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Don't talk to strangers? The role of network composition, WhatsApp groups, and partisanship in explaining beliefs in misinformation about COVID-19 in Brazil

Patrícia Rossini  and Antonis Kalogeropoulos

ABSTRACT

The spread of disinformation has been a topic of heightened concern, particularly during the COVID-19 pandemic, as the response to a public health crisis relies on the ability for public officials to inform citizens. Using a representative two-wave panel of internet users in Brazil, we examine the relationship between pathways to information, WhatsApp use, and the persistence of misinformed beliefs about the pandemic. We find a strong relationship between presidential support, right-wing news sources, and participating in WhatsApp groups with strangers, and becoming more misinformed over time. Conversely, most media diets (traditional news media, social media and WhatsApp for news) had no effect. However, Bolsonaro supporters, using WhatsApp and Facebook for news was strongly associated with increasing and persistent misinformation. Our findings provide further evidence that political leaders undermine a country's ability to respond to a pandemic insofar as they breed mistrust in other institutions by instrumentalizing public health measures to win political fights.

KEYWORDS



Misinformation; disinformation; news use; WhatsApp; social media; COVID-19


The spread of mis- and disinformation on social media has been the focus of scholarly attention in the past few years, primarily motivated by a series of political events, from the Brexit referendum in the UK to recent electoral cycles in the US, Brazil, UK, and India (Badrinathan, 2021; Guess, Nagler, & Tucker, 2019; Machado, Kira, Narayanan, Kollanyi, & Howard, 2019; Vaccari, Chadwick, & Kaiser, 2022). Amidst societal concerns around the amount of false information social media users are exposed to (Guess, Nagler, & Tucker, 2019), the challenges in correcting misinformed beliefs (Bode & Vraga, 2015), and the role of politically motivated disinformation campaigns in spreading falsehoods (Wooley & Howard, 2018), the COVID-19 pandemic contributed to shifting concerns about misinformation from politics to health and well-being, inspiring a prolific research agenda (Chen, Chen, Zhang, Meng, & Shen, 2020; Motta, Stecula, & Farhart, 2020; Stecula & Pickup, 2021). The World Health Organization repeatedly warned about the danger of misleading content circulating about the pandemic, and the spread of false, inaccurate, or completely made-up claims on social media and messaging applications posed

a challenge to governments' and health authorities' ability to inform the public and harness support for the public health measures needed to curb the spread of the virus (Enders, Uscinski, Klofstad, & Stoler, 2020). This is particularly concerning because the restrictions to public life have led to a surge in the search for news and information online (Van Aelst et al., 2021), increasing the likelihood of being exposed to false or misleading information about COVID-19.

Social media platforms took proactive measures to pre-bunk, moderate, and exclude falsehoods about the pandemic (Krishnan, Gu, Tromble, & Abrams, 2021). However, in countries such as Brazil, people are increasingly turning to private mobile messaging applications like WhatsApp to get information and to talk about the news (Newman, Fletcher, Schulz, Andi, & Nielsen, 2020), raising concerns about the quality and reliability of the information that circulates on the platform given the limitations of content moderation in encrypted spaces (Resende et al., 2019).

In countries where political polarization has shaped public responses to COVID-19, beliefs in misinformation may also be influenced by

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ideology. In Brazil, governors in several states clashed with the Federal Government over actions to address the pandemic, and former president Jair Bolsonaro downplayed the risks of the virus and promoted solutions that had no scientific support (Ricard & Medeiros, 2020). Emerging research suggests that the politicization of the pandemic has detrimental effects on the public. In the US, scholars found that Republicans and those who approve of former president Trump were more likely to believe in conspiracies about the virus and to be less compliant with public health guidelines (Enders, Uscinski, Klofstad, & Stoler, 2020; Jamieson & Albarracin, 2020; Uscinski et al., 2020).

In this context, this study investigates the antecedents of beliefs in COVID-19 misinformation and the predictors of increased beliefs in such falsehoods over time, leveraging a two-wave online panel survey ($N_{W2} = 1,378$) in Brazil. We find that using alternative news sites, participating in WhatsApp groups with weak or non-existing ties, and being a Bolsonaro supporter are significant predictors of holding misinformed beliefs about COVID-19, in general, as well as of becoming more misinformed over time. Surprisingly, using traditional news outlets, social media, or WhatsApp for news had no significant effects on holding misinformed beliefs across our whole sample. However, we found that for Bolsonaro supporters, WhatsApp and social media news use could lead to more detrimental outcomes over time, highlighting the importance that ties and algorithmic amplification of specific types of content have in these platforms. These results suggest that the polarized response to the pandemic in Brazil contributed to confusing – and ultimately misinforming – the population.

Pathways to COVID-19 (mis)information: news, social media & messaging apps

The coronavirus pandemic has intensified scholarship around the role of social media in the spread of conspiracy theories and misinformation (Bridgman et al., 2020; Chen, Chen, Zhang, Meng, & Shen, 2020; Enders, Uscinski, Klofstad, & Stoler, 2020). Several studies have highlighted a high prevalence of beliefs in conspiracies about COVID-19 in the United States, reaching between

30% and 50% of the population (Bridgman et al., 2020; Jamieson & Albarracin, 2020; Motta, Stecula, & Farhart, 2020; Stecula & Pickup, 2021; Uscinski et al., 2020). Among the causes of holding conspiracy beliefs, scholars have highlighted the role of ideological and partisan predispositions (Jamieson & Albarracin, 2020; Uscinski et al., 2020), and populist attitudes (Stecula & Pickup, 2021).

Considering the news media's centrality in informing the public in contemporary democracies (e.g. Carpini & Keeter, 1993), research also considered the role of the news media in informing the public during the COVID-19 pandemic (Van Aelst et al., 2021). With regards to misinformation and knowledge about the pandemic, findings are mixed: while some scholars have found a positive association between broadcast and cable news use and knowledge about COVID-19 (Jamieson & Albarracin, 2020), others found no evidence that the use of mainstream news media can mitigate beliefs in misinformation about COVID-19 (Motta, Stecula, & Farhart, 2020). Recent evidence from a comparative panel study in Brazil, India, and the UK suggests a more positive outlook, with news use being, in some cases, associated with greater awareness of misinformation about COVID-19, and with weakened beliefs in falsehoods – contingent on the use of particular outlets and modality (online, offline) (Altay, Nielsen, & Fletcher, 2023). Their study also finds that, over time, news use is associated with political knowledge, arguing that, ultimately, news can help mitigate misinformation.

Mixed findings about the role of mainstream media, knowledge, and misinformation are not particular to the pandemic. Moreover, it is important to highlight that most studies of COVID-19 and media diets were based on cross-sectional survey data at the beginning of the pandemic, in 2020, which may have affected findings insofar as knowledge is developing rapidly. With the exception of Altay, Nielsen, and Fletcher (2023), there is little evidence of the incremental effects of news use on misinformation. Considering the long-established relationship between news use and political knowledge (de Vreese & Boomgaarden, 2006; Moeller & de Vreese, 2019), we investigate the impact of traditional news use in mitigating misinformation, hypothesizing that, over time, people who consume

traditional news outlets more frequently will become less misinformed about COVID-19.

H1 *Traditional news use will be negatively correlated with holding misinformed beliefs about COVID-19 over time.*

In addition to traditional news use, the rise of partisan news sources has the potential to affect how people get news about the pandemic. Research has found a strong association between the consumption of conservative media outlets and holding conspiratorial beliefs about COVID-19 in the US (Stecula & Pickup, 2021), which may be associated with the role that such outlets played in spreading misinformation about the pandemic (Motta, Stecula, & Farhart, 2020). Based on these findings, we hypothesize that partisan sources will lead to increases in misinformed beliefs over time.

H2 *People who use partisan online sources will be more likely to hold misinformed beliefs about COVID-19 over time.*

Traditional news use is declining in many countries – something that can be partially attributed to the rise of more complex digital media diets that include social media (Newman, Fletcher, Schulz, Andi, & Nielsen, 2020). As a result of the changes in the information environment, there has been a plethora of studies investigating the role of social media in the spread of false information (Guess, Nagler, & Tucker, 2019; Valenzuela, Halpern, Katz, & Miranda, 2019), as well as the detrimental effects of exposure to, and engagement with, information on social media (Guess, Nagler, & Tucker, 2019; Thorson, 2016; Valenzuela, Halpern, Katz, & Miranda, 2019).

Social media use became particularly prominent during the pandemic (Theocharis et al., 2021; Van Aelst et al., 2021), as restrictions on social life increased the amount of time people spend online (Nielsen et al. 2022). Scholars have investigated the extent to which social media contributes to the circulation of COVID-19 misinformation, including beliefs in falsehoods and conspiracies (Bridgman et al., 2020; Theocharis et al., 2021).

