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Quantifying the "infodemic": People turned to trustworthy news outlets during the 2020 coronavirus pandemic

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How did the 2020 coronavirus pandemic affect people's online news consumption? To understand this, we present a comparative analysis of data on an estimated 905B desktop and mobile visits to news outlets, and 54B Facebook engagements, generated by news outlets in the US, UK, France, and Germany between 2017 and 2021. We find that in 2020 online news consumption increased. Trustworthy news outlets benefited the most from the increase in web traffic. In the UK trustworthy news outlets also benefited the most from the increase in Facebook engagement, but in other countries both trustworthy and untrustworthy news outlets benefited from the increase in Facebook engagement. Overall, untrustworthy news outlets (as rated by NewsGuard) captured 2.3% of web traffic and 14.0% of Facebook engagement, while news outlets regularly publishing false content accounted for 1.4% of web traffic and 6.8% of Facebook engagement. People largely turned to trustworthy news outlets during the 2020 coronavirus pandemic.

Keywords: infodemic, news, misinformation, social media, COVID-19.

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Concerns over misinformation and "fake news" have recently gained prominence in public discourse, especially since the 2016 US presidential election. The World Health Organization has argued that in parallel to the 2020 coronavirus pandemic, societies have faced an 'infodemic', where "we are all being exposed to a huge amount of COVID-19 information on a daily basis, and not all of it is reliable." (WHO, 2020). Yet, no empirical study has quantified how people's main forms of online news consumption changed during the pandemic. Before the pandemic, a growing body of research had shown that "fake news" sites account on average for between 0.7% and 6% of people's daily media diet (Allen et al., 2020b; Cordonier & Brest, 2021; Guess et al., 2018, 2020), and that this percentage is similar on Twitter (Boberg et al., 2020; Grinberg et al., 2019; Osmundsen et al., 2021; see Table 1 below). However, some social networks—most prominently Facebook—are sometimes gateways to untrustworthy sources (Guess et al., 2020), so the figure is likely to vary from platform to platform (as well as from country to country).

Table 1. Non-exhaustive overview of peer-reviewed estimates of unreliable news consumption in the literature.

Study	Estimate	Platform	Country	Time period	Level of analysis	Definition of misinformation
Grinberg et al. 2019	5% of news diet	Twitter	US	August 2016 to September 2016	Domain	Negligent, deceptive, little regard for the truth or fake news.
Allen et al. 2020	1% of news diet	TV, desktop & mobile media consumption	US	January 2016 to December 2018	Domain	Fake, deceptive, low-quality, or hyperpartisan news (similar to Grinberg)
Guess et al. 2020	6% of news diet	Desktop media consumption	US	October 2016	Domain	Negligent, deceptive, little regard for the truth or fake news (similar to Grinberg)
Osmundsen et al. 2021	4% of news diet	Twitter	US	December 2018 to January 2019	Domain	Negligent, deceptive, little regard for the truth or fake news (replicated with Grinberg's classification)
Allen et al. 2021	19.4% of news clicks*	Facebook	US	January 2017 to December 2018	Domain	Fake, deceptive, low-quality, or hyperpartisan news (same as Allen et al. 2020)
Guess et al. 2021	15% of news exposure*	Facebook	US	2018	Domain	Fails to meet basic standards of credibility and transparency (NewsGuard)

Note. *These estimates come from the Social Science One URLs data, and are likely inflated because only URLs with 100 public shares are included (Allen et al., 2021).

Did these patterns hold during the 2020 pandemic, and are they the same across countries? In times of crisis, as people try to make sense of unusual situations, they typically consume more information (Lowrey, 2004). This point is consensual in the literature and led us to expect an increase in online news use during the coronavirus pandemic. A more disputed question is who benefits from the increase in information consumption during times of crisis. Some theories in social psychology predict that the uncertainty and anxiety caused by major crises is a fertile ground for rumors to take hold (Allport & Postman, 1947; Caplow, 1947; DiFonzo & Bordia, 2007; Festinger et al., 1948; Prasad, 1935; Schachter & Burdick, 1955).

