

# Covid-19 and the Media

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## Abstract

This chapter describes the growing literature on the effects of media on Covid-19-related outcomes. First, we discuss the papers related to traditional media. In particular, we discuss the literature that studies the effect of public messages, misinformation, and slanted media on health behaviors and health outcomes. Second, we discuss papers that highlight the role of social media content and social media users' networks in the spread of information, formation of social norms, and transmission of diseases. We conclude with a discussion of how the pandemic, in turn, shapes the media.

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# 1 Introduction

The Covid-19 pandemic has become part of life; it caused millions of deaths, disrupted labor relations and trade, and generated political tensions in the global economy. A large body of economic literature emerged in an attempt to understand how the pandemic affects all aspects of the economy and how different people, regions, and governments respond to this shock. While lots of lessons can be drawn from studying historical pandemics, such as the 1918 Influenza (e.g., [Almond, 2006](#); [Velde, 2020](#); and summarized in [Beach, Clay and Saavedra, 2020](#)), the way people get information, process information, and spread information has changed fundamentally over the last century, which has a profound impact on the course of development of the current pandemic. Historical contexts provide anecdotal evidence on the role of information; in contrast, the current context allows researchers to directly observe and measure the impact of media, social media, and social networks on the Covid-19 Pandemic.<sup>1</sup>

In this chapter, we discuss emerging literature that connect media and Covid-related outcomes. Covid-19 is an air-borne contagious respiratory disease caused by a new coronavirus (SARS-CoV-2). Scientists have identified social distancing ([Hsiang et al., 2020](#); [Anderson et al., 2020](#)) and hygienic behaviors (such as hand-washing, social distancing, and mask-wearing, see [Lewnard and Lo, 2020](#); [Prather, Wang and Schooley, 2020](#); [Kissler et al., 2020](#)) as a set of the key measures to slow down the spread of the disease, and vaccination became the most important action in the fight against the virus ([Polack et al., 2020](#); [Amit et al., 2021](#); [Dagan et al., 2021](#)). We concentrate on two types of outcomes in this literature review. The first group of outcomes is health behaviors: social distancing, mask-wearing, and vaccination (on the later stages of the pandemic). The second set of outcomes is health outcomes, including the number of Covid cases, number of hospitalizations, and number of deaths. Understanding the effect of media on both of these groups of outcomes is crucial in fighting the pandemic.

The literature has documented how media affects voting and political events ([DellaVigna and Kaplan, 2007](#); [Enikolopov, Petrova and Zhuravskaya, 2011](#); [Adena et al., 2015](#)), political polarization ([Prior, 2007](#); [Martin and Yurukoglu, 2017](#)), conflict and mass atrocities ([Yanagizawa-Drott, 2014](#)), perception of crime and judicial decisions ([Ash and Poyker, 2019](#)), and municipal spending ([Galletta and Ash, 2019](#)). In the context of the Covid-19 pandemic, there are several reasons why media can play an important role. First, the

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<sup>1</sup>There is relatively limited evidence in the historical context on the topic of health-related information on health-related behaviors. [Beach, Clay and Saavedra \(2020\)](#) discuss how political pressure obstructed information transmission during the 1918 Influenza. [Alsan and Wanamaker \(2018\)](#) study the effect of proximity to Tuskegee notorious for their syphilis experiments on trust to health system among African-Americans, and [Fairley, Jones and Rose \(2021\)](#) study Cutter incident with Polio vaccine on future vaccination rates.

onset of the pandemic was unexpected, and the spread was fast, catching everyone by surprise. Governments and organizations needed to fastly learn about the most effective way of combating the disease, make recommendations, issue regulations, and communicate this information to the public. TV, newspapers, and radio, which are now also on online platforms, are the major means of this communication, and they provide news related to the pandemic in real-time. Individuals learn about the latest development of the pandemic situation and government rules from media and from their social network and adjust their behavior. All these learning, communicating, and adjusting have been taking place in the past two years at an unprecedented speed and intensity, with media facilitating the flow of information.

Second, media coverage may influence trust institutions, science, and risk perceptions. These beliefs can be important role in high-stake situations such as the pandemic. Even reading the same contents on the number of cases, number of deaths, and the government-issued travel restrictions, people can have different perceptions of the situation depending on their trust toward the information source and trust in the institutions. Misinformation and slanted media can hinder the efforts in disease containment by generating vaccine hesitancy and affecting compliance with mobility restrictions.