Scholars have also found that websites associated with “low quality” content, compared to traditional news sources, are more likely to share misinformation on Twitter, and such content is itself more likely to be shared by users than high-quality sources (Singh et al., 2020), thus increasing the possibility that social media users would be exposed to low-quality information about the pandemic. In the United States, Jamieson and Albarracin (2020) found a significant relationship between using Facebook, Twitter, or YouTube, and believing in a series of misperceptions about the pandemic. A comparative study of 17 European countries provided further evidence that social media use for news may lead citizens to become misinformed but noted that this was only true for YouTube, Facebook, and messaging services, but not Twitter (Theocharis et al., 2021). These findings bring us to our third hypothesis:

H3 *Using social media for news will be positively associated with holding misinformed beliefs about COVID-19 over time.*

This research agenda has been primarily focused on Twitter and Facebook, but there is emerging evidence that mobile messaging applications are important venues for informal conversations about news and current or political affairs (Gil de Zúñiga, Ardèvol-Abreu, & Casero-Ripollés, 2019; Valeriani & Vaccari, 2018; Vermeer, Kruikemeier, Trilling, & de Vreese, 2020) – as well as sources of misinformation (Resende et al., 2019). WhatsApp is an encrypted private messaging application that allows people to connect with their phone contacts in one-to-one and group chats. The app is the most popular message application in the world, with two billion users in 2020 (WhatsApp, n.d.), and is particularly prominent in the Global South.

Messaging applications are notably different from public or semi-public social media platforms (e.g., Facebook, Twitter). First, there is no news feed, and all communication and information sharing takes place in one-to-one or group chats, primarily with close friends and family members (Karapanos, Teixeira, & Gouveia, 2016). Second, messages are encrypted, meaning that scholars cannot get access to what is shared on the platform and

are unable to reconstruct information-sharing networks (Rossini, 2023). Third, information discovery from reliable sources is limited due to the lack of “public” profiles and pages, and information feeds. Finally, there is no algorithmic filtering or amplification, meaning that users are the only actors responsible for making information circulate among private chats and groups.

These affordances¹ mean that accessing news on WhatsApp is fundamentally different from public social media platforms. They also mean that WhatsApp might provide a fertile ground for misinformation to circulate unchecked: unlike Facebook or Twitter, WhatsApp cannot use content labels or provide additional information about the source to prevent users from believing in false information. While the platform has implemented measures to curb the spread of falsehoods, such as restricting content-forwarding and adding labels to warn users about viral sharing, content is largely unmoderated compared to public social media platforms (Theocharis et al., 2021).

This is particularly relevant in the context of the COVID-19 pandemic. The threats to public health posed by misinformation about the pandemic have led social media companies such as Facebook and Twitter to take measures to curb health-related misinformation, increasing fact-checks and content takedowns of false and misleading information, as well as proactively linking official public health sources to posts about COVID-19 (Krishnan, Gu, Tromble, & Abroms, 2021). But there are important differences in how platforms dealt with misinformation in private apps: while platforms such as Facebook, Twitter, Instagram, and YouTube had explicit rules prohibiting misinformation, the same was not true for WhatsApp and Facebook Messenger (Krishnan, Gu, Tromble, & Abroms, 2021).

Prior research has not investigated the extent to which relying on messaging platforms can affect people’s beliefs in falsehoods. The intense use of WhatsApp for news in Brazil is potentially problematic, as WhatsApp users are frequently exposed to misinformation (First Draft, 2019; Rossini, Stromer-Galley, Baptista, & Oliveira, 2020). The concern with misinformation on WhatsApp has

led the Brazilian Ministry of Health to set up a *hotline* on the app for users to forward dubious information, which was fact-checked and made available on the ministry’s website – but the service was deactivated in July 2020.²

It is relevant to note that an increasing number of news outlets now use WhatsApp as a distribution channel as well as an engagement channel (Boczek & Koppers, 2020), and research has also found that messaging applications provide new venues for journalists to engage with the public – what Kligler-Vilenchik and Tenenboim have described as a *meso news-space* (Kligler-Vilenchik & Tenenboim, 2020). In Brazil, fact-checking agencies also use WhatsApp bots for users to fact-check messages they receive (First Draft, 2019). To our knowledge, there is no publicly available data about how many people subscribe to news channels on WhatsApp, and only a minority of highly engaged users would be expected to participate in such spaces (Kligler-Vilenchik & Tenenboim, 2020). Thus, while scholars have noted an increase in journalistic uses of messaging apps, concerns about the quality and accuracy of the information in the app are similar to those projected on social media platforms, with the added challenge that content-based interventions are not feasible in encrypted environments. Limited research has suggested that there is a positive relationship between using WhatsApp for news and believing in conspiracies about COVID-19 in Europe (Theocharis et al., 2021). Considering the pervasiveness of WhatsApp use among Brazilians, and higher reliance on messaging apps for news compared to many European countries (Newman, Fletcher, Schulz, Andi, & Nielsen, 2020), we hypothesize that relying on WhatsApp for news will likely increase beliefs in misinformation about the pandemic over time.

H4 *Using WhatsApp for news will be positively associated with holding misinformed beliefs about COVID-19 over time.*

Political ideology and misinformation

The response to the coronavirus pandemic has been highly polarized in countries such as the United States and Brazil, where government and opposition have consistently clashed about the correct approach to mitigate the public health threat posed by COVID-19. The polarization is evident in public opinion polling – Trump’s approval ratings sank amidst his handling of the pandemic (Whitesides, 2020), and Bolsonaro’s approval ratings were also heavily impacted (Reuters, 2021). Evidence from the US suggests that partisan alignment may help understand why people believe in conspiracies and misinformation about COVID-19. For instance, a survey in March 2020 found that Democrats were more likely to know that COVID-19 was more lethal than the flu and Republicans were more likely to believe that the *Center for Disease Control* was exaggerating the threat of the coronavirus to hurt President Trump (Jamieson & Albarracin, 2020). Uscinski et al. (2020) found that partisan and ideological predispositions were a relevant predictor of beliefs in two conspiracy theories – namely, that the virus had been fabricated and that the threat had been exaggerated. Stecula and Pickup (2021) also found a strong association between the consumption of conservative media outlets and holding conspiratorial beliefs about COVID-19, with the stronger effects for those scoring high in populist attitudes and being consistent across party lines, suggesting that partisanship or ideology alone may obscure other predictors of conspiratorial beliefs.

While polarization has shaped the political response to COVID-19 in Brazil, research has not investigated its consequences in relation to misinformation and has primarily focused on the content of information posted on social media. Given the association between Bolsonaro’s rhetoric and disinformation about the pandemic circulating on WhatsApp (Soares, Recuero, Volcan, Fagundes, & Sodr , 2021), as well as his declared support for conspiracies and unproved methods to combat the pandemic, investing government resources in “preventive measures” (e.g. drugs proven not to cure the disease) instead of supporting lockdown and vaccination (Ricard & Medeiros, 2020), we ask the extent to which support for the (former) president, as well as ideology, might

affect people’s susceptibility to misinformation. Considering emerging evidence from the US that partisan alignment might help explain belief in conspiracies about the pandemic (Jamieson & Albarracin, 2020; Motta, Stecula, & Farhart, 2020), we ask whether similar dynamics are at play in Brazil. In addition, we ask whether support for Bolsonaro affects the relationship between social media and WhatsApp use and belief in misinformed statements about Covid-19, given the level of elite disinformation about the pandemic on these networks and the high prevalence of pro-Bolsonaro discourse in WhatsApp group chats (Soares, Recuero, Volcan, Fagundes, & Sodr , 2021).

RQ1 *How does (a) political ideology and (b) approval of the presidential handling of the pandemic affect the likelihood of holding misinformed beliefs about COVID-19?*

RQ2 *How does the relationship between social media and WhatsApp use for COVID-19 and belief in misinformed statements about COVID-19 vary among individuals with different levels of presidential approval?*

WhatsApp groups, tie strength, and misinformation

Scholars investigating misinformation and disinformation³ on WhatsApp in Brazil have often turned to public discussion groups to circumvent the challenge posed by end-to-end encryption and study the content of discussions (Resende et al., 2019). In this context, prior research has suggested that political discussion groups frequently share misinformation and coordinate users to spread content through their own contacts (Resende et al., 2019). In the aftermath of the 2018 elections, a report based on messages received by a fact-checking *tip-line* showed that political misinformation was abundant on WhatsApp (Wardle, Pimenta, Conter, Dias, & Burgos, 2019).

There is evidence that messaging groups in Brazil were rife with false information about the pandemic. For instance, scholars investigated false information

on “public” WhatsApp discussion groups between March and April of 2020 and found a substantive amount of false, distorted, and conspiratorial content about COVID-19—triggered by political speeches by former president Bolsonaro (Soares, Recuero, Volcan, Fagundes, & Sodr , 2021). The study also found that the most popular “topics” of disinformation were closely connected to Bolsonaro’s arguments against restrictions, including conspiracies about how mayors, governors, the media, the Supreme Court, and the “leftists” were plotting against the president.

However, no research has investigated misinformation in close-knit group chats, where content is inaccessible to researchers (Malhotra, 2023). WhatsApp states that nine in ten messages are sent from one person to another and that most groups are small, averaging fewer than ten participants.⁴ Prior research has suggested that the findings from studies analyzing large political group discussions may not reflect the experiences of most WhatsApp users (Rossini et al., 2021).

