

# The effect of big-city news on rural America during the COVID-19 pandemic

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Can "urban-centric" local television news coverage of the COVID-19 pandemic affect the behavior of rural residents with lived experiences so different from their "local" news coverage? Leveraging guasi-random geographic variation in media markets for 771 matched rural counties, we show that rural residents are more likely to practice social distancing if they live in a media market that is more impacted by COVID-19. Individual-level survey responses from residents of these counties confirm county-level behavioral differences and help attribute the differences we identify to differences in local television news coverage-selfreported differences only exist among respondents who prefer watching local news, and there are no differences in media usage or consumption across media markets. Although important for showing the ability of local television news to affect behavior despite urban-rural differences, the media-related effects we identify are at most half the size of the differences related to partisan differences.

media effects | natural experiment | rural America | COVID-19

The ability of the news media to provide information to the mass public is critical (1), especially during events like the COVID-19 pandemic when our understanding of the disease, its spread, and government responses are changing rapidly. The importance of accessing up-to-date information about one's own community is critical precisely because the impact of the COVID-19 pandemic varies tremendously across localities in the United States. Although many have turned to their local television news media as their primary source of COVID-19– related information in response (2), the local television news is not always local for some viewers. For many of the rural residents in a media market, their daily experiences and concerns may be vastly different from the stories covered by their local television news.

This discrepancy is important because the early outbreaks of COVID-19 have mostly occurred in large cities. How rural people respond to urban-focused COVID-19 news coverage has critical, but uncertain, implications for better understanding the trajectory of the COVID-19 pandemic and how the urban-rural divide may continue to impact American politics and mass political behavior. On the one hand, stories focusing on the public health consequences affecting nearby cities may make rural residents more willing to engage in social distancing behaviors to prevent outbreaks in their own communities. Alternatively, exposure to "urban-centric" pandemic coverage may cause rural Americans to be more likely to dismiss the virus because of differences between their rural community and the harder-hit urban communities portrayed in local media. Indeed, as Kathy Cramer (3) persuasively argues in The Politics of Resentment: Rural Consciousness in Wisconsin and the Rise of Scott Walker, perceptions that their communities are significantly different from urban areas in ways that are unfairly overlooked by politicians and the media lie at the core of the American rural consciousness and resentment. If so, the willingness of rural residents to dismiss the concerns being raised by an "urban-centered" news may undermine public health when collective responses are required.

Attempts to identify media effects have long been plagued by issues of endogeneity, measurement error, and self-selection (4). Comparing viewers and nonviewers leads to misleading effects because of how different viewers are from nonviewers including in how willing they are to seek out news in the current high-choice media environment (5, 6). Experiments allow researchers to better control for variation in media exposure (ref. 7 has recent innovation), but it is impossible to know whether the estimated effects generalize or persist beyond the experimental condition. As a result, recent studies rely on ambitious field experiments and quasi-experiments to identify effects (8–13)—an approach we follow.

To identify the effect of urban-centric local television news on rural residents, we leverage geographic variation in media market coverage to compare otherwise similar rural respondents living in media markets with varying levels of COVID-19 severity. These comparisons are possible because the United States is partitioned into 210 geographically defined designated market areas (DMAs) that are generally centered in an urban area\* by Nielsen Media Research (14). Issues of signal quality aside, every resident in a media market (DMA) is theoretically able to receive the same set of broadcast channels.

We focus on local television news because it is the primary source of local news—nearly 60% of our sample report watching local television news (compared with only 19% who report reading local newspapers) (*SI Appendix*, section K has more details), and viewership of local television news has only

## Significance

The COVID-19 pandemic reminds us of the importance of local news for keeping the public informed about their community. However, because of how media markets are defined geographically, "local" television news is not equally local. For some rural residents, their local news often focuses on urban communities with issues quite different from their own. We show that rural residents are more likely to engage in social distancing behavior than otherwise similar rural residents if their local news is produced in a city that is more impacted by COVID-19. Despite the urbanrural differences, coverage of the pandemic's impact in the more urban counties is able to slightly, but significantly, impact the willingness of rural residents to engage in social distancing.