Third, social media platforms have changed the way in which information is communicated and have generated new datasets to observe individual behavior (e.g., mobility reduction, posting, group membership) and social networks. Along with other data sources using smartphone GPS location data to track social distancing behavior (e.g., Google, Apple, UNACAST, and SafeGraph), Facebook's Data for Good Project uses the location of Facebook app. users to measure mobility declines in cities around the world. In addition, as one of the major social networking platforms, Facebook generates the social connectedness index which can proxy for social networks across different regions within a country and across countries. These novel sets of data make it possible to generate comparable measures in changes in behaviors at a global scale, can be updated in real-time during the Covid-19 period, and capture responses to exposure to the Covid-19 shock through social networks. In addition, individuals take a much more active role in spreading information and voicing their choices by posting on social media, which is also observable using new datasets.

To sum up, there are many novel elements in the literature on media in the Covid context, given that (i) the historical context can not provide an accurate account for the impact of media on disease transmission due to the limited media source and lack of data; (ii) media plays an incredibly important role in the Covid crisis since there is an urgent need for information transmission and the nature of the crisis requires coordination of ef-

forts; (iii) new datasets, including the ones generated by social media platforms, allow the direct measurements of behaviors and social networks. These datasets are not pandemic-specific and can be of general interest for other research in the future.

In this review, we first discuss economic literature related to traditional media (TV, newspapers, and radio) and their information messages that can inform, mislead, or confuse people. We separately discuss literature on information campaigns by political leaders and celebrities, the content of slanted media, and deliberate spread of misinformation. We then discuss effects of social media, both in terms of its content and in its effects through the individuals' social networks.

Overall, the literature documents that media can actually be very effective in both harming and improving situations especially in pandemics when one should react fast. Additionally, now social media matters. It can complement traditional media due to the low cost of entry and the decentralized way of information diffusion.

The rest of the chapter is as follows. Section 2 describes the literature related to the effect of traditional media and information on Covid-related outcomes. Section 3 covers the literature related to the connection of Covid with social media content and friends' networks. Section 4 concludes.

## **2 Effect of Traditional Media**

In this section, we discuss literature related to traditional media sources. We start by covering literature on the effect of TV and newspaper coverage and messages of political leaders and public figures in the media on Covid-19-related outcomes. Then, we discuss issues related to content of traditional media sources, including misinformation. Finally, we discuss the literature on the effect of slanted media sources on health outcomes and behaviors.

### **2.1 Traditional Media Content and Information Campaigns**

The severity of the pandemic depends on the personal behavioral choices of a large number of individuals who choose to comply with governmental health policies (e.g., social distancing and lockdowns) or voluntarily choose to restrict themselves in case of the absence of such regulations (e.g., in Belarus or Sweden). Traditional media sources, like TV, newspapers, and radio are crucial in persuading people to adjust their behavior.

It is generally hard to directly measure the consumption of media. In addition, given the global nature of the pandemic and the prevalence of online news platforms, it is likely

that the same information is available to everyone at the same time. Two papers argue that local news feed still matters and exploit plausibly exogenous local variation in media consumption to identify the causal impact of TV and newspapers on health behaviors. The idea is that a local TV station or a local newspaper may serve several geographic areas at the same time, but the stories covered are usually about the “core” area rather than the “peripheral” area. Thus, for the peripheral area, people are reading news that are likely to reflect the situations in the core areas, giving rise to the plausibly exogenous variation. At the same time, the authors directly control for the local situation. [Kim, Shepherd and Clinton \(2020\)](#) implement this identification strategy by comparing rural U.S. counties that are in different designated market areas (DMAs), where the urban areas in those DMAs are either of different media market size or having different severity of Covid outbreaks. The authors use matching to identify comparable rural counties in different DMAs, and in addition to county-level results, the authors conduct a survey at the individual level to show that the results are driven by individuals who consume local TV news.<sup>2</sup>

[Garz and Zhuang \(2021\)](#) studies a similar situation in Sweden, focusing on exposure to local newspaper. There are three noticeable advantages in [Garz and Zhuang \(2021\)](#). First, Sweden was one of the few countries that did not implement lockdown, and this institutional contexts allows the authors to separate the impact of media from government policies. Second, instead of using a cross-sectional analysis as in [Kim, Shepherd and Clinton \(2020\)](#), the authors have a longer time period that allows for a panel regression with region fixed effects, alleviating the concerns on potential differential trends.<sup>3</sup> Third, the authors collect news articles with Covid contents and the exposure measure can directly take into account the visibility of Covid-19 coverage. Overall, [Kim, Shepherd and Clinton \(2020\)](#) finds that rural counties are more likely to practice social distancing if their local news are produced in cities with more severe Covid outbreaks, and [Garz and Zhuang \(2021\)](#) shows that exposure to Covid-19 news coverage leads to reduction in the number of visits to workplaces and shop.<sup>4</sup>