In line with this account, inaccurate rumors have been shown to flourish during crises, in particular when uncertainty is high and official channels of information are not trusted or accessible (DiFonzo & Bordia, 2007; Shibutani, 1966). There is evidence that uncertainty and anxiety increased at the beginning of the COVID-19 pandemic (Altig et al., 2020; Hawes et al., 2021; Hyland et al., 2020), so one would expect a surge in the diffusion and consumption of unverified information to reduce uncertainty and increase a sense of control.

Other accounts suggest that in times of crisis, when official channels of information are trusted and functional, people typically consume more news from established news media and official sources because of their accessibility and reliability (Lowrey, 2004; Shibutani, 1966; Van Aelst et al., 2021). Yet it is not clear the extent to which official channels of information are trusted in the countries that we study. For instance, in 2020, trust in the media was particularly low in France, with only 23% of people saying that they can trust the news most of the time (Newman et al., 2020). The same appears to be true in the US (28%) and the UK (29%). By contrast, trust in the media is relatively high in Germany (45%). If the latter theoretical account is correct, one would expect untrustworthy news outlets to do better in France, the US, and the UK, than in Germany. Yet, no existing data speaks to this hypothesis because the literature is largely US-centric and lacks cross-cultural comparisons.

In this article, we document how people's online news consumption and their reliance on more or less trustworthy news outlets in four countries changed during the pandemic. To do so, we analyze behavioral and digital trace data from two of the most important and widely used news sources today: online news sites and Facebook (Newman et al., 2021). In the US, UK, France and Germany, Facebook is still the most widely used social media in terms of general use and news use (Newman et al., 2020). Across these four countries, 60% of the population use Facebook (compared to only 22% for Twitter) and 31% of the population use Facebook to get news (compared to only 12% for Twitter). Similarly, online news use is the most common way to access news in these four countries (71.25%), in front of TV (62%) and print (22.5%) (*ibid*).

Building on large-scale studies on misinformation that have been largely US-centric (see Table 1), we offer the first cross-country and cross-platform comparison of web traffic and Facebook engagement generated by news outlets between 2017 and 2021. Note that our Facebook data only captures engagement generated by posts on news outlets' Facebook page, whereas our web traffic data capture visits to news websites. We answer three research questions.

First, we document the proportion of web traffic (visits to news websites) and Facebook engagement (likes, emojis, shares, and comments) captured by untrustworthy news outlets in 2020.

> RQ1. What proportion of all news web traffic and Facebook engagement was generated by untrustworthy news outlets in 2020?

Second, we quantify the extent to which web traffic to news outlets, and Facebook engagement with news outlets, increased in 2020 compared to 2019.

> RQ2. Did web traffic and Facebook engagement generated by news outlets increase during the pandemic (compared to 2019)?

Third, we investigate who benefited the most from the increase in visits to news websites and Facebook engagement with news outlets that occurred in 2020. As stated above, some theories predict that this increase should benefit more trustworthy news outlets (Lowrey, 2004; Shibutani, 1966; Van Aelst et al., 2021), while others predict that it should benefit less trustworthy news outlets (Allport & Postman, 1947; Caplow, 1947; DiFonzo & Bordia, 2007; Festinger et al., 1948; Prasad, 1935; Schachter & Burdick, 1955).

RQ3. Did the change in web traffic and Facebook engagement in 2020 vary by news outlets' trustworthiness?

Materials and methods

News outlets' trustworthiness (NewsGuard)

To determine how well more or less trustworthy news outlets performed during the pandemic we relied on NewsGuard. NewsGuard offers extensive coverage of credible and low-quality online news producers. NewsGuard does not only cover mainstream media and local news organizations, but also blog posts and a variety of alternative news sources (see the 'List of news outlets' file on OSF). NewsGuard's coverage is so large that many news producers rated by NewsGuard were not covered by Comscore because they did not generate enough traffic (see SI section 1). NewsGuard ratings have been used in numerous scientific articles (Aslett et al., 2022; Dias et al., 2020; Edelson et al., 2021; Guess et al., 2021; Singh et al., 2020), and are similar to the ratings of national fact-checkers such as 'Les Décodeurs' from Le Monde in France or 'Media Bias Fact Check' in the US (Edelson et al., 2021).

