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Influences of Mediated Information on Vaccination Decision-making and Implications for Overcoming Misinformation

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Manuscript text

The State of the World's Children 2023 report suggests that parents' dependence on media and online sources of information contributes to lower trust in vaccines and gaps in childhood vaccination coverage globally (UNICEF, 2023). In this journal's special issue, Perreault and Foss present findings from a national survey of American parents on the impact of news consumption patterns and information sources on their decision to accept COVID-19 vaccines for their children (Perreault et al., 2023). The study findings show that, compared to parents who are unwilling to accept COVID-19 vaccines for their children, those willing to vaccinate are more likely to rely on multiple news sources for information. Study findings also show lower trust in media outlets among parents who are unwilling to accept COVID-19 vaccines for their children. These findings underscore the importance of understanding mechanisms through which media and online sources of information support vaccination decisions and identifying alternative avenues to reach vaccine-hesitant parents who may dismiss traditional media sources. In this commentary, we review relevant considerations in addressing these challenges and reaching vaccine-hesitant parents effectively for future vaccination efforts.

Vaccination decision-making – a complex cognitive process

Vaccination decision-making is a complex cognitive process that involves evaluating trade-offs between the risk of disease and the benefits of vaccination. Vaccination decisions are shaped heavily by contextual influences such as social circles, political figures, historical events, experiences with racism, cultural practices, and religion. Narratives and social norms around vaccination derived from these contextual sources are often shared via media and online sources. However, the coverage of this information is not always balanced. Imbalance and partisanship in the

presentation of information due to beliefs in divergent narratives and norms are termed “media slant”. Several studies have examined the impact of media slant on beliefs towards, and uptake of preventive behaviors, including vaccination. Romer et al. found that conservative media exposure may be associated with conspiracy beliefs more than mainstream media exposure (Romer et al., 2021). However, when Choi et al. examined polarization and media consumption, they found a greater frequency of media consumption rather than media slant to be associated with higher compliance with COVID-19 prevention behaviors like social distancing and masking (Choi et al., 2022). Further research into whether increased media consumption is tied to accessing a diverse range of media and online sources, or sources that promote positive views on vaccination, could elucidate the role of media consumption in shaping vaccination behaviors.

Moreover, it's essential to recognize distinctions in the impact of traditional news versus social media on decision-making. For example, studies have highlighted associations between excessive use of social media and poor cognitive decision-making regarding risks (Meshi et al., 2019), along with increased impulsivity in decision-making (Delaney et al., 2018). Social media and other online information channels have the potential to amplify risks and ensure the longevity of discourse that discourages vaccinations (Larson et al., 2022; Johnson et al., 2020). Trust in online sources of information, rather than specific content, may play a pivotal role in motivating vaccination in some cases; trust-related sentiments were the dominant category identified in sentiment analysis of Tweets (Lyu et al., 2021). Understanding variations in the impact of social media compared to traditional news media is crucial for tailoring vaccine communication through these respective channels.

Exposure to misinformation and vaccine hesitancy

Although parents overwhelmingly cite health providers as the most trusted source of health information, constraints like limited appointment time, provider shortages, and conflicting priorities during appointments often force parents with questions or concerns about vaccines to seek information from alternative sources. With the ubiquity of internet access, online news and social media serve as immediate information sources for most families. An inevitable consequence of accessing media and online sources is the exposure to vaccine misinformation (Neely et al., 2022). Southwell and colleagues define scientific misinformation as “publicly

available information that is misleading or deceptive relative to the best available scientific evidence and that runs contrary to statements by actors or institutions who adhere to scientific principles” (Southwell et al., 2022). Various studies have documented a correlation between exposure to online misinformation and vaccine hesitancy (Neely et al., 2022). For example, Loomba et al. measured a definitive reduction in vaccination intention, particularly among older age groups in the United States (U.S.), in response to exposure to misinformation (Loomba et al., 2020). Additionally, Bok et al. developed a COVID-19 vaccine misinformation scale (CVMS) and showed an association between higher scores on this scale to greater vaccine hesitancy (Bok et al., 2023). However, the coincidence of exposure and misperceptions does not necessarily imply a direct causal relationship. Understanding ways to identify and mitigate exposure to misinformation needs further exploration by researchers.