While the two aforementioned papers have an interesting identification strategy, there are still concerns about omitted variable bias, since regions that are served in the same media markets usually share similar underlying characteristics and are likely to be affected by other common shocks. One way to solve this identification issue is to use randomized

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<sup>2</sup>The sample size (per county) of the survey is small, with about 9,000 individuals in 771 counties.

<sup>3</sup>However, with a daily frequency, it is hard to interpret the results since it is not likely that day-to-day change in media exposure can induce day-to-day change in behaviors.

<sup>4</sup>Additionally, [Garz and Zhuang \(2021\)](#) use an identification strategy with circulation-weighted excess mortality in a newspaper’s distribution area as the instrument. This instrumental variable strategy introduces possible violation of exclusion restrictions as excess mortality may cause the population to see the dangers of Covid in-person rather than through newspaper coverage, and as a result, reduce their mobility.

control trials (RCTs), as in [Banerjee et al. \(2020\)](#). In addition to the advantage in identification strategy, this paper also tests a cleaner hypothesis, since it provides an information campaign where the conveyed message is purely health-related information, while in the general media context, the contents are comprehensive and mixed.

[Banerjee et al. \(2020\)](#) conduct a randomized control trial where direct messages from a locally known Nobel Prize laureate, Abhijit Banerjee, are sent to mobile phone users to test the impact of information on behavior. The authors sent an SMS containing a 2.5-minute YouTube video message from Banerjee encouraging reporting symptoms to the local health workers, while the control regions received a link to a government website with Covid-19 information.<sup>5</sup> This intervention was proved to be successful, doubling the reporting of health symptoms to the community health workers, decreasing mobility, and increasing healthy practices such as hand-washing and mask-wearing. The authors also identified spillovers effects on the non-recipients of the messages within the same community. These results suggest that advocates from a celebrity can have an additional impact on public health campaigns even when similar information is provided by the government. One concern is how long these effects last. In the paper, the outcomes are measured immediately after the campaign (two weeks), and it is not clear whether the effect will fade away over time.<sup>6</sup>

Besides messages from celebrities, political leaders' speeches can also be extremely influential. [Ajzenman, Cavalcanti and Da Mata \(2020\)](#) study how the speech of Brazilian President Jair Bolsonaro affected social distancing behaviors in Brazil. President Bolsonaro was famously dismissive toward the virus, opposed quarantine measures, and even dismissed two health ministers, despite the increasing death toll.<sup>7</sup> [Ajzenman, Cavalcanti and Da Mata \(2020\)](#) use cross-sectional variation in political support for Bolsonaro (measured as presidential election vote share) and the timing of events when he publicly dismissed the risks associated with the pandemic. One difficulty is to define the key events in regard to Bolsonaro's opposition to social distancing interventions. The authors use newspaper front-page coverage, google search results, and the tweets' popularity to confirm the key dates. Overall, the authors find that areas with larger support to the president experienced a smaller reduction in social distancing than in areas with lower support for the president, while there was no difference in mobility in the days before the public events.<sup>8</sup>

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<sup>5</sup>There are also cross-randomization on additional message contents, including health behaviors, motivation, and ostracism. However, the authors did not find differential effects by contents.

<sup>6</sup>The authors do not find a consistent pattern on the effects over-time during the 2-week period.

<sup>7</sup>See [www.bbc.co.uk/news/world-latin-america-53021248](http://www.bbc.co.uk/news/world-latin-america-53021248).