NewsGuard employs a team of journalists and editors to rate news outlets from 0 to 100 based on nine journalistic norms of credibility and transparency, including whether they publish false content and/or use deceptive headlines (see 'https://www.newsguardtech.com/ratings/rating-process-criteria/'). The New York Times has a score of 100, Fox News 69.5, Breitbart 49.5, and One America News Network of

17.5. Sharp, binary distinctions between trustworthy and untrustworthy sources are fraught, and people will have strong views about how some brands are labeled, but NewsGuard categorizes news outlets with a score of 60 or lower as "generally untrustworthy" and above 60 as "generally trustworthy". Throughout the paper, we rely on their ratings, classifications, and terminology. Note that we excluded platforms, such as YouTube, and news outlets classified as satirical, such as the Onion. For our analysis, we combine NewsGuard ratings of 3592 news outlets from four countries with web traffic data obtained via Comscore and Facebook data obtained via CrowdTangle.

Web traffic (Comscore)

Comscore relies on panel (N = 300K in the US, 55.5K in the UK, 23K in France and 27K in Germany) and census measurement techniques to obtain longitudinal and cross-country unified digital audience measurement statistics. Comscore tracks desktop and mobile visits to news websites (on mobile it tracks visits via apps and mobile browsers). It has been used in numerous scientific articles (Allcott et al., 2019; Allen et al., 2020a; Fletcher et al., 2020; González-Bailón & De Domenico, 2021; Thurman et al., 2021; Yang et al., 2020).

As of September 2020, Comscore stopped tracking mobile web traffic in Germany. We excluded German data after August 2020 since mobile web traffic represents an important share of online web traffic.

Engagement on news outlets' Facebook page (CrowdTangle)

To measure engagement on the Facebook pages of news outlets we relied on the Facebook API, via the CrowdTangle front-end. CrowdTangle is a public insights tool owned and operated by Facebook. We excluded sources that were not affiliated with one of the four countries that we covered, such as the Facebook page of the World Health Organization (WHO) or Russia Today. However, when these sources had specific national

Facebook pages, such as Russia Today France and Russia Today Germany, they were included in the dataset. Note that when a news outlet had many Facebook pages (e.g., a subpage for business news) we used their main Facebook news pages (often the one with the most page likes). It is important to note that given the size of the dataset and the number of outlets covered (~3600), individual outlets, even the most popular ones (e.g. Fox News or the CDC), have little impact on the overall results (see SI section 7).

Results

Figure 1 offers a descriptive overview of our data. In the US, UK, France, and Germany we see an increase in visits to news websites in March 2020 (the month when the WHO declared COVID-19 a pandemic). In absolute numbers, this increase primarily benefited the most trustworthy news outlets (in dark green). The web traffic generated by untrustworthy news outlets is so small compared to trustworthy news outlets, that they are almost indistinguishable from the x-axis. The same is not true for engagement on news outlets’ Facebook page. In the US and France, we see that unreliable news outlets with a score between 40 and 60 (in orange) generated a substantial amount of engagement. Overall we see that the most trustworthy news outlets, with a score of 80 or more, largely dominate both visits to news outlets and Facebook engagement in terms of absolute numbers.