Given the lack of consensus around the role and the relevance of political WhatsApp groups, we pose exploratory research questions to investigate whether membership in group discussions with distinct network compositions increases the likelihood of believing in misinformation. Considering the wide range of group-size possibilities (2–254), we opted to focus on tie strength as a proxy for group size and membership, asking participants whether they participated in discussions about COVID-19 in WhatsApp groups with people they do not know personally as well as in discussions with friends, family, and acquaintances. We expect tie strength to be a relevant aspect of groups for two main reasons: first, strong and weak ties serve different informational roles (Granovetter, 1973). In terms of discussions about news and politics, strong ties facilitate exposure to homogeneous perspectives while weak ties are likely to share diverse viewpoints (Eveland & Hively, 2009).

In our study, we also include participation in groups with people one does not know personally as a proxy to identify potential membership in public groups. Although such “disconnected” networks might seem strange in the context of group chats, they can occur due to 1) membership in public discussion groups; 2) membership in groups based on interests, association (e.g., school, sports, social

clubs); 3) expansion of groups with weak-ties with the inclusion of friends-of-friends, among other possibilities. Thus, we ask:

RQ3 *What is the relationship between talking about COVID-19 in WhatsApp groups with different tie-strength and holding misinformed beliefs about COVID-19 over time?*

Finally, limited research investigating the content of public WhatsApp groups suggests that most of the misinformation shared in these spaces tends to be disproportionately in favor of Bolsonaro (Resende et al., 2019), particularly in the context of the pandemic (Soares, Recuero, Volcan, Fagundes, & Sodr , 2021). Likewise, it is possible that people who join discussion groups with weak and non-existing ties share interests with them, including partisanship and political support. To further probe the relationship between political support and believing in misinformation, considering the potentially distinct dynamics in strong and weak ties WhatsApp groups, we ask:

RQ4 *How does the relationship between participating in WhatsApp groups with different tie-strength and belief in misinformed statements about COVID-19 vary among individuals with different levels of presidential approval?*

Methods

Data

This study leverages original panel survey data in Brazil. Data collection took place between 6–21 July 2020 for the first wave (2,010 respondents) and between 21 August and 3 September 2020 for the second wave (1,378 respondents). During this period, Brazil was experiencing the first peak of infections and deaths – during W1, the 7-day average of infections was between 33,000 and 36,000, while in W2 the rate was between 36,000 and 40,000, meaning the data collection coincided with one of the worst moments of the pandemic in 2020.

Table 1. False statements about COVID-19 with response distributions in the first and the second wave of the study. “Don’t know” answers are not included in the table.

	True/Probably True W1	True/Probably True W2	False/Probably False W1	False/Probably False W2
Face masks donated by China to Brazil were contaminated by the coronavirus	11%	9%	71%	75%
The coronavirus dies when the temperature is above 26°C	17%	17%	57%	61%
The medicine ivermectina cures Covid-19	18%	18%	55%	59%
Empty coffins are being buried in the Amazon as if they were victims of the coronavirus or Covid-19	21%	27%	57%	61%
The coronavirus was created in a laboratory China for financial gain	26%	25%	50%	53%
Wearing masks for long periods of time causes hypoxia (insufficient oxygen in the blood)	21%	21%	58%	61%
5 G helps to transmit the coronavirus	5%	4%	73%	81%
Until May, Brazil recorded the world’s recovery rate of people infected with coronavirus	36%	35%	34%	33%
The flu vaccine increases the chance of having the coronavirus	5%	5%	83%	83%
For each death in the hospital by Covid-19, the state receives more resources from the Ministry of Health	33%	34%	43%	45%

The data collection was fielded by IPEC Inteligência (formerly IBOPE), a Brazilian research company. While over 84% of the population in Brazil has an internet connection (IBGE, 2022), coverage is still higher in urban areas. As such, our sample is more representative of the urban population. To ensure demographic representativeness and account for regional discrepancies in internet access, we used quotas for age, gender, education, and region.

There were no significant differences in the make-up of the two samples in variables like age, gender, region, or education. The panel retention rate was 69%. AAPOR’s standards do not apply to large nonprobability panels using demographic quotas (AAPOR, 2016). The study was reviewed and approved by the University of Liverpool Ethics Committee (ref. 7819), and participants were debriefed about false items they had been exposed to after the second wave.

Measures

Dependent variable

Belief in misinformed statements about COVID-19: we selected 10 statements ranging from misinformation about cures to transmission, origins, or preventive measures (see appendix), which were circulating in the early stages of the pandemic and had been fact-checked by independent agencies. They were measured in both waves, meaning that participants in W2 wave had already been exposed to them. Respondents were asked whether each statement is “false,” “probably false,” “true,”

“probably true,” or “I don’t know.” Responses were coded as a binary variable, with 1 denoting that a respondent stated that a falsehood was true or probably true. Then we created our dependent variable, measuring the number of false statements each respondent thought was true ($M = 1.86$, $SD = 2.19$, Loewinger’s H coefficient: .40 for W1 and $M = 1.86$, $SD = 2.21$, Loewinger’s H coefficient .44 for W2⁵). While there was no change in the dependent variables on the aggregate level between the waves, there was sufficient individual level change, to justify the use of two waves: 29.5% of survey participants increased their belief in misinformed statements about COVID-19 over time, 28.5% decreased it, while 42% had a stable score across the waves Table 1.

Independent variables

To measure traditional news use we asked respondents how often they have used print national newspapers, local newspapers, TV news, cable TV news, radio, or their online versions during the past week. For each item they could answer “I didn’t use it last week,” “Once to three days a week,” “more than three days a week” (scaled as 0 to 2). These items were added in an index of “traditional news use” with higher scores denoting more frequent use of traditional news use during the past week ($M = 5.07$, $SD = 2.93$, in a 0–12 scale, $\alpha = .70$). Using the same answer scale, we further measured partisan news use, by asking about frequency of using alternative news websites, giving examples of partisan non-mainstream Brazilian outlets (O Antagonista, Brasil 24) ($M = .55$, $SD = .76$), frequency of social

media news use ($M = 1.29$, $SD = .79$) and WhatsApp use for news ($M = 1.25$, $SD = .84$). To assess membership in WhatsApp groups with different networks we asked whether participants have discussed about COVID-19 in groups with their close friends and family during the past 30 days (Strong Tie WhatsApp Groups, $M = .79$, $SD = .44$, measured as 0/1), and whether they have talked about COVID-19 in groups with people they do not know personally (Weak Tie WhatsApp Groups, $M = .31$, $SD = .46$, measured as 0/1).

To measure political ideology, we asked: “In politics, people usually speak of ‘left,’ ‘right’ and ‘center.’ On a scale where 1 is far left and 10 is far right, what position would you put yourself in?.” We later coded this variable’s items as Left (those who picked values from 1–3), Center (4–7), and Right (8–10). We also asked respondents whether they approve of the way President Bolsonaro was dealing with the COVID-19 pandemic on a 1–5 Likert scale (Totally disapprove to totally approve) ($M = 2.66$, $SD = 1.55$). Last, to capture trust in different institutions for the provision of information, we asked: “How much do you trust the information about COVID-19 from the following sources?.” Respondents could respond on a 1–4 Likert scale (“I don’t trust it at all” to “I trust it a lot”). We asked for trust in COVID-19 information provision from the media ($M = 2.51$, $SD = .90$), the federal government ($M = 2.26$, $SD = .95$) and the state government ($M = 2.32$, $SD = .90$).

Control variables

We included five control variables in our analysis: Three sociodemographic variables capturing age ($M = 39.7$, $SD = 13.85$ ranging from 18 to 83), gender (51% female), and education as a 10-scale ordinal variable measuring highest education qualifications ranging from “I didn’t go to school” to “doctorate degree” ($M = 6.47$, $SD = 1.70$, degree holders = 31%). We further controlled for interest in political affairs (Generally speaking, how much do you consider yourself interested in politics?) in a 1–4 Likert scale (“not interested at all,” to “very interested” ($M = 2.79$, $SD = 1$). We controlled for personal experiences using a binary variable asking whether participants have been diagnosed with COVID-19 (5% in W2).

Last, we controlled for coronavirus knowledge, measured using four multiple choice questions. Two questions were related to the health aspect of the virus (What is an antibody test?; Which are the most common symptoms of COVID-19?) and two items were related to the political aspect of the handling of the virus (Who is the minister of health and which country decided to stop its funding to the WHO?). Then we build a variable measuring the number of correct items ($M = 2.38$, $SD = 1.16$, Loevinger’s H coefficient: .29 for W1; $M = 2.40$, $SD = 1.17$, Loevinger’s H coefficient .27 for W2).

Analysis

We used ordinary least-squares (OLS) regressions to examine the predictors of holding misinformed beliefs about COVID-19. We included a lagged dependent variable to examine how independent variables affect the dependent variables over time. Two-wave panel designs allow for stronger causal claims than a cross-sectional design (Markus, 1979), however, given the absence of experimental data we refrain from making causal claims. We also present the results of a cross-sectional model to show how each variable predicts both levels and the changes of the independent variable over time. Last, we included four other models with interaction terms to examine RQ2 and RQ4. All six models can be found in the Appendix.

Results

Before we examine the predictors of our dependent variable, we present its frequencies for the two waves of our study (Figure 1). Overall, around 2/3 of respondents believed at least in one misinformed statement with the share of those who do not believe in any misinformed statement rising slightly between the two waves from 34% to 37%.

