.1919808
Lewis, M., & Grantham, S. (2022). From fork hands to microchips: An analysis of trending #CovidVaccine content on TikTok. *International Journal of Communication*, *16*, 4337–4360.

Li, J., & Su, M. H. (2020). Real talk about fake news: Identity language and disconnected networks of the US public's "fake news" discourse on Twitter. *Social Media + Society*, *6*(2), 2056305120916841. https://doi.org/10.1177/2056305120916841

Maciuszek, J., Polak, M., Stasiuk, K., Doliński, D., & Jonason, P. K. (2021). Active pro-vaccine and anti-vaccine groups: Their group identities and attitudes toward science. *PloS One*, *16*(12), e0261648. https://doi.org/10.1371/journal.pone.0261648

Marcus, G. E., Neuman, W. R., & MacKuen, M. (2000). *Affective intelligence and political judgment*. University of Chicago Press.

Mitchell, A., & Liedke, J. (2021, August 24). *About four-in-ten Americans say social media is an important way of following COVID-19 vaccine news*. Pew Research Center.

Muric, G., Wu, Y., & Ferrara, E. (2021). COVID-19 vaccine hesitancy on social media: Building a public Twitter data set of antivaccine content, vaccine misinformation, and conspiracies. *JMIR Public Health and Surveillance*, *7*(11), e30642. https://doi.org/10.2196/30642

Nabi, R. L. (2003). Exploring the framing effects of emotion: Do discrete emotions differentially influence information accessibility, information seeking, and policy preference? *Communication Research*, *30*(2), 224–247. https://doi.org/10.1177/0093650202250881

Peng, Y., Lu, Y., & Shen, C. (2023). An agenda for studying credibility perceptions of visual misinformation. *Political Communication*, *40*(2), 225–237. https://doi.org/10.1080/10584609.2023.2175398

Rathje, S., Van Bavel, J. J., & van der Linden, S. (2021). Out-group animosity drives engagement on social media. *Proceedings of the National Academy of Sciences*, *118*(26). https://doi.org/10.1073/pnas.2024292118

Sluss, D. M., & Ashforth, B. E. (2007). Relational identity and identification: Defining ourselves through work relationships. *Academy of Management Review*, *32*(1), 9–32. https://doi.org/10.5465/amr.2007.23463672

Southwick, L., Guntuku, S. C., Klinger, E. V., Seltzer, E., McCalpin, H. J., & Merchant, R. M. (2021). Characterizing COVID-19 content posted to TikTok: Public sentiment and response during the first phase of the COVID-19 pandemic. *Journal of Adolescent Health*, *69*(2), 234–241. https://doi.org/10.1016/j.jadohealth.2021.05.010

Stecula, D. A., & Pickup, M. (2021). Social media, cognitive reflection, and conspiracy beliefs. *Frontiers in Political Science*, *3*, 62. https://doi.org/10.3389/fpos.2021.647957

Steiger, M., Bharucha, T. J., Venkatagiri, S., Riedl, M. J., & Lease, M. (2021, May). The psychological well-being of content moderators: The emotional labor of commercial moderation and avenues for improving support. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (pp. 1–14). https://doi.org/10.1145/3411764.3445092

Swani, K., & Labrecque, L. I. (2020). Like, comment, or share? Self-presentation vs. brand relationships as drivers of social media engagement choices. *Marketing Letters*, *31*(2–3), 279–298. https://doi.org/10.1007/s11002-020-09518-8

Tajfel, H. (1981). *Human groups and social categories: Studies in social psychology*. Cambridge University Press.

Vargo, C. J., & Hopp, T. (2020). Fear, anger, and political advertisement engagement: A computational case study of Russian-linked Facebook and Instagram content. *Journalism & Mass Communication Quarterly*, *97*(3), 743–761. https://doi.org/10.1177/1077699020911884

Wang, V. H. C., Silver, D., & Pagán, J. A. (2022). Generational differences in beliefs about COVID-19 vaccines. *Preventive Medicine*, *157*, 107005. https://doi.org/10.1016/j.ypmed.2022.107005

Zadrozny, B., & Nadi, A. (2019, September). How anti-vaxxers target grieving moms and turn them into crusaders against vaccines. *NBC News*.

Zeng, C. (2021). A relational identity-based solution to group polarization: Can priming parental identity reduce the partisan gap in attitudes toward the COVID-19 pandemic. *Science Communication*, *43*(6), 687–718. https://doi.org/10.1177/10755470211036676

Zhao, K., Zhou, L., & Zhao, X. (2022). Multi-modal emotion expression and online charity crowdfunding success. *Decision Support Systems*, *163*, 113842. https://doi.org/10.1016/j.dss.2022.113842