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\*A DMA refers to a set of counties that form an exclusive geographic area "in which the home market television stations hold a dominance of total hours viewed."

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increased as a result of the pandemic. As a recent industry study concludes, "the COVID-19 pandemic is fueling a resurgence in viewership of local news and linear television in the United States" (15). That said, we know that local television news coverage varies from local newspaper coverage (16–19), so we are careful to interpret our findings in terms of local television news rather than local news more generally.

Most important for the purpose of identifying media effects is the fact that television media market boundaries create a natural quasi-experiment where otherwise similar (and even neighboring) rural counties are assigned to radically different media market centers and local news media. For example, residents of Sullivan County, NY-a county located in the Catskill Mountains to the northwest of New York City-receive their "local" news from stations with headquarters in New York City, but residents of neighboring Delaware County receive their local news from Binghamton, NY. Largely by chance, depending on where they live, otherwise similar rural residents receive their local news from stations located in cities experiencing substantially different versions of the COVID-19 outbreak. Because local television news outlets are known to prioritize the concerns of core cities in a media market (20), variation in the impact of COVID-19 pandemic across urban cities creates variation in local news coverage of the public health consequences of COVID-19.

This difference matters. Using data on the percentage of county residents staying home in 771 otherwise similar rural counties and a survey of nearly 9,000 white rural residents of those counties, we show that rural residents engage in more social distancing if they happen to live in a media market whose local television news is produced in a city that is more impacted by COVID-19 than otherwise similar rural residents who receive their local news from less-impacted cities. Our ability to eliminate confounding explanations (e.g., the increase in social distancing only occurs among otherwise similar individuals who report watching the local news) suggests that the differences we identify are attributable to differences in local television news coverage.

Concerns about the erosion of democratic accountability often arise when local news focuses largely on the concerns of distant communities-especially in a fragmented media environment that is increasingly dominated by national concerns (21). Local journalism is often thought important for the public interest because of its ability to inform individuals about local issues than can counterbalance the negative effects of partisan events covered by the national news coverage. Whether the local media is able to perform such a role is unclear, and the case we examine is a hard one for media effectsfocusing on whether urban-centric television news can change the behavior of rural Americans despite substantial community (and partisan) differences in the subject, the audience, and also, the nature of local television news. The positive effects we find are reassuring from a public health perspective, but the relative magnitudes of the effects are notably smaller than important countervailing factors such as Republican partisanship and gender-suggesting that there are important limits to the effect that local television news can have on changing behavior.

### **Data and Research Design**

To identify the effect of differences in local television news coverage of COVID-19, we compare otherwise similar residents of rural counties—defined by the US Census as having less than 400 people per square mile—who differ in whether their local television news is from 1 of the top 25 largest media markets or from outside the top 100 media markets. To do so, we use county demographics to match every rural county located in a top 25 media market to its most similar county located in an outside the top 100 media market.<sup> $\dagger, \ddagger, \$$ </sup>

To characterize the difference in media markets and rural counties in terms of the incidence of COVID-19, Fig. 1 graphs the distribution of confirmed COVID-19 cases as of 1 April 2020 in the 771 rural counties we examine (Fig. 1, Upper) relative to the largest county of the associated media market for these rural counties (Fig. 1, Lower) using a log scale to correct for outliers.<sup>‡</sup> As the figure makes clear, the distribution of the incidence of COVID-19 in our 771 matched rural counties is nearly identical regardless of whether the county is in a populous media market or not. In contrast, there are far more confirmed COVID-19 cases in the counties containing the local television news stations in the larger media markets. Moreover, the incidence of COVID-19 cases in media markets outside the top 100 DMAs is far more similar to our sample of rural counties than is the distribution of COVID-19 cases in the larger media markets. Because local news coverage is typically driven by issues affecting the most populous county of the media market, our identification strategy leverages the differences in Fig. 1 to determine if the differential impact of COVID-19 in the larger media market increases the social distancing behavior of residents of rural counties with similar numbers of COVID-19 cases.