<sup>8</sup>[Mariani, Gagete-Miranda and Retti \(2020\)](#) study effect of Bolsonaro's speeches on disease spread in Brazil using a similar design. [Aguilar-Gomez et al. \(2021\)](#) and [Daverio-Occhini, Montoya-Aguirre and Woo-](#)

## 2.2 Effect of Misinformation

Misinformation can pose severe public health risks if it affects people's willingness to comply with public health recommendations (e.g., social distancing and mask-wearing) and generates vaccine hesitancy. Roozenbeek et al. (2020) conduct a survey using five national samples from Ireland, Mexico, Spain, UK, and USA to investigate the prevalence of belief in Covid-19 misinformation across different countries and the role of belief in such misinformation in predicting relevant health behaviors. In particular, they identify the most common false claims circulating on media regarding the virus from the World Health Organization's (WHO) Myth-busters page and present the participants nine statements about the virus: *"six of which represent common examples of health-related and political misinformation (e.g. '5G networks may be making us more susceptible to the coronavirus' and 'Gargling salt water or lemon juice reduces the risk of infection from Coronavirus'), two of which were common factual statements (e.g., 'People with diabetes are at higher risk of complications from coronavirus') and one of which was not false but ambiguous (Taking ibuprofen when you are infected could make your symptoms worse)."*<sup>9</sup> Then they conduct correlational analysis to determine the predictors of susceptibility to misinformation about Covid-19. They find that a higher level of trust in scientists is associated with less susceptibility to misinformation, and importantly, the information source matters: people who are more likely to get information from WHO and less likely to get information from social media are also less susceptible to misinformation.

Susceptibility to misinformation has behavior consequences. Roozenbeek et al. (2020) find that people's increased susceptibility to misinformation is negatively correlated with self-reported compliance with public health guidance about Covid-19 and willingness to accept vaccine for themselves and for their family and friends. Using a different sample (Ireland and UK), Murphy et al. (2021) find similar results. The authors show that individuals who opposed the Covid vaccine are less likely to obtain information about the pandemic from traditional media and authoritative sources.

These two papers are informative about the characteristics of individuals who are susceptible to misinformation. However, the surveys are conducted in the early months of the Pandemic (March–May 2020), with respondents recruited via the internet, and with a relatively small sample size. In addition, from a policy perspective, it is not clear what are the effective measures to combat misinformation, since the analysis is not causal. In this

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Mora (2021) study the effect of Mexican President López Obrador's position on health outcomes in Mexico using a very similar identification strategy.

<sup>9</sup>[www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters](https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters).

light, [Loomba et al. \(2021\)](#) conduct a randomized controlled trial in the UK and the USA to quantify how exposure to online misinformation around Covid-19 vaccines affects intent vaccination. They measure people's willingness to vaccinate at the baseline and after the treatment, and the treatment is exposure to misinformation. Specifically, they present the treated group with misinformation and the control group with factual information and then record the respondents' evaluation of the information (whether they agree with the information displayed, whether they would fact check, and whether they would share the information) and potential behavior changes (whether they are inclined to be vaccinated). They do find that exposure to misinformation reduced the intent to vaccinate. While we acknowledge the importance of these findings, we are puzzled about how an experimental treatment that involved exposure of human subjects to misinformation could have passed an institutional ethics review. At the end of the questionnaire, the authors inform the participants that they were presented misleading or incorrect information about a Covid-19 vaccine, and ask the participants to check the corresponding government websites for the most up-to-date information. We think this message should be stronger and more salient.

What institutional features can determine an individual's level of trust in the government and susceptibility to misinformation? One hypothesis is that media quality matters. Countries with more free media may have less governmental propaganda that can spread misinformation, and it is reasonable to assume that people will be more trusting to the governmental recommendations. [Besley and Dray \(2020\)](#) rationalize this intuition with a formal model and test its predictions empirically. Using country-day panel data they show that countries with free media are more likely to report truthfully Covid-19 deaths and as a result more likely to impose lockdowns and reduce peoples' mobility. While the evidence comes from cross-sectional variation in the index of media freedom from the Varieties of Democracy project and suffers from a regular set of endogeneity concerns related to cross-country regressions, these findings are important to our understanding of how people react to media with a tarnished reputation in times pandemics.<sup>10</sup>

[Fetzer et al. \(2020\)](#) depicts one scenario where government actions correct misperception and improve trust towards government. Using a survey of 73 countries, the authors find that people's anxiety about the Covid was eased when the government take actions that were in line with their perceived correct path (e.g., lockdowns). In addition, misperception declined, meaning that people's beliefs about others' views became closer to the actual views of others.

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<sup>10</sup>The authors also use an epidemiological method to generate the predicted level of deaths. However, the parameters entering into the epidemiological model can also be affected by policy changes (e.g.  $\mathbb{R}_0$ , the basic reproduction number) and affected by institutional features that are correlated with free-media presence (e.g., intensive care unit availability).