To answer our four hypotheses and research questions 1 and 3, we regress belief in misinformed statements on several key independent variables and control variables, including a lagged-dependent variable as a control to account for change over time (Markus, 1979) and this is visualized in Figure 2. In the online appendix, we also include a simpler model (1) without the lagged dependent variable. H1 predicted that higher levels

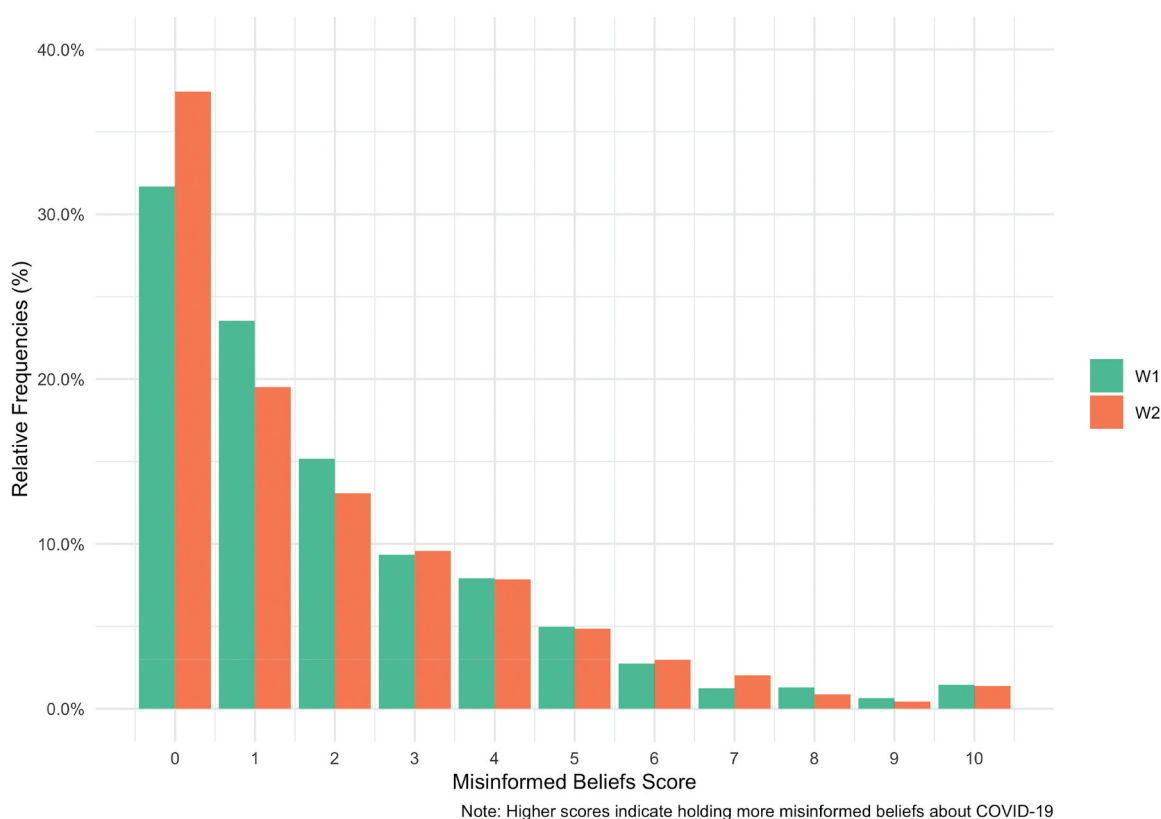


Figure 1. Relative frequencies of misinformed belief scores per survey wave. Note. Green represents first wave scores, and orange represents second wave scores.

of traditional news use would predict a decrease in misinformed beliefs over time, but this hypothesis was not supported, as relationship was not significant (Figure 2).

Our second hypothesis, predicting that partisan news use would be correlated with beliefs in misinformation, is supported, as there is a positive and significant relationship between the two variables in both the cross-sectional ($\beta = .29, p < .001$, Model 1) and the panel models ($\beta = .19, p < .01$, Model 2). Our third and fourth hypothesis predicted that social media and WhatsApp use for news would be positively associated with an increase in misinformed beliefs over time, but neither relationship was significant in the lagged model (see Figure 2).

Turning to our first research question, exploring political ideology and alignment, approval of Bolsonaro is significantly and strongly correlated with increased misinformed beliefs over time ($\beta = .21, p < .001$). Those who have a right-wing

ideology are significantly more likely to believe in more misinformed statements when compared with centrists ($\beta = .50, p < .001$), and over time ($b = .23, p < .01$) even though it is only significant at the .1 level ($p = .53$). Those on the political left were no more or less likely to believe misinformed statements when compared with centrists. Presidential approval and right-wing ideology were not only statistically significant but the strongest predictors of holding misinformed beliefs.

Our second research question explores whether presidential approval has a moderating role in the relationship between using WhatsApp and social media for news and holding misinformed statements about Covid-19. Our results as can be seen on Models 3 and 4, plotted in Figures 3 and 4, suggest that this is the case (see appendix for tables). The relationship between social media news use and belief in misinformation is stronger for those who approve Bolsonaro ($\beta = .08, p < .05$) and the same is true for WhatsApp news use ($\beta = .07, p < .05$). As seen on Figure 4, for

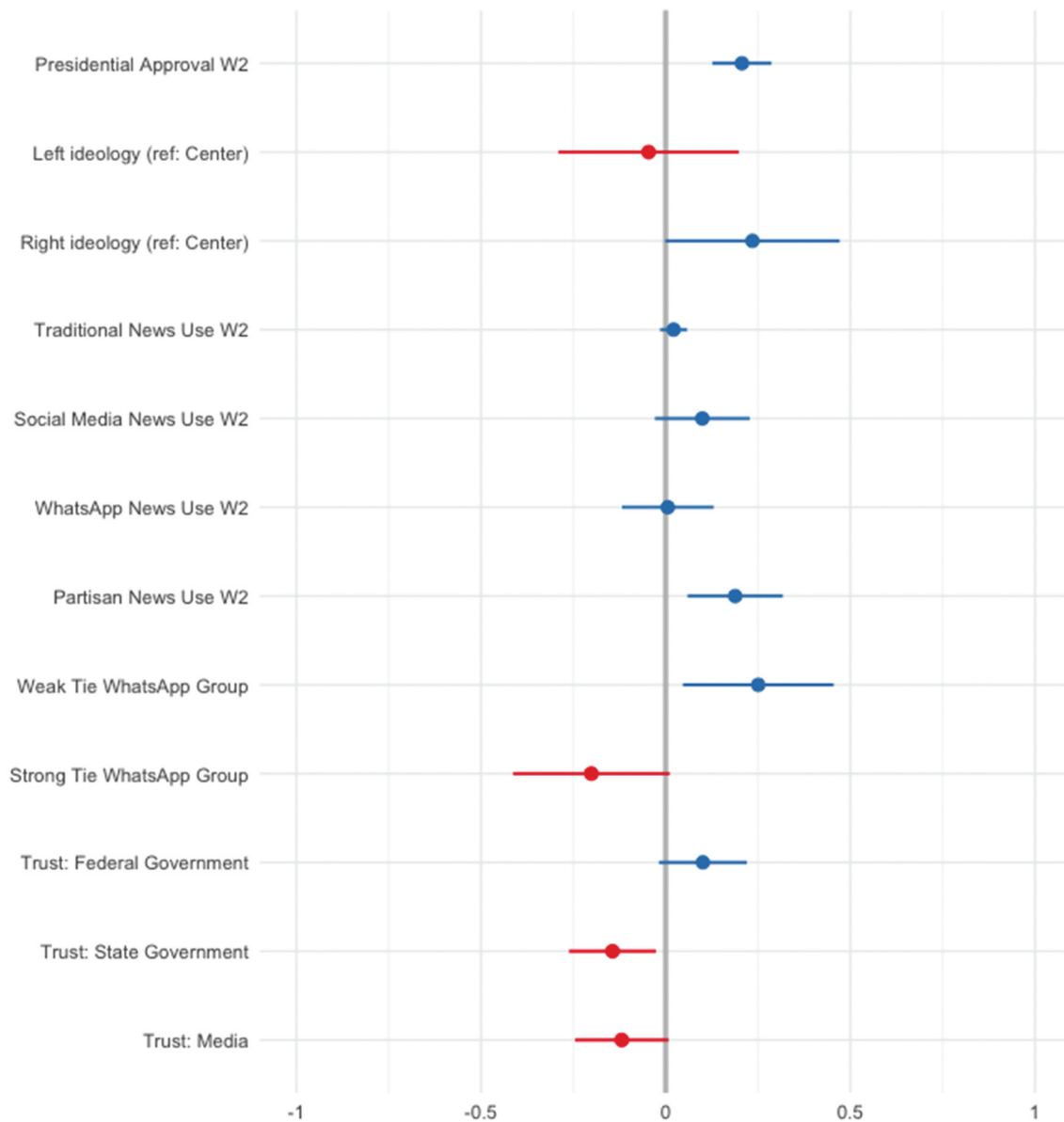


Figure 2. A selection of Coefficients from Model 2 (lagged) with 95% confidence intervals. Note. Red represents negative coefficients; blue represents positive coefficients.

those with high presidential approval, higher WhatsApp use for news meant increased levels of misinformation over time, and for those with low presidential approval, higher WhatsApp news use meant lower levels of misinformation over time.