Identifying the consequences of the differences displayed in Fig. 1 on social distancing behavior requires addressing ecological inference concerns and eliminating confounding explanations for behavioral differences that may covary with media market size. To do so, we survey 9,081 white respondents with internet access from the 771 matched rural counties between 6 and 14 April using the online survey platform, Lucid.<sup>§</sup> We collect information on media usage, COVID-19 concerns, and self-reported social distancing behaviors (if any). The research protocol was reviewed and approved by Vanderbilt University's Institutional Review Board (IRB#200574). All subjects provided informed consent. As expected given the county-level sample balancing we employ, rural respondents are nearly identical in terms of demographics and other potentially confounding factors regardless of whether they reside in a top media market or not (*SI Appendix*, section B). Respondents also do not differ in their media usage or attitudes toward the news media in general among those who prefer local news or among those who report that they do not watch the local news (SI Appendix, section D).

Although there are no statistically distinguishable differences in terms of who prefers to watch local television news across media markets, rural residents in top 25 media markets are less approving, on average, of local news coverage of the COVID-19 pandemic compared with their counterparts in media markets outside the top 100 (*SI Appendix*, section E). This difference is reassuring given the discrepancy in COVID-19 incidence graphed in Fig. 1—we would expect the dramatic difference in COVID-19 cases to create a mismatch between local television news coverage and local rural experiences to increase the disapproval of local news coverage for rural residents living in a

<sup>&</sup>lt;sup>+</sup>*SI Appendix*, section B explains the matching process and reports the similarity of the 771 matched counties using the 2014 5-year average of the 2010 US Census.

<sup>&</sup>lt;sup>‡</sup>We choose 1 April 2020 because our survey of rural residents asking about their social distancing behavior "last week" was launched on 6 April. We also chose this date because both 1 April 2019 and 1 April 2020 are weekdays, and comparing the percentage of residents who are staying at home year over year is therefore a more meaningful comparison. *Sl Appendix*, section G presents the relationship using a per capita measure to show a similar relationship, but we focus on the number of cases for expositional purposes because the logged per capita distributions are all negative.

<sup>&</sup>lt;sup>§</sup>We ultimately recruited respondents from 705 of the 771 matched counties. We focus on white respondents to maximize our statistical power and avoid differences due to race and ethnicity, but the rural counties we analyze are roughly 85 to 90% white on average. *SI Appendix*, section L has the wording of the survey questions we analyze.



**Fig. 1.** Upper compares the distribution of the log number of COVID-19 cases in rural counties located in 1 of the 25 largest DMAs and the distribution in matched rural counties located in a media market outside the top 100 largest media markets. *Lower* graphs the distribution occurring in the respective media market core county for these 771 rural counties. Horizontal lines denote the median number of cases. Because using a logged measure results in missing cases for counties with no confirmed cases of COVID-19, we recode these cases to be the minimum value in the sample with positive cases to avoid creating missing values. *SI Appendix*, section B reports a similar relationship using the logged number of cases per capita.

media market whose core county is more impacted by COVID-19. We interpret the increased dissatisfaction as revealing that rural residents are more dissatisfied with their local television news coverage when the incidence of COVID-19 is much more prevalent in the core media market county than it is in their own rural county of residence. Whether this increased dissatisfaction results in an inability of local television news to impact the behavior of rural residents is the question to which we now turn.

### **Differences in County-Level Social Distancing**

To determine whether the urban-centric local news coverage of COVID-19 in larger media markets affects the social distancing behavior of rural residents, we rely on the county-level percentage of cellular devices staying at home reported by https://www.cuebiq.com/ for the week of 1 April 2020.<sup>¶</sup>

To begin, Fig. 2A compares how the percentage of residents staying home in our matched rural counties varies depending on whether they are located in one of the most populous media markets (Fig. 2A, *Upper*) or in one of the most COVID-19–impacted media markets (Fig. 2A, *Lower*). Regardless of the measure used, the distribution of raw data reveals that higher percentages of residents are staying home in rural counties located in top media markets.

To probe whether this relationship persists after controlling for the many ways in which the counties may vary, Fig. 2B presents the results of predicting the percentage staying home in a county on 1 April 2020 as a function of whether the county is located in an "urban" media market, the logged number of COVID-19 cases in the county per capita, whether the county was under a "stay-at-home" order, population density, median income, percentage of county residents who are white, percentage of residents with a high school education or less, and the two-party vote share for President Trump in the 2016 presidential election.