## 2.3 Effect of Slanted Media

One of the specific and important strands of the literature on traditional media and Covid is related to the effects of slanted or biased media. These media sources are not necessarily providing outright falsehoods, but by framing news in partisan context, they might shape the behavior of its viewers in undesirable ways.<sup>11</sup>

Probably, the most famous example of such media is the Fox News channel in the United States. Being the most popular U.S. cable network with almost 3.5 million prime-time viewers, Fox is also a very conservative channel.<sup>12</sup> During the initial days of the pandemic, Fox devoted attention to three major topics: the role of China, the threat of Covid-19 being exaggerated, and alleged use of the Covid-19 threat by the Democrats to further their partisan interests.<sup>13</sup>

Importance of the Fox News in the life of the considerable share of the U.S. population and its reaction to the pandemic immediately resulted in a series of papers investigating its effects on health behavior and medical outcomes.<sup>14</sup> One of the first papers in this literature, [Bursztyn et al. \(2020\)](#) identifies the effect of the most popular Fox News show, Hannity, on Covid-19 mortality. The authors use U.S. time-zone discontinuity at the Designated Market Area level as a source of exogenous variation in how much time people spend watching Hannity as compared to another popular Fox News show, Tucker Carlson Tonight. In the initial days of the pandemic, Hannity was more dismissive towards the dangers of the novel coronavirus. The paper finds that areas more exposed to Hannity had a higher number of cases and deaths.

Several studies use exogenous variation in Fox channel position in the channel lineup to investigate the impact of Fox News on Covid outcomes. As explain in [Martin and Yurukoglu \(2017\)](#), cable providers, who wished to offer Fox News Channel to their viewers, put the channel into the most appropriate free slot. This idiosyncratic process created quasi-experimental variation in FNC exposure. When FNC has a larger number in the cable lineup position, people are less likely to watch it because it takes more efforts to move

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<sup>11</sup>E.g., [Allcott et al. \(2020\)](#) and [Milosh et al. \(2021\)](#) show that political polarization between the Republicans and the Democrats (exacerbated by the divide in choice of media consumption) explains changes in social-distancing behavior between U.S. counties.

<sup>12</sup>Foxnews.com: "Fox News reaches highest viewership...", URL: <https://www.foxnews.com/media/highest-viewership-network-history-msnbc-cnn-2020>.

<sup>13</sup>[Ananyev, Poyker and Tian \(2021\)](#) document that the message of China's culpability was the most prominent in three most-watched Fox News opinion shows in January and February of 2020. [Hart, Chinn and Soroka \(2020\)](#) study Covid-19 coverage in U.S. newspapers and TV networks and conclude that they all are mostly focused on the political aspects of the pandemic rather than the health aspects. Similarly, [Mellado et al. \(2021\)](#) find similar patterns in social media posts of news outlets in various countries.

<sup>14</sup>Most papers on this topic are empirical. [Wright et al. \(2020\)](#) offer a formal model showing how slanted media can affect people's choice of compliance with government recommendations.

to this channel.

Ash et al. (2020); Simonov et al. (2020); Ananyev, Poyker and Tian (2021) study the effect of Fox News on COVID-related outcomes using the channel position design.<sup>15</sup> All three papers find a negative effect of Fox on population compliance with social distancing. Ananyev, Poyker and Tian (2021) and Ash et al. (2020) also document the effect on the number of Covid-19 deaths in localities more exposed to Fox News. Additionally, Pinna, Picard and Goessmann (2021) show that Fox News exposure reduced vaccination rates after the Covid-19 vaccine become available.

Taken together, these results demonstrate that delivering factual information through media is important. The contents, who convey the messages, how messages are spread, and the type of audience matter for the effectiveness of information transmission. Interventions that aim to improve critical thinking and trust in science may be a promising measure to help the fight against the Covid and public health crisis in general. In addition, high media quality and correct actions by the governments can improve trust and contain the spread of misinformation.