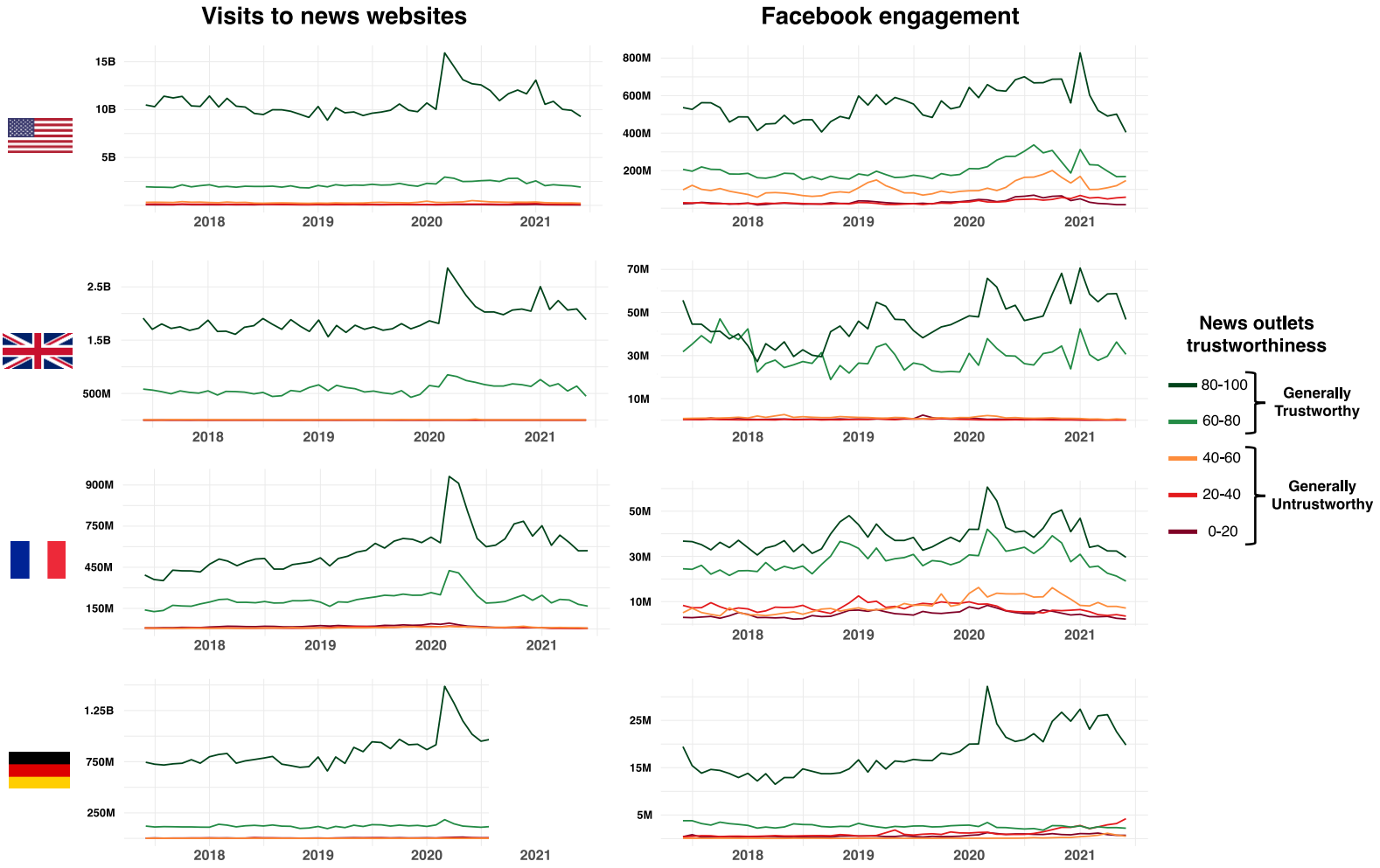

Figure 1. Number of visits to news websites (left) and engagement generated by news outlets' Facebook pages (right), by their NewsGuard score of trustworthiness, between 2017 and 2021. We excluded web traffic data in Germany after August 2020 because Comscore stopped tracking mobile web traffic.

RQ1. What proportion of all news web traffic and Facebook engagement was generated by untrustworthy news outlets in 2020?

Web traffic refers to the total number of visits to news websites, whereas Facebook engagement to the number of likes, emojis, shares, and comments, accumulated on the posts of news outlets' Facebook pages. In 2020, generally untrustworthy news outlets, as rated by NewsGuard, accounted for 2.28% of the web traffic to news outlets and 13.97% of the Facebook engagement with news outlets. In Table 2, we report these percentages by country and year.

Table 2. Proportion of web traffic & Facebook engagement captured by untrustworthy news outlets.