The third research question asked whether discussing COVID-19 in WhatsApp groups with different tie-strength affects beliefs in misinformation over time. Strong-tie groups were not significantly associated with becoming more misinformed over time but discussing the pandemic in weak-tie groups had a strong and significant correlation (β

$= .25, p < .01$) with increased beliefs in misinformation over time.

Last, our fourth research question focuses on the moderating role of presidential approval in the relationships between group tie strength and misinformed beliefs. We find that the relationship between discussions in weak tie groups and belief in misinformation is even stronger among those who approve the president ($\beta = .18, p < .01$), as illustrated in Figure 5 below. No significant moderation was found for groups with strong ties, as seen on Figure 6.

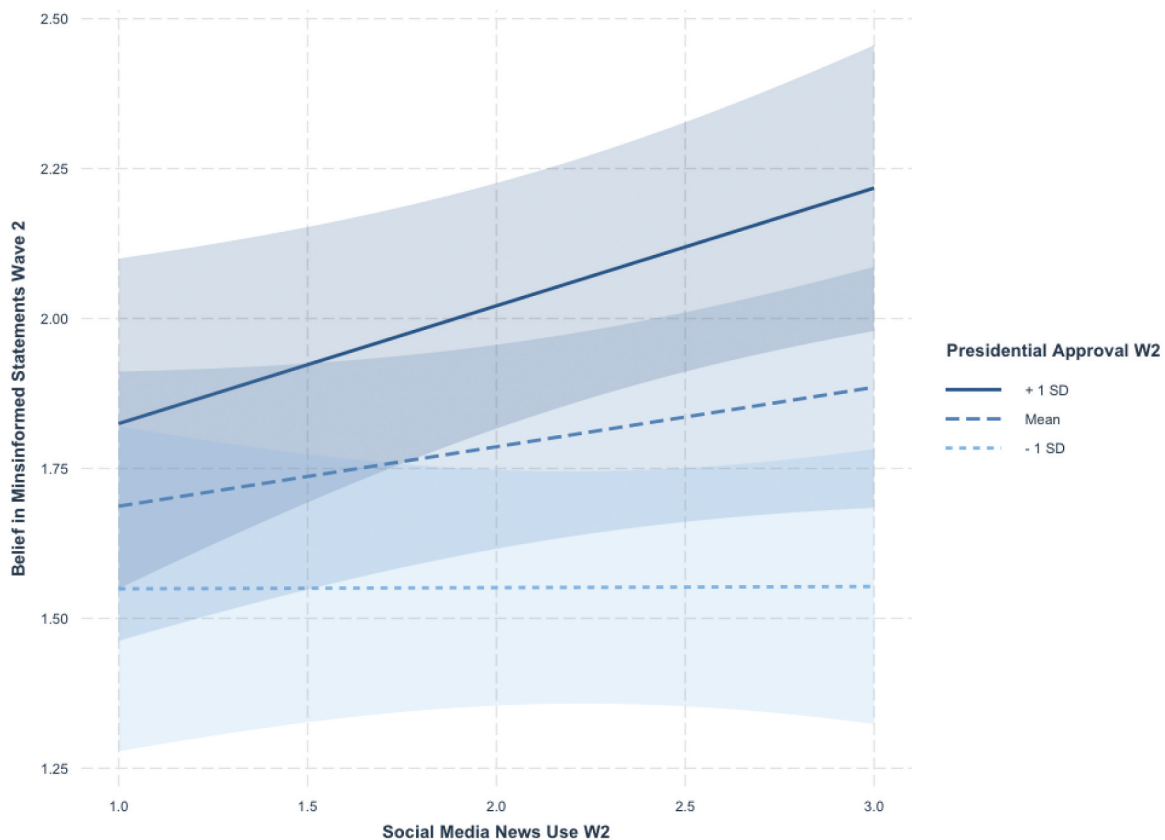


Figure 3. Marginal effect of Social Media News Use on Belief in Misinformed Statements for different levels of Presidential Approval with 95% confidence intervals.

Discussion

This study examines the antecedents of holding misinformed beliefs about COVID-19, focusing on the role of different information pathways, social media use, and messaging applications, based on data from a two-wave panel survey on a representative sample of Brazilian internet users. Our results add to the growing literature highlighting the detrimental impacts of political polarization in citizens' ability to stay informed and shine a light on the pathways under which politically motivated misinformation infiltrates the information environment. While we do not find universally detrimental effects associated with the use of social media and WhatsApp for news, these platforms have differential effects for some individuals which are heavily shaped by their political preferences. For those who approved former president Jair Bolsonaro, using social media or WhatsApp for news was strongly associated with becoming more misinformed over time. This could mean that, on social media platforms, these individuals are

exposed to partisan content through a mix of social ties and algorithmic amplification, and on WhatsApp, they are exposed to misinforming content through private chats and groups, shared by weak and strong social ties.

Findings about the use of traditional and partisan news outlets are mixed: partisan news use predicted holding more misinformed beliefs over time whereas traditional news use was not associated with an improvement in levels of misinformation, unlike other studies (Bode & Vraga, 2015; Jamieson & Albarracin, 2020). These results hold while controlling for right-wing ideology and presidential approval, which are also significantly related to holding misinformed views. There are a few potential explanations for this. Exposure to different traditional news outlets could be related to holding both more and less misinformed beliefs, given the differences in quality and the potential of misinformation from traditional news as well. It is also possible that the effect of being exposed to misinformation through alternative sources is stronger

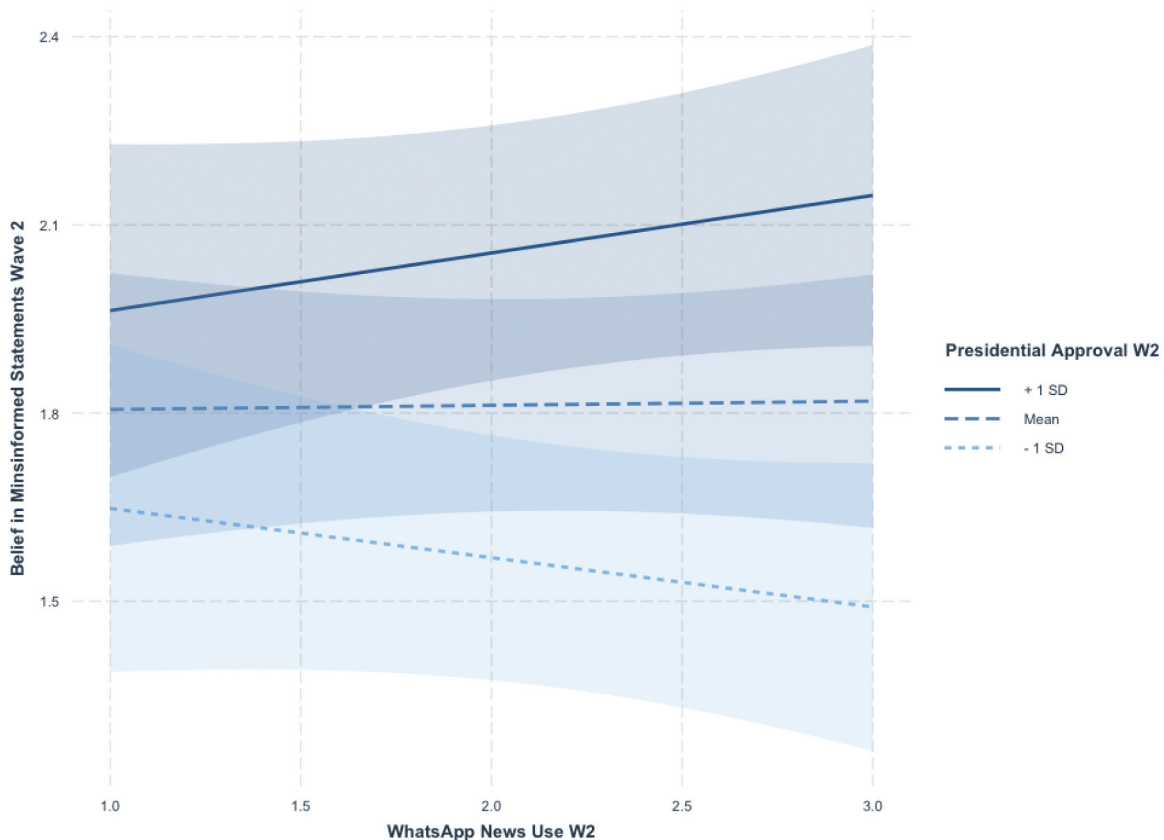


Figure 4. Marginal effect of WhatsApp News Use on Belief in Misinformed Statements for different levels of Presidential Approval with 95% confidence intervals.

than the effect of being exposed to news and fact-checking about it. A third explanation is that, when disinformation comes from official sources, the coverage by the news media contributes to amplifying – rather than mitigating – false claims in the eyes of partisans.