### 3 Effect of Social Networks and Social Media

Social media — social networking sites like Facebook, Instagram, TikTok, and Twitter as well as messengers like WeChat, WhatsApp, and Telegram — have in many cases supplanted the traditional media (newspapers, TV, and radio) as a source of information. As Zhuravskaya, Petrova and Enikolopov (2020) point out, social media differs from traditional media in two crucial ways: (i) lower barriers to entry, and (ii) prevalence of user-generated content. Information that gets published on social media is usually not vetted by any editorial body and is less regulated. Thus, it is not surprising that all kinds of non-mainstream messages circulate on social media: information about corruption (Enikolopov, Petrova and Sonin, 2018), false messages related to the current electoral context (Allcott, Gentzkow and Yu, 2019), crowdfunding campaigns (Lu et al., 2014), personal stories of sexual violence (Quan-Haase et al., 2021), and other issues. The spread of such information is facilitated by the “digital addiction” of social media users (Allcott,

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<sup>15</sup>Ash et al. (2020) and Simonov et al. (2020) instrument actual county-/zipcode- and time-varying viewership of the Fox News in 2020 with the cross-sectional variation in Fox channel position in 2016 and 2015, respectively. Ananyev, Poyker and Tian (2021) estimate reduced-form effect of the exposure to Fox News using a cross-sectional variation to the Fox channel position in 2005, to address the fact that Fox may endogenously lower their channel position over-time. Hence, due to the cross-sectional nature of the instrument — Fox channel position — all three papers, essentially, measure heterogeneous effects of exposure to Fox News. Here, Simonov et al. (2020) and Ash et al. (2020) use SafeGraph data to measure physical mobility, while Ananyev, Poyker and Tian (2021) use two independent datasets: by UNACAST and by Facebook.

Gentzkow and Song, 2021). Social media have been demonstrated to have causal impact on anti-government protests (Enikolopov, Makarin and Petrova, 2020), hate-crimes (Müller and Schwarz, 2021), and xenophobic attitudes (Bursztyn et al., 2019).

Even before the current pandemic, social media sites and messengers became hotbeds for various conspiracy theories and misinformation. For example, QAnon, an idea that the world is controlled by a secretive elite of Satan-worshipping pedophiles, had gained traction on Facebook and Instagram (Bracewell, 2020). In the meantime, Facebook groups opposing vaccinating children against communicable diseases started to gain traction. In 2012, Diekema (2012) warned about low vaccination rates in some areas within the U.S. that contributed to outbreaks of measles, pertussis, and other contagious diseases. The article also noted: “False or misleading information about vaccination is widely dispersed by a few influential individuals, self-described vaccine-safety advocates, and some clinicians.” Since 2012, the influence of these individuals and their reach only grew.

The literature exploring the role of social media can be roughly divided into two currents. The first one looks at the role of social networks and peers in determining behavior and health-related outcomes. The second one studies social media as a communication channel through which information and misinformation are transmitted, and various groups (including anti-vaccination campaigners) are organized. It should be pointed out that, as in the studies of the effects of traditional media on Covid-related outcomes, the problem of causal identification looms large, and many papers attempt to address it using creative research designs.

### **3.1 Social Networks as Transmission Mechanism and Measurement Device**

Social networks are important channels for information exchange. However, the measurement of social networks can be difficult in survey data or administrative records. Social media provide a platform for communication and also allows for the direct observation and measurement of social networks. Facebook, as one of the most prominent social network platforms, creates a social connectedness index between regions using friendship information. Intuitively, two regions are more socially connected if there are more Facebook connections between them, conditioning on the total number of possible connections based on the number of Facebook users in these two regions.

Several studies use the Facebook-based social network measure to investigate how the exposure to Covid through networks impacts individuals’ behavior and severity of Covid outbreaks. Holtz et al. (2020) uses the data on Facebook friends in the U.S. to

demonstrate that social distancing policies across U.S. counties can have spillover effects through social-network friendship connections: people reduce mobility when shelter-in-place policies take place in their friends' counties. Using a calibrated analytical model, they demonstrate that uncoordinated policies across regions are less efficient by ignoring these social and geographical spillover effects. While [Holtz et al. \(2020\)](#) show that policies effects travel through social networks, [Bailey et al. \(2020\)](#) show that perceived Covid severity also does. Using the same social connectedness index across U.S. counties, they demonstrate that if a person has more Facebook friends in areas affected by Covid-19, they are more likely to reduce their movement and spending in response to the pandemic. Consistently with the importance of friends, the effect is larger from closer friendships.<sup>16</sup> The networks also predict disease transmission. Using within-country connections in the U.S. and Italy, [Kuchler, Russel and Stroebel \(2021\)](#) show that the spread of Covid-19 can be predicted by the number of Facebook friends of persons in the initial hotspots, even after adjusting for an array of geographical controls.