Individuals seeking alternatives to mainstream media (e.g., television news) may, in general, be more susceptible to misinformation. The potential influence of misinformation through digital and social media platforms has been recognized as a factor affecting vaccine acceptance (Wilson et al., 2020). In 2020, the World Health Organization declared the existence of a global "infodemic" to signify the rapid spread of misinformation across online media (Zarocostas, 2020). Addressing vaccine misinformation is challenging because it often proliferates within echo chambers or opinion bubbles, where information that aligns with individuals' perspectives circulates. Hwang et al. demonstrated that both positive and negative discourse on Twitter occurred among different groups of people and focused on divergent topics suggesting segmentation of audiences (Hwang et al., 2022). Analyzing vaccine sentiments on social media, Kang et al. found that positive discourse focused on evaluating vaccine risks and benefits, whereas negative discourse was more scattered and centered on distrust of entities behind vaccination (Kang et al., 2017).

Echo chambers are exacerbated by the influence of targeted advertising and personalized content, as it directs individuals towards information that primarily strengthens their existing preferences and perspectives, rather than presenting a diverse range of information (Wang et al., 2022). This phenomenon is evident on certain social media platforms, where users may be presented with content recommendations tailored to their beliefs or concerns (Wang et al., 2022). Confirmation bias exacerbates this effect by compelling individuals to actively seek out

information that aligns with their preexisting views. In a study investigating the exposure to misinformation about COVID-19 vaccines and its impact on vaccination intention, researchers discovered that various factors, such as available information, prevailing attitudes toward vaccines, and the perceived risk of contracting the disease, can influence public willingness to be vaccinated (Loomba et al., 2020). Individuals who preferred to wait until others had received the vaccine were more inclined to opt not to be vaccinated. Exposure to misinformation reduces the likelihood of someone getting vaccinated and is also associated with decreased motivation to receive vaccination for the benefit of others (Loomba et al., 2020).

Misinformation can have lasting impacts, as it has the potential to become deeply entrenched in the public's consciousness and long-term memory. Continuous exposure to misinformation can trigger a phenomenon referred to as the "illusory truth effect," influencing individuals' beliefs and attitudes that are resistant to altering views, even when accurate information is later presented (van der Linden, 2022). Thus, effectively combating misinformation requires providing accurate information and addressing and rectifying false narratives that may have taken root in individuals' minds. Ongoing efforts are focused on developing a taxonomy of vaccine concerns as a foundation for more sophisticated machine-learning interventions aimed at annotating online vaccine misinformation (Stureborg et al., 2023).

Changing media landscape and use patterns during the COVID-19 pandemic

During the COVID-19 pandemic, global media played a pivotal role in shaping the public's perception regarding the COVID-19 vaccine and associated public health measures. Many media sources observed a surge in interest from their audience, along with increased viewership and online subscription purchases during the early phase of the pandemic (Deloitte, 2020). However, media reporting during the pandemic has not been without criticism. Mach et al. suggested that during the early stages of the COVID-19 pandemic, media coverage often lacked scientific evidence and evidence-based reporting, leading to the dissemination of incomplete or inaccurate information to the public (Mach et al., 2021). According to a survey conducted by the Pew Research Center, a substantial number of Americans recognized the role of the media in fulfilling its responsibility during the pandemic. However, this sentiment

was mostly shared by Democrats, who tend to place greater trust in the news compared to Republicans (Gottfried, 2020).