We also find evidence that considering different networks on WhatsApp is important to understand its role as an information source. Even though WhatsApp use, in general, was not associated with misinformation, users who participated in groups with strangers were more likely to become misinformed over time, even after controlling for political ideology and presidential approval. This means that unlike more general uses of WhatsApp for news, participation in groups where information is being shared by weak (or non-existing) ties leads people to become more ill-informed over time regardless of their political predispositions. This finding may seem counterintuitive, as weak ties are often associated with greater exposure to

diverse opinions on- and offline, which would then have the potential to counter misinformation and lead to incidental news exposure (Barnidge, 2020; Kligler-Vilenchik, Hermida, Valenzuela, & Villi, 2020). It is possible that the dynamics of weak-tie communication on private messaging apps are different from social media platforms in that membership in discussion groups may be driven by seeking pro-attitudinal and homogeneous discussions, which provides fertile ground for partisan propaganda and misinformation to spread unchecked (Chauchard & Garimella, 2022; Machado, Kira, Narayanan, Kollanyi, & Howard, 2019).

Our findings have important consequences for the understanding of the factors that undermine people's ability to navigate a crowded information environment amidst a global health crisis, and beyond. First, we find that people's (mainstream) media diets have little to do with people's likelihood to believe in misinformation and that the

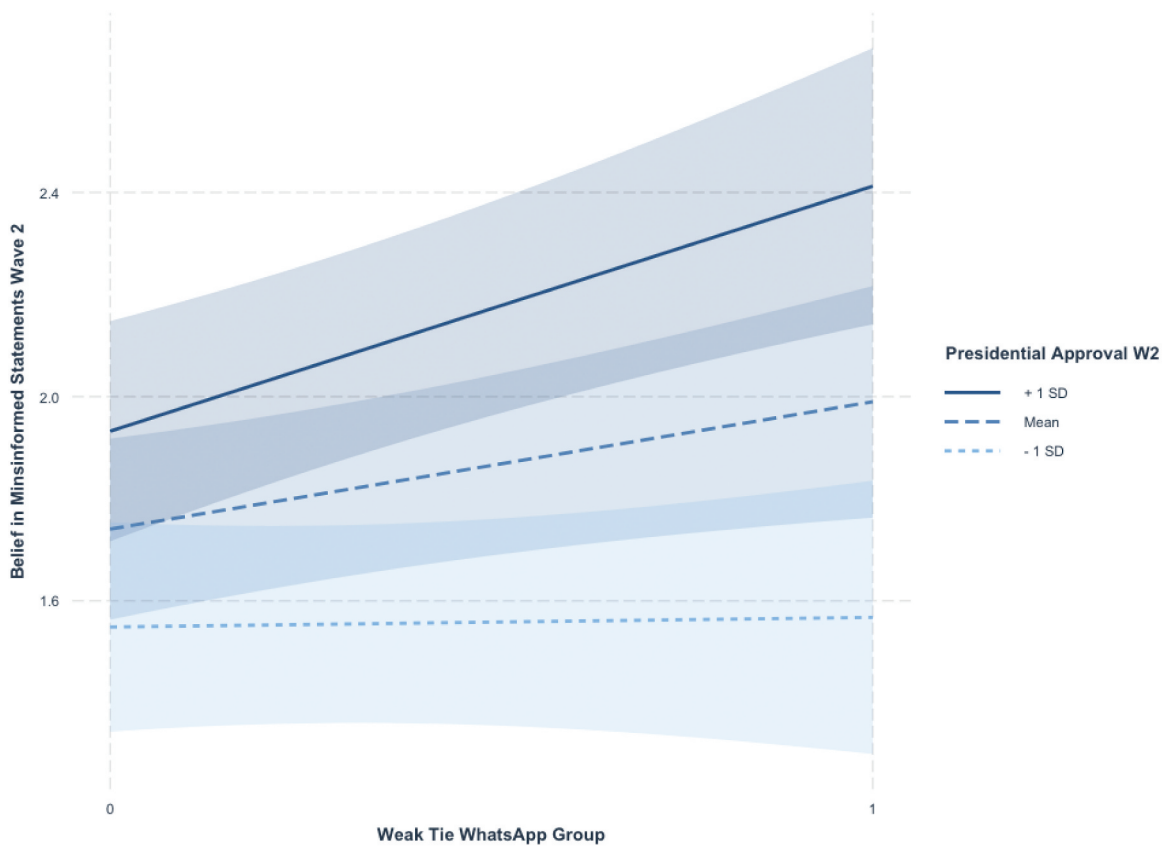


Figure 5. Marginal effect of membership in Weak Tie WhatsApp Groups on Belief in Misinformed Statements for different levels of Presidential Approval with 95% confidence intervals.

strongest predictors of holding misinformed beliefs are related to ideological predispositions and political support. This suggests that misinformation can be more powerful when it comes from the top—i.e., politicians picking public fights with scientists and public health recommendations, and purposefully spreading unfounded claims about the pandemic (Soares, Recuero, Volcan, Fagundes, & Sodr , 2021)—, and can lead to lasting detrimental effects on the public, effectively increasing misinformed beliefs over time. It is also possible that the traditional news media coverage of episodes where political elites engage in disinformation is not effective in countering them. Taken together, these findings suggest that the ill effects of polarization and ideology identified by scholars in the US (Jamieson & Albarracin, 2020; Stecula & Pickup, 2021) can also hold in multi partisan systems, and may be associated with the fact that political elites are “super-spreaders” of disinformation. Importantly, this means that the news media needs to consider how it covers disinformation

spread by political elites, as politicians of the like of Bolsonaro or Trump are skilled in manipulating and driving political coverage (Lawrence & Boydston, 2017). By allowing these politicians to influence the news cycle to cover their falsehoods, journalists may be contributing to further spread disinformation to segments of the population who would otherwise not see it—either because they do not consume partisan outlets or because they are less engaged with various information sources. Media outlets need to consider the trade-offs between giving illiberal politicians visibility and contributing to spread falsehoods—even if the intention is to fact-check them. This may require changes in how such claims are covered, for instance, suppressing direct quotes to avoid their amplification, and reducing overall attention given to them. While the COVID-19 pandemic is no longer an acute health crisis, these disinformation structures are affecting the information environment for other political and societal issues such as elections (Rossini et al., 2023).

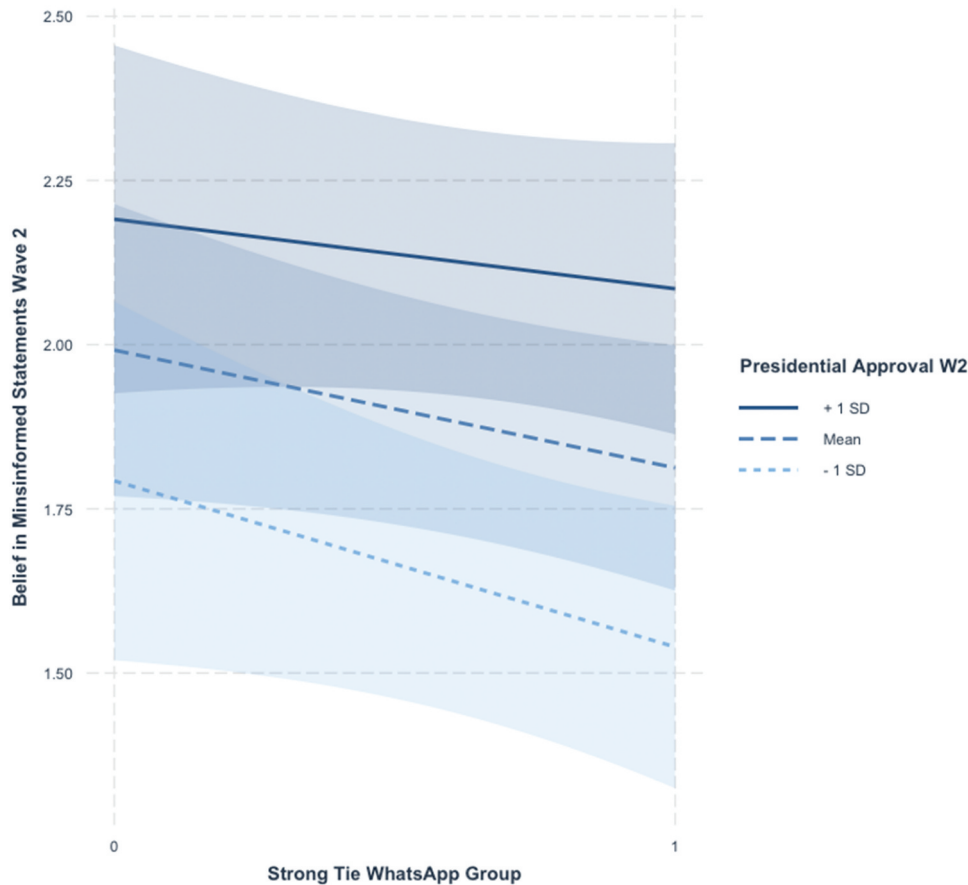


Figure 6. Marginal effect of membership in Strong Tie WhatsApp Groups on Belief in Misinformed Statements for different levels of Presidential Approval with 95% confidence intervals.