Social networks crossing countries' borders also matter. Using social connectedness index between U.S. counties and other countries, [Charoenwong, Kwan and Pursiainen \(2020\)](#) document that counties with higher levels of connections to Italy and China (two countries that were most affected by Covid-19 in the early days of the pandemic) had higher rates of compliance with the mobility restrictions imposed by the local governments. Note that connectedness with these two countries can be interpreted both as exposure to lockdown policies and as exposure to outbreak severity. Additionally, [Milani \(2021\)](#) analyzes *cross-country* connections with Facebook and uses these data to estimate the vector autoregression (VAR) model of the spread of Covid-19, social distancing behavior, and risk perceptions in 41 countries arguing that the initial shocks from the affected countries lead to the gradual adjustments of people's behavior.<sup>17</sup>

While these results are interesting, one needs to be cautious about causal interpretations. First, regions that are more connected on Facebook can share other common features, such as culture, social norms, risk perception, and policy preferences. All these factors can affect people's behavior in terms of responses to the Covid shocks and outbreak severity. Second, more social connections are also associated with more economic

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<sup>16</sup>However, reverse causality can be a substantial concern in [Holtz et al. \(2020\)](#) since it is quite likely that a U.S. county's choice of social-distancing policy is affected by those of neighboring counties, both for public health and political reasons. The authors use weather and industry shift-share instruments to address these concerns; there are additional issues related to these instruments. Similar identification threats are present in [Bailey et al. \(2020\)](#).

<sup>17</sup>Note that there are also other ways to measure social networks. [Valsecchi and Durante \(2021\)](#) use pre-determined province-to-province migration patterns, regional outbreaks, and real-time population movements to show the role of migrants both as information providers and as virus carriers.

and political connections. There is no direct evidence on the information transmission through the social network, and in particular, through social media. Rather, it is either an assumption or is inferred from indirect evidence.

Besides the within-and-between-country social network measures, Facebook also provides the social distancing measures for more than 100 countries and regions, at the sub-national level. This data can be useful since researchers don't need to rely on separate data sources in different countries. For example, [Tian, Caballero and Kovak \(2021\)](#) document the spread of social distancing practices from U.S. counties to Mexican *municipios* through migrant networks using mobility measures from Facebook in these two countries.

In sum, the analysis of social media data prove to be highly relevant and productive for the literature on Covid-19. First, social media connection is an important forecasting and modeling device. Second, social media sites and phone applications, if used ethically and responsibly, can be important sources of mobility data used to evaluate behavioral responses to new regulations and changes in epidemiological situations. Beyond the Covid crisis, these datasets have wide applications in urban economics and research on social networks.

### 3.2 Social Media Content

Even before the Covid-19 pandemic, Facebook had become an important platform for the movement against vaccination ([Dhaliwal and Mannion, 2020](#)). After the outbreak, the problem became worse: the largest main “anti-vax” groups gained additional 7.8 million followers ([Armitage, 2021](#)) contributing to the confusion about vaccinations and the spread of outright misinformation. It is estimated that the online anti-vaccination movement can receive a billion U.S. dollars of annual revenue through Facebook and YouTube ads ([Burki, 2020](#)). [Pierri et al. \(2021\)](#) document a negative correlation between the Covid-19 misinformation shared on Twitter and vaccination rates across U.S. states.<sup>18,19</sup>

However, social media can also play a positive role in the pandemic. [Porcher and Renault \(2021\)](#) measure Covid-19 beliefs on Twitter using phrases like “wear a mask,” “stay safe” and others, and find that prevalence of such phases is correlated with the subsequent increase in social-distancing behaviors. Most interestingly, due to the “low cost” nature of

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<sup>18</sup>Social media companies have implemented some policies to combat misinformation. However, the effectiveness of the policies are in question. For example, [Théro and Vincent \(Forthcoming\)](#) find that while Facebook attempts to reduce the distribution of the posts by the groups who share misinformation, such groups increase the frequency of posting. Overall, their engagement is contained but not necessarily decreased.

<sup>19</sup>Papers in this paragraph are also an example of the literature on misinformation during the pandemic covered in Section 2.2. Because these papers discuss misinformation in *social media* we decided to cover them in this Section.

entry into the social media content production, RCT interventions become more feasible for researchers. [Breza et al. \(2021\)](#) describes such an intervention: a group of doctors and nurses created videos about the importance of staying at home during 2020 Thanksgiving and Christmas and randomized the intensity of Facebook ad campaign across U.S. counties. As a result of such intervention, places with a high campaign intensity experienced a 1-percentage-point larger decline in distance traveled as well as a 3.5-percent lower rate Covid-19 infection rate after the holidays.