Despite being ranked as one of the countries best prepared to manage a pandemic like COVID-19 before its outbreak, the U.S. witnessed a significant surge in cases and deaths, ranking among the highest impacted globally (Mach et al., 2021; World Health Organization, 2023). Political partisanship in vaccination discourse influenced individuals' outlooks and behaviors regarding wide-ranging COVID-19 preventive measures including mask-wearing, physical distancing, and vaccination (Gupta et al., 2022). Surveys conducted by the Kaiser Family Foundation revealed a stark contrast in COVID-19 vaccination rates among Democrats and Republicans in the U.S. Democrats were likely to report vaccination, whereas Republicans expressed a stronger tendency toward not wanting to receive the COVID-19 vaccine (Hamel et al., 2020; Larson et al., 2022). Future vaccination campaigns must address the consequences of the politicization of the COVID-19 response in the U.S. and work to prevent further polarization of public health measures based on political affiliations.

Changes in media use in the post-COVID era and implications for future vaccination promotion campaigns

Trust in and consumption of traditional media increased during the pandemic. However, recent polls indicate a decline in consumption and waning trust, albeit still higher than pre-pandemic levels (Newman, 2022). While the proportion of people relying on social media sources has remained steady, the percentage of people using other news sources such as print media, TV or no source has declined (Newman, 2022). Confidence in journalists varies by partisan affiliations, and American consumers expressed satisfaction with the information they received, despite partisanship in media coverage of COVID-19 (Gottfried, 2020). Amid challenges with trust in media and online sources, detecting misinformation has become increasingly difficult. Entities spreading mis- and disinformation employ advanced technology, including artificial intelligence, to manipulate all modes of information including voice, text, images, and videos. Although fact-checking is a common approach used to combat online misinformation, and there is evidence supporting that it can correct misperceptions, relying solely on fact-checking is insufficient to address the volume of misinformation generated online daily. In the context of vaccines, such fact-checking or debunking interventions may be

counterproductive, and even reduce the intention to get vaccinated (Nyhan et al., 2014; Nyhan et al., 2015; Meszaros et al., 1996).

Misinformation may have specific characteristics (e.g., topics, sentiments, sources) that may alert readers of potential exposure (Gupta et al., 2022). Recent efforts have focused on educating consumers of news and online media to spot misinformation, a strategy referred to as 'pre-bunking' or 'inoculation'. This approach aims to increase media literacy and vigilance among consumers. There are widespread efforts to test the impact of pre-bunking on platforms such as YouTube (Lewsey, n.d.). Large social media platforms include content-based alerts indicating potential exposure to misinformation (Arnold et al., 2021). However, the effectiveness of such alerts in reducing the spread of misinformation is mixed and may be platform-dependent (Arnold et al., 2021). Additionally, the impact of such alerts on health behaviors, such as vaccine uptake, is poorly studied.

Successes and failures from the rollout of COVID-19 vaccines can offer valuable insights for future vaccination campaigns. The pervasive and severe impact of the pandemic, along with the early preventive measures, generated societal interest in strategies to combat the pandemic, including the development of new COVID-19 vaccines. This led to intense and round-the-clock media and online coverage, emphasizing every minute of the vaccine development and testing process, often to the detriment of public understanding and trust in the process. The evolving nature of the pandemic and responding policies created confusion, especially since the impact of the pandemic and policies were uneven across the various states in the U.S. Effective approaches anecdotally involving local communities and trusted leaders in disseminating rapidly evolving information could be beneficial for future vaccination campaigns.

The rollout of social listening interventions such as the World Health Organization's Early AI-supported Response with Social Listening (EARS) platform emerged to monitor and respond to circulating misinformation narratives (WHO-EARS, n.d.). In the United States, the Surgeon General's Advisory on Building a Health Information Environment strives to educate the general public about online misinformation and provide tools to mitigate negative impacts (Health and Human Services, n.d.). Among these resources is a Community Toolkit for Addressing Health Misinformation which provides information, checklists, and advisories for use by families and communities (Health and Human

Services, 2021). However, greater accountability among media and online sources of information is necessary to fully combat online misinformation. Any accountability measures must balance notions of freedom, ethics, transparency, and credibility in online discourse, and such balance may be intractable to achieve in practice. Yet, instilling trust in journalism during future health crises will require impartial and accurate reporting, bridging social divides, and ensuring public access to accurate and evidence-based information.

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