Finally, WhatsApp has been on the forefront of public discourse about misinformation in the Global South, and its increasing use for news raise concerns about the quality of information people get. Our findings partially alleviate these concerns, as those reporting the use of WhatsApp for news are no more likely to become more misinformed. However, WhatsApp is a complex information ecosystem, as people may find information in different settings, from one-to-one to group discussions. Researchers examining public groups have highlighted the prevalence of misinformation as well as of politically motivated disinformation (Resende et al., 2019; Soares, Recuero, Volcan, Fagundes, & Sodr e, 2021). In line with these concerns, we find that those who discussed the pandemic with strangers were more likely to become more misinformed over time. These findings suggest that groups where people are engaging with strangers are influential in the spread of misinformation, and that participation in such settings can

have lasting problematic consequences. This is worrisome with the rise of other messaging platforms, such as Telegram, which allow for groups of up to 200,000 users, providing fertile ground for mis- and disinformation to thrive. False information can circulate on messaging apps without much public scrutiny, and platforms have limited ability to address the problem as they cannot implement features such as debunks, pre-bunks, or fact-checks, which have been used by platforms such as Facebook, Instagram, and Twitter. Moreover, as most of the content circulating in encrypted messaging apps remains in the private realm, it becomes more difficult to hold platforms accountable to take action and curb misinformation.

While the political consequences of increased use of private messaging are beginning to emerge (Chauchard & Garimella, 2022; Gil de Z niga, Ard evol-Abreu, & Casero-Ripoll s, 2019; Velasquez, Quenette, & Rojas, 2021), it seems clear that these platforms are becoming less

focused on interpersonal, intimate chats, and more oriented toward large discussion groups – as evidenced by WhatsApp’s recent group-size increase to 1024 members in November 2022, from 512 earlier that year). As platforms prioritize growth and engagement by focusing on larger group conversations while managing to avoid scrutiny under the guise of encrypted communication, regulators, scholars, and civil society writ large need to reflect on which mechanisms of accountability can be implemented to ensure that the notion of “duty of care,” prevalent in social media regulation such as the European Digital Services Act, is not overridden by encryption. Moreover, a broader reflection is required to consider to what extent groups with thousands of participants can be considered private, balancing the benefits of encrypted communication with the detrimental societal outcomes often associated with these spaces – from mis- and disinformation to hate speech and violence.

This study, and its findings, have limitations. First, we rely on self-reported measures, which are susceptible to individual recall. Second, this is a single-country study focused on a highly polarized response to the global pandemic. While some of our results mirror evidence from other countries with high degrees of polarization, they cannot be directly compared. Despite such limitations, this paper makes an important contribution to the understanding of how polarization and elite-disinformation can influence citizens’ susceptibility to misinformation.

Conclusion

This study has sought to examine the relationship between different pathways to information about COVID-19, including via WhatsApp and social media, and lasting beliefs in misinformation about the pandemic in Brazil. Overall, our findings provide further evidence that the traditional news media has limited ability to mitigate the detrimental effects of misinformation in a complex informational environment where people’s media diets become more complex and varied, particularly with the rise of partisan digital sources, social media, and messaging apps. On the other hand, they also suggest that political polarization severely undermines a country’s ability to respond to

a pandemic insofar as public health measures are instrumentalized to win political fights.

In this context, social media and messaging applications appear to provide fertile ground for mis- and disinformation to thrive, and partisans are likely to suffer the detrimental consequences of relying on these platforms for news. When citizens are getting their news from multiple – and sometimes untrustworthy – sources, it can be challenging to distinguish facts from falsehoods, which may have lethal consequences amidst a global health crisis. Given the strong links between presidential support, right-wing outlets, and information flows (e.g. WhatsApp groups), future research needs to move beyond investigating pathways (e.g. media outlets, social media) and further scrutinize the relevance of sources and discourses to understand the effects of misinformation in the populace. Considering the rise of populist leaders and their ability to amplify disinformation through social media and messaging apps without engaging with journalistic scrutiny, the news media needs to rethink its role in covering political falsehoods to effectively contribute to mitigate misinformation among the public.

Notes

1. Affordances can be defined as the properties of a “thing,” both perceived and actual, that determine the different ways it can be used (Norman, 2002).
2. As of June, 2021, the fact-checking page of the Ministry of Health was no longer publicly linked in the official website, but archives were still available in <https://antigo.saude.gov.br/fakenews/>. While we are unable to check when this change took place, the last piece of fact-checked information is dated July 17, 2020.
3. Scholars have proposed a distinction between mis- and disinformation, based on intent. According to Jack (2017), misinformation relates to false or inaccurate content that is inadvertently shared while disinformation relates to content that is intentionally shared to mislead.
4. This information was shared by a WhatsApp employee with one of the authors in August of 2019, in a private e-mail, and the person has confirmed that the contents of the e-mail could be shared publicly.
5. We used H, the Loevinger’s coefficient of homogeneity. The coefficient H is preferred for our analysis because it takes account of different item frequency distributions (Van Schuur, 2003). H coefficient values higher than .3 are accepted as a rule of thumb (Mokken, 1971, p. 185).

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References

- AAPOR. (2016). *Standard definitions: Final dispositions of case codes and outcome rates for surveys* (9th ed., p. 81). AAPOR. <https://aapor.org/wp-content/uploads/2022/11/Standard-Definitions20169theditionfinal.pdf>
- Altay, S., Nielsen, R. K., & Fletcher, R. (2023). News can help! the impact of news media and digital platforms on awareness of and belief in misinformation. *The International Journal of Press/politics*, 19401612221148980. doi:10.1177/19401612221148981
- Badrinathan, S. (2021). Educative interventions to combat misinformation: Evidence from a field experiment in India. *American Political Science Review*, 1–17. doi:10.1017/S0003055421000459
- Barnidge, M. (2020). Testing the inadvertency hypothesis: Incidental news exposure and political disagreement across media platforms. *Journalism*, 21(8), 1099–1118. doi:10.1177/1464884920915373
- Boczek, K., & Koppers, L. (2020). What's new about Whatsapp for news? A mixed-method study on news outlets' strategies for using WhatsApp. *Digital Journalism*, 8(1), 126–144. doi:10.1080/21670811.2019.1692685
- Bode, L., & Vraga, E. K. (2015). In Related News, That was Wrong: The Correction of Misinformation Through Related Stories Functionality in Social Media. *Journal of Communication*, 65(4), 619–638. doi:10.1111/jcom.12166
- Bridgman, A., Merkle, E., Loewen, P. J., Owen, T., Ruths, D., Teichmann, L., & Zhilin, O. (2020). The causes and consequences of COVID-19 misperceptions: Understanding the role of news and social media. *Harvard Kennedy School Misinformation Review*. doi:10.37016/mr-2020-028
- Carpini, M. X. D., & Keeter, S. (1993). Measuring political knowledge: Putting first things first. *American Journal of Political Science*, 37(4), 1179. doi:10.2307/2111549
- Chauchard, S., & Garimella, K. (2022). What circulates on partisan WhatsApp in India? Insights from an unusual dataset. *Journal of Quantitative Description: Digital Media*, 2. doi:10.51685/jqd.2022.006
- Chen, K., Chen, A., Zhang, J., Meng, J., & Shen, C. (2020). Conspiracy and debunking narratives about COVID-19 origins on Chinese social media: How it started and who is to blame. *Harvard Kennedy School Misinformation Review*. doi:10.37016/mr-2020-50
- de Vreese, C. H., & Boomgaarden, H. (2006). News, political knowledge and participation: The differential effects of news media exposure on political knowledge and participation. *Acta Politica*, 41(4), 317–341. doi:10.1057/palgrave.ap.5500164
- Enders, A. M., Uscinski, J. E., Klofstad, C., & Stoler, J. (2020). The different forms of COVID-19 misinformation and their consequences. *Harvard Kennedy School Misinformation Review*. doi:10.37016/mr-2020-48
- Eveland, W. P., & Hively, M. H. (2009). Political discussion frequency, network size, and “heterogeneity” of discussion as predictors of political knowledge and participation. *Journal of Communication*, 59(2), 205–224. doi:10.1111/j.1460-2466.2009.01412.x
- First Draft. (2019, June 27). What 100,000 WhatsApp messages reveal about misinformation in Brazil. First Draft. <https://firstdraftnews.org/443/latest/what-100000-whatsapp-messages-reveal-about-misinformation-in-brazil/>
- Gil de Zúñiga, H., Ardévol-Abreu, A., & Casero-Ripollés, A. (2019). WhatsApp political discussion, conventional participation and activism: Exploring direct, indirect and generational effects. *Information, Communication & Society*, 0(0), 1–18. doi:10.1080/1369118X.2019.1642933
- Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology*, 78(6), 1360–1380. doi:10.1086/225469
- Guess, A., Nagler, J., & Tucker, J. (2019). Less than you think: Prevalence and predictors of fake news dissemination on Facebook. *Science Advances*, 5(1), eaau4586. doi:10.1126/sciadv.aau4586
- IBGE (Ed.). (2022). *Pesquisa nacional por amostra de domicílios—Acesso à Internet e à televisão e posse de telefone móvel celular para uso pessoal 2021*. IBGE. https://biblioteca.ibge.gov.br/visualizacao/livros/liv101963_informativo.pdf
- Jack, C. (2017). *Lexicon of Lies: Terms for Problematic Information* (p. 22). Data & Society Research Institute.
- Jamieson, K. H., & Albarracín, D. (2020). Not just conspiracy theories: Vaccine opponents and proponents add to the