To ensure that our results are robust, we measure the treatment using three different measures: an indicator for whether the rural county was in 1 of the 25 most populous media markets, an indicator for whether the rural county is in 1 of the most top 25 COVID-19–impacted media markets, and a continuous measure based on the logged number of COVID-19 cases in the most populous county in the media market.<sup>#</sup>

The effects graphed in Fig. 2 reveal more social distancing in rural counties located in top 25 media markets relative to the social distancing that is observed in otherwise similar rural counties in "outside the top 100" media markets. This is true regardless of the measure we use to measure how the severity of the pandemic might impact local television news coverage. In addition, we also reassuringly find more social distancing effects in counties under stay-at-home orders and with larger numbers of confirmed cases of COVID-19. Reflecting the importance of elite partisan cues even during the pandemic, the more a county supported President Trump in the 2016 presidential election, the less likely its residents were to engage in social distancing all else equal.

Even so, rural residents of a county in a top 25 media market were 1 percentage point more likely to stay at home than rural residents in similar counties located in media markets outside the top 100—an effect that is roughly half the size of a stay-at-home order.

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<sup>&</sup>lt;sup>¶</sup>*SI Appendix*, section C shows that the results are robust to using the yearly change in the percentage staying at home, although the effects are much smaller.

<sup>&</sup>lt;sup>#</sup>Our results are robust to using a per capita measure (*SI Appendix*, section G), but we use the raw count because news programs typically reported the number of cases rather than the population-adjusted number of cases. If the effects are due to media coverage as we claim, social distancing should therefore vary according to the number of cases as that was the number being widely publicized.



**Fig. 2.** A shows the difference in the distribution of county-level social distancing using two different measures of urban media market type. *B* shows predicted change in percentage stay at home from a one-SD change in each variable from three models using three different measures of urban media market type. Positive values indicate increased social distancing.

### **Differences in Individual-Level Social Distancing**

The county-level results of Fig. 2 are suggestive, but they are incomplete because they rely on aggregate relationships. To validate our interpretation, we use a survey of rural residents of these matched counties to rule out confounding differences in media usage and show that similar differences emerge at the individual level even after controlling for individuallevel differences in demographics, political orientations, and media usage. Our survey also allows us to better examine our proposed mechanism because we are able to confirm that the differences in self-reported social distancing behavior only occur among those who report watching their local television news.

Table 1 presents the results of using least-squares regression to predict whether white rural residents are more likely to report engaging in social distancing if they live in an urban media market and they also watch their local television news.<sup>||</sup> Specifications 1 to 4 predict whether the respondent chooses "I stay at home and only go out to get food or medicine" when asked "Which of the following are you doing because of the coronavirus outbreak?," and specifications 5 to 8 report the results for predicting whether a respondent reports "I wear a mask when I go outside." For each response, we present the estimated effect of residing in a top 25 media market or top 25 most COVID-19–impacted media market (top 25 DMA and top 25 COVID-19 core) for those who report that they do not consume

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SI Appendix, Table S19 replicates the results using logistic regressions to confirm that the results are statistically distinguishable from zero. *SI Appendix*, section H reveals that there is also a relationship with increased concerns about catching COVID-19 among local television news watchers in larger media markets.

Table 1.	The effects of residing	in urban DMA in self-re	ported COVID-19 socia	l distancing behaviors