Why do people decide to share certain Covid-related content on social media? The aforementioned paper by [Bailey et al. \(2020\)](#) investigate this issue as well. The authors identify a person's position towards Covid-related restrictions using Facebook posting contents and group membership. They find that having friends in Covid-affected areas raised awareness about the risks of the disease, increased the probability of posting content supporting the restrictions, and decreased the probability of joining a Reopen-Group.

In sum, social media content prove to be consequential for Covid-19 related behaviors. However, the direction and extent of its influence and an optimal menu of policy responses are still open questions. It has been demonstrated that in the context of political campaigns, imposed and voluntary fact-checking can significantly decrease the spread of falsehoods on social media (see, for example, [Guriev, Henry and Zhuravskaya, 2020](#)). It might be informative to explore the effect of similar interventions on Covid-19 misinformation.

### **3.3 Effect of Covid-19 on Media**

In addition to the literature on the effects of media on Covid-19-related outcomes, new literature emerged shedding light on how the pandemic itself affects the media. Probably, the most visible effect that the pandemic had on the media is that it can change news composition, since media wants more viewership and may cater to the preference of readers. [Sacerdote, Sehgal and Cook \(2020\)](#) analyze the majority of English-language news articles from January 1, 2020, to July 31, 2020. Then the authors conducted textual analysis on roughly 20,000 Covid-related news stories to examine levels of negativity by subtopic, source of the news, and time period. They find that U.S. news from the top media outlets is on average more negative than more general U.S. media outlets or non-U.S. media sources. They also find that this negativity is uncorrelated to the political leanings of the media's audience. Most puzzling, they find that U.S. media is more eager to discuss Trump's refusal to wear a mask or Trump suggesting drinking hydroxychloroquine to cure Covid-19 than discussing the benefits of health behavior.

Consuming negative news can impact one's stress level and generate depression; cute memes on social media may help. Myrick, Nabi and Eng (2021) conducted an experiment by showing cute memes (including memes with kittens and puppies) to the participants in Amazon's Mechanical Turk. Then they measured how these memes affect general stress level, as well as Covid-related stress and coping efficacy. Additionally, they were showing Covid-related memes to the participants. The authors find that discussing Covid-related issues using memes is not as stressful: memes about Covid-19 were associated with lower levels of Covid-related stress than were non-Covid-related memes.

Another important outcome that was affected by the pandemic is anti-Asian hatred, especially in the United States. This won't be a surprise to anyone who saw President Trump publicly calling Covid-19 "Chinese virus" and Fox News catching it up after him. The Covid-19 pandemic can affect media coverage of race that exacerbate anti-Asian sentiments in the U.S. Deng and Hwang (2021) collected survey data from 2,363 non-Asian respondents living in the U.S. and show the correlation of Fox News viewership with the level of xenophobic behavior.

Overall, the way Covid news are produced and consumed can help our understanding on incentives of media and its interaction with general population mentality and fundamental social trends.

## 4 Summary

The emerging literature on Covid-19 and media investigate many important issues: the effectiveness of information transmission, the effects of misinformation, the impact of social networks, and the impact of biased media on behavioral and epidemiological outcomes. While the topic itself is new, many important studies have been produced that utilized novel data, collected fascinating descriptive evidence, and developed persuasive strategies of causal identification.

The causal findings are consistent with the previously established results on the impact of media on behavior. Previously, the effects of media have been established for many contexts, and one can view social-distancing, mask-wearing, and vaccinations as yet another situation where media proved to be important. It is important to keep in mind, however, that while in other contexts, such as voting, individual decisions matter only when aggregated with other similar decisions, when it comes to Covid-19 related behaviors, individual decisions not to engage in safe behaviors can directly and immediately harm the affected individuals and members of their families. Demonstrated importance and media in such life-and-death contexts represent pushing the boundary in the field of media

economics.

Another salient feature is the growing complementary between traditional media and social media. The literature on Covid and media shows that both can play an important role, in a positive way and in a negative way. Importantly, the interaction between the two can make the information transmission more efficient. For example, [Banerjee et al. \(2020\)](#) combine several elements to make the information campaign effective: a (non-social-media) celebrity, a centralization way of distribution (through SMS message), and usage of novel media platforms (YouTube).

Potential avenues for future research include identifying optimal ways to limit the spread of online misinformation, exploring feasible ways to counter the pernicious impact of slanted media, developing convincing research designs to shed light on the organization and functionality of social networks and social media, and investigating the optimal design for information transmission combining both traditional and novel media formats.

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