- COVID-19 'infodemic' on Twitter. *Harvard Kennedy School Misinformation Review*, 1. doi:10.37016/mr-2020-012
- Karapanos, E., Teixeira, P., & Gouveia, R. (2016). Need fulfillment and experiences on social media: A case on Facebook and WhatsApp. *Computers in Human Behavior*, 55, 888–897. doi:10.1016/j.chb.2015.10.015
- Kligler-Vilenchik, N., Hermida, A., Valenzuela, S., & Villi, M. (2020). Studying incidental news: Antecedents, dynamics and implications. *Journalism*, 21(8), 1025–1030. doi:10.1177/1464884920915372
- Kligler-Vilenchik, N., & Tenenboim, O. (2020). Sustained journalist–audience reciprocity in a meso news-space: The case of a journalistic WhatsApp group. *New Media & Society*, 22(2), 264–282. doi:10.1177/1461444819856917
- Krishnan, N., Gu, J., Tromble, R., & Abrams, L. C. (2021). Research note: Examining how various social media platforms have responded to COVID-19 misinformation. *Harvard Kennedy School Misinformation Review*. doi:10.37016/mr-2020-85
- Lawrence, R. G., & Boydston, A. E. (2017). What we should really be asking about media attention to trump. *Political Communication*, 34(1), 150–153. doi:10.1080/10584609.2016.1262700
- Machado, C., Kira, B., Narayanan, V., Kollanyi, B., & Howard, P. (2019). A study of misinformation in whatsapp groups with a focus on the Brazilian presidential elections. *Companion Proceedings of The 2019 World Wide Web Conference*, 1013–1019. 10.1145/3308560.3316738
- Malhotra, P. (2023). Misinformation in WhatsApp family groups: Generational perceptions and correction considerations in a Meso-News Space. *Digital Journalism*, 0(0), 1–19. doi:10.1080/21670811.2023.2213731
- Markus, G. (1979). *Analyzing panel data*. SAGE Publications, Inc. doi:10.4135/9781412983389
- Moeller, J., & de Vreese, C. (2019). Spiral of political learning: The reciprocal relationship of news media use and political knowledge among adolescents. *Communication Research*, 46(8), 1078–1094. doi:10.1177/0093650215605148
- Mokken, R. J. (1971). A theory and procedure of scale analysis. In *The Hague*. The Netherlands: Mouton, Berlin: De Gruyter.
- Motta, M., Stecula, D., & Farhart, C. (2020). How right-leaning media coverage of COVID-19 facilitated the spread of misinformation in the early stages of the pandemic in the U.S. *Canadian Journal of Political Science/Revue Canadienne de Science Politique*, 53(2), 335–342. doi:10.1017/S0008423920000396
- Newman, N., Fletcher, R., Schulz, A., Andi, S., & Nielsen, R. K. (2020). *Reuters institute digital news report* (p. 112). Reuters Institute for the Study of Journalism. <https://www.digitalnewsreport.org/>
- Nielsen, R. K., Fletcher, R., Kalogeropoulos, A., & Simon, F. M. (2022). *The UK COVID-19 news and information project*. Reuters Institute for the Study of Journalism. <https://reutersinstitute.politics.ox.ac.uk/communications-coronavirus-crisis-lessons-second-wave>
- Norman, D. A. (2002). *The design of everyday things*. New York: Basic books.
- Resende, G., Melo, P., Sousa, H., Messias, J., Vasconcelos, M., Almeida, J., & Benevenuto, F. (2019). (Mis)information dissemination in whatsapp: gathering, analyzing and countermeasures. *The World Wide Web Conference on - WWW,'19*, 818–828. 10.1145/3308558.3313688
- Reuters. (2021, February 22). Bolsonaro popularity tumbles in Brazil, shows CNT poll. *Reuters*. <https://www.reuters.com/article/us-bolsonaro-petrobras-poll-idUSKBN2AM1P9>.
- Ricard, J., & Medeiros, J. (2020). Using misinformation as a political weapon: COVID-19 and Bolsonaro in Brazil. *Harvard Kennedy School Misinformation Review*. doi:10.37016/mr-2020-013
- Rossini, P. (2023). Farewell to big data? Studying misinformation in mobile messaging applications. *Political Communication*, 0(0), 1–6. doi:10.1080/10584609.2023.2220666
- Rossini, P., Mont'alverne, C., & Kalogeropoulos, A. (2023). Explaining beliefs in electoral misinformation in the 2022 Brazilian election: The role of ideology, political trust, social media, and messaging apps. *Harvard Kennedy School Misinformation Review*. doi:10.37016/mr-2020-115
- Rossini, P., Stromer-Galley, J., Baptista, E. A., & Oliveira, V. V. D. (2020). Dysfunctional information sharing on WhatsApp and Facebook: The role of political talk, cross-cutting exposure and social corrections. *New Media & Society*, 23(8), 2430–2451. doi:10.1177/1461444820928059
- Rossini, P., Stromer-Galley, J., Baptista, E. A., & Veiga de Oliveira, V. (2021). Dysfunctional information sharing on WhatsApp and Facebook: The role of political talk, cross-cutting exposure and social corrections. *New Media & Society*, 23(8), 2430–2451. doi:10.1177/1461444820928059
- Singh, L., Bode, L., Budak, C., Kawintiranon, K., Padden, C., & Vraga, E. (2020). Understanding high- and low-quality URL Sharing on COVID-19 Twitter streams. *Journal of Computational Social Science*, 3(2), 343–366. doi:10.1007/s42001-020-00093-6
- Soares, F. B., Recuero, R., Volcan, T., Fagundes, G., & Sodr e, G. (2021). Research note: Bolsonaro's firehose: How Covid-19 disinformation on WhatsApp was used to fight a government political crisis in Brazil. *Harvard Kennedy School Misinformation Review*. doi:10.37016/mr-2020-54
- Stecula, D. A., & Pickup, M. (2021). How populism and conservative media fuel conspiracy beliefs about COVID-19 and what it means for COVID-19 behaviors. *Research & Politics*, 8(1), 2053168021993979. doi:10.1177/2053168021993979
- Theocharis, Y., Cardenal, A., Jin, S., Aalberg, T., Hopmann, D. N., . . . Štětka, V. (2021). Does the platform matter? Social media and COVID-19 conspiracy theory beliefs in 17 countries. *New Media & Society*, 14614448211045666, 1461444821104566. doi:10.1177/14614448211045666
- Thorson, E. (2016). Belief Echoes: The persistent effects of corrected misinformation. *Political Communication*, 33(3), 460–480. doi:10.1080/10584609.2015.1102187

- Uscinski, J. E., Enders, A. M., Klofstad, C., Seelig, M., Funchion, J., . . . Murthi, M. (2020). Why do people believe COVID-19 conspiracy theories? *Harvard Kennedy School Misinformation Review*, 1(3). doi:10.37016/mr-2020-015
- Vaccari, C., Chadwick, A., & Kaiser, J. (2022). The campaign disinformation divide: Believing and sharing news in the 2019 UK general election. *Political Communication*, 40(1), 4–23. doi:10.1080/10584609.2022.2128948
- Valenzuela, S., Halpern, D., Katz, J. E., & Miranda, J. P. (2019). The paradox of participation versus misinformation: social media, political engagement, and the spread of misinformation. *Digital Journalism*, 0(0), 1–22. doi:10.1080/21670811.2019.1623701
- Valeriani, A., & Vaccari, C. (2018). Political talk on mobile instant messaging services: A comparative analysis of Germany, Italy, and the UK. *Information, Communication & Society*, 21(11), 1715–1731. doi:10.1080/1369118X.2017.1350730
- Van Aelst, P., Toth, F., Castro, L., Štětka, V., Vreese, C. D., . . . Theocharis, Y. (2021). Does a crisis change news habits? A comparative study of the effects of COVID-19 on news media use in 17 European Countries. *Digital Journalism*, 9(9), 1208–1238. doi:10.1080/21670811.2021.1943481
- Van Schuur, W. H. (2003). Mokken scale analysis: Between the Guttman scale and parametric item response theory. *Political Analysis*, 11, 139–163.
- Velasquez, A., Quenette, A., & Rojas, H. (2021). WhatsApp political expression and political participation: The role of ethnic minorities' group solidarity and political talk ethnic heterogeneity. *International Journal of Communication*, 15, 2743–2764.
- Vermeer, S. A. M., Kruijkemeier, S., Trilling, D., & de Vreese, C. H. (2020). WhatsApp with politics?: Examining the effects of interpersonal political discussion in instant messaging apps. *The International Journal of Press/politics*, 26(2), 410–437. doi:10.1177/1940161220925020
- Wardle, C., Pimenta, A., Conter, G., Dias, N., & Burgos, P. (2019). *An evaluation of the impact of a collaborative journalism project on Brazilian journalists and audiences*. Comprova.
- WhatsApp. (n.d.). Two Billion users—connecting the world privately. WhatsApp.Com. Retrieved March 12, 2021, from <https://blog.whatsapp.com/two-billion-users-connecting-the-world-privately/?lang=en>
- Whitesides, J. (2020, October 8). Trump's handling of coronavirus pandemic hits record low approval: Reuters/Ipsos poll. *Reuters*, <https://www.reuters.com/article/us-usa-election-trump-coronavirus-idUSKBN26T3OF>
- Wooley, S., & Howard, P. N. (Eds.). (2018). *Computational Propaganda: Political Parties, Politicians, and Political Manipulation on Social Media*. New York: Oxford University Press.