	Pr(stay home)				Pr(wear mask outside)			
	No local		Local		No local		Local	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Top 25 DMA	-0.02 (0.02)		0.03** (0.01)		0.03 (0.02)		0.03* (0.01)	
Top 25 COVID-19 core		-0.02 (0.02)		0.04*** (0.01)		0.02 (0.02)		0.04** (0.01)
Stay-at-home order	0.000	-0.000	0.01	0.01	0.03+	0.03+	0.01	0.01
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)
log(COVID-19 county cases per capita)	0.003	0.004	0.01	0.01	0.01	0.01	0.03***	0.03***
	(0.01)	(0.01)	(0.005)	(0.005)	(0.01)	(0.01)	(0.01)	(0.01)
Democrat	0.19***	0.19***	0.07***	0.07***	0.11***	0.11***	0.08***	0.08***
	(0.02)	(0.02)	(0.01)	(0.01)	(0.03)	(0.03)	(0.02)	(0.02)
Republican	0.09***	0.09***	0.02	0.02	—0.01	-0.02	_0.03⁺	_0.03⁺
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
Age	0.003***	0.003***	0.003***	0.003***	0.004***	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)
Weekly church attendance	0.000	0.000	—0.01	—0.01	0.07***	0.07***	0.02	0.02
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
Child at home	0.01	0.01	0.04**	0.03**	0.03	0.03	0.01	0.01
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)
Parent in elderly home	_0.13***	_0.13***	_0.06**	_0.06*	-0.004	-0.005	0.02	0.02
	(0.03)	(0.03)	(0.02)	(0.02)	(0.04)	(0.04)	(0.03)	(0.03)
HS education or less	_0.09***	_0.09***	_0.04**	_0.04**	_0.07**	_0.07**	_0.04**	_0.04**
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)
College education or more	0.03 (0.02)	0.03 (0.02)	0.03* (0.01)	0.03* (0.01)	-0.01 (0.02)	-0.01 (0.02)	0.03* (0.01)	0.03* (0.01)
Male	-0.11***	-0.11***	-0.09***	-0.09***	-0.04*	-0.04*	-0.04**	-0.04**
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)
Unemployed	0.04*	0.04*	0.04*** (0.01)	0.04*** (0.01)	0.01 (0.02)	0.01 (0.02)	-0.01 (0.01)	-0.02 (0.01)
Constant	0.56*** (0.07)	0.57*** (0.07)	0.67*** (0.05)	0.65*** (0.05)	0.20* (0.08)	0.20* (0.08)	0.44*** (0.06)	0.42***
Observations	3,007	3,007	6,014	6,014	3,007	3,007	6,014	6,014
R <sup>2</sup>	0.09	0.09	0.05	0.05	0.05	0.05	0.04	0.04

SEs are in parentheses. HS, high school. \**P* < 0.1; \**P* < 0.05; \*\**P* < 0.01; \*\*\**P* < 0.001.

local news (specifications 1, 2, 5, and 6) and those who do (specifications 3, 4, 7, and 8).\*\* If local television news is responsible for increased social distancing, we should only detect differences between media markets among local news watchers.

The results in Table 1 are consistent with the county-level social distancing results summarized in Fig. 2. First, the positive and statistically significant effect for top 25 DMA and top 25 COVID-19 core observed in specifications 3, 4, 7, and 8 reveals that white rural residents who happen to receive their local television news from a top 25 media market are more likely to stay at home and more likely to wear a mask outside than their counterparts in a media markets outside the top 100 among those who watch their local television news.

Second, we only observe differences among those who report watching local television news—we observe no difference in social distancing behavior (specifications 1, 2, 5, and 6). This is precisely the pattern we would predict if the differences in social distancing we detect in the county-level analysis are due to differences in local television news coverage of COVID-19. If It is also reassuring that the magnitude of the effects we identify in our individual-level analysis is roughly similar to the magnitude we detect in our county-level analysis using different data and different specifications. Our county-level analyses reported in Fig. 2 revealed an effect size of roughly 1%. Specifications 2 and 4 in Table 1 reveal an individual-level effect size of either 0.03 or 0.04 (with an SE of 0.01). Because only 60% of our sample report consuming local television news, this means that the implied county-wide difference in social distancing is between 1.8% (0.03  $\times$  0.6) and 2.4% (0.04  $\times$  0.6) plus or minus 1.18% (0.01  $\times$  1.96  $\times$  0.6) for each. Thus, the implied county-level effects of our individual-level analyses are reassuringly consistent with the effect sizes we estimate in our county-level analyses.

Several other political and demographic factors also affect self-reported social distancing. Male respondents are

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<sup>\*\*5</sup>I Appendix, section G replicates the results using treatments defined using the number of COVID-19 cases, the number of COVID-19 cases per capita, the number of COVID-19-related deaths, and the number of COVID-19 deaths per capita. Using different measures of the impact of COVID-19 in a media market does not affect the estimated relationship.

other factors were responsible for the county-level differences reported in Fig. 2, we would expect to find behavioral differences among those who live in the same communities but who do not consume local television news. Instead, only those who prefer watching local news engage in more social distancing behavior.<sup>††</sup>

<sup>&</sup>lt;sup>t†</sup>Also important for our interpretation is the fact that who chooses to watch local television news does not vary by media market (*SI Appendix*, section K).

significantly less likely to stay at home or wear a mask outside. Those with a high school education or less are also less likely to engage in social distancing behaviors, and college-educated local news watchers are more likely to do so. The elderly are also reassuringly more likely to engage in social distancing. Partisanship obviously also clearly matters; Democrats are much more likely to engage in social distancing than either independents or Republicans.<sup>‡‡</sup>

The media effects we find are important, but it is important to highlight that the effects we are able to attribute to differences in local news coverage are smaller than partisan and gender differences. Rural white residents in a top 25 media market who prefer local news (specification 3) are more likely to report staying home except for when obtaining food and medicine by 3 percentage points, but this difference is substantially smaller than the 7-percentage point difference between Democrats and independents or the 8-percentage point difference between men and women. Living in a top 25 COVID-19-impacted media market also makes local news watchers 4 percentage points more likely to report wearing a mask outside (specification 8), but Democrats are 8 percentage points more likely than independents to wear a mask. Even in the presence of a pandemic, partisanship and other demographics have a considerable effect on individual behavior-although there is also evidence that local television news coverage can help change individual behavior.

### Discussion

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As a result of the geographically varying public health consequences of the COVID-19 pandemic, many Americans have turned to their local television news for information about their local community (22). The resulting surge in local television news viewership is unique, especially given the ongoing decline in local journalism and the increasingly segmented media environment. However, local news is not always local, and whether individuals are able to receive local television news that focuses on the issues relevant to their community can vary because of how media markets are geographically defined in the United States. The local news for some rural residents may focus on the lives and experiences of urban communities far

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different from their own—perhaps especially during a pandemic that has impacted urban areas much harder than rural areas to date.

These differences can lead rural individuals to feel ignored by political and media elites (3), and this can undermine the effectiveness of local television news during a crisis. In fact, rural Americans report large levels of dissatisfaction with their local news coverage.<sup>§§</sup> Despite the dissatisfaction that many rural residents express about the local television news coverage they are able to receive, our results show that local news coverage is still able to impact individual behavior. Even if local news coverage affecting urban communities more than those that affect rural communities, our results show that local news coverage of the COVID-19 pandemic still influences the public health behavior of rural viewers.

From a public health perspective, the effects of the urbancentric news we identify are normatively positive but also limited. Our results show that rural individuals who may have otherwise been predisposed to be less likely to engage in social distancing during the COVID-19 outbreak are more likely to do so than similar rural individuals because they happen to receive their local television news from one of the more impacted cities. This is true even though they are also more disapproving of their local news coverage of the pandemic.

However, the effects of local television news we identify are limited—even during a pandemic when local news is arguably most important. In addition to being able to avoid local news coverage by choice, our results show that the effects of exposure are unable to fully compensate for partisan differences even among those who consume local television news. The ability of local news media to bridge the urban–rural behavioral gap is reassuring but also limited.

**Data Availability.** Replication data and codes are available in Dataverse (https://dataverse.harvard.edu/dataset.xhtml? persistentId=doi:10.7910/DVN/GC9JKM).

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<sup>&</sup>lt;sup>‡‡</sup>The fact that the partisan and demographic differences we detect are larger among those who prefer not to watch local news is suggestive of selection effects and the importance of accounting for local news consumption—Democrats who prefer national news (or no news at all) are more likely to engage in social distancing than Democrats who prefer local news, which likely reflects differences in the type of Democrats.

<sup>&</sup>lt;sup>§§</sup>Consider this quote from a rural Wisconsinite in Cramer's *The Politics of Resentment: Rural Consciousness in Wisconsin and the Rise of Scott Walker:* "This big building burned in some area. It's all over the news. [But if] some farmer loses his barn. . . it barely gets 3 sec" (ref. 3, p. 63).