		US	UK	France	Germany
Web traffic	**2019**	3.22%	0.13%	5.73%	0.93%
	2020	3.42%	0.097%	4.55%	1.07%
	2017-2021	3.36%	0.10%	4.43%	0.97%
Facebook engagement	**2019**	17.42%	3.11%	25.11%	7.45%
	2020	20.31%	2.11%	24.75%	8.72%
	2017-2021	18.52%	2.44%	23.00%	8.52%

These percentages are smaller when considering only the subset of news outlets identified by NewsGuard as repeatedly publishing false content. In 2020, news outlets repeatedly publishing false content accounted for 1.39% of the web traffic to news outlets and 6.76% of the Facebook engagement with news outlets. In Table 3, we report these percentages by country and year.

Table 3. Proportion of web traffic & Facebook engagement captured by news outlets repeatedly publishing false content.

		US	UK	France	Germany
Web traffic	**2019**	0.94%	0.025%	4.53%	0.91%
	2020	0.93%	0.016%	3.23%	1.06%
	2017-2021	0.97%	0.018%	3.30%	0.96%
Facebook engagement	**2019**	4.30%	1.37%	15.78%	7.31%
	2020	5.77%	0.85%	11.99%	8.42%
	2017-2021	4.66%	0.88%	13.35%	8.05%

With some variation by country, untrustworthy news outlets and news outlets repeatedly publishing false content account for a small minority of visits to news websites in the US, UK, France, and Germany in 2020 and before. They also account for a minority of Facebook engagement, though a considerable one in the US and France, where untrustworthy news outlets account for almost a quarter of all engagement with news outlets. These numbers shrink when only considering news outlets repeatedly publishing false content, especially in the US (from 20.31% to 5.77%), but remain relatively high in other countries such as France (11.99%) and Germany (8.42%).

In Table 4 below we report the news outlets generating the most web traffic and Facebook engagement by country. We see that no untrustworthy news outlet is present in the web traffic top five, which is dominated by trustworthy news outlets with a NewsGuard score of 80 or more (dark green), while four untrustworthy news outlets are present in the Facebook engagement top five.

Table 4. News outlets generating the most web traffic and Facebook engagement between 2017 and 2021.

	US	UK	France	Germany
Web traffic	Yahoo News (9.6%)	BBC (30.6%)	L'internaute (5.8%)	Web (15.6%)
	Fox News (4.9%)	Daily Mail (11.1%)	L'équipe (4.6%)	GMX (11.6%)
	ESPN (4.7%)	The Guardian (8.2%)	Le Figaro (4.6%)	Bild (10.6%)
	New York Times (2.8%)	Mirror (5.2%)	Journal des Femmes (4.6%)	Der Spiegel (4.5%)
	MSN News (2.5%)	Express (4.1%)	France Info (4.3%)	T-Online (3.7%)
Facebook engagement	The dodo (4.8%)	Daily Mail (24.7%)	BFM (6.6%)	Bild (8.8%)
	Fox News (3.3%)	BBC (12.8%)	Huffpost France (6.3%)	Tagesschau (7.4%)
	Occupy Democrats (3.1%)	The Independent (6.9%)	Santé + Mag (6.1%)	Der Spiegel (5.8%)
	Power of Positivity (2.1%)	The Guardian (4.1%)	Demotivateur (6.1%)	Focus (4.0%)
	Breitbart (1.8%)	The Sun (3.9%)	20 minutes (4.9%)	RT Germany (3.7%)

Note. The colors of the lines refer to NewsGuard's classification of news outlets' trustworthiness. Green indicates generally trustworthy news outlets, while orange and red indicate generally untrustworthy news outlets (see the legend of Figure 1 for more details).

RQ2. Did web traffic and Facebook engagement generated by news outlets increase during the pandemic (comparing 2019 to 2020)?

In all the analyses reported below, we natural log-transformed our dependent variables (web traffic and Facebook engagement) to have a normal distribution of the residuals. We operationalize NewsGuard's ratings of trustworthiness in two ways: as a continuous variable from 0 to 100, and as a dichotomous variable with generally

trustworthy news outlets (61 or more) versus generally untrustworthy news outlets (60 or less). To assess the evolution of web traffic and Facebook engagement in 2020, we ran random effects within-between models (Bell et al., 2019; Long, 2020; Lüdecke, 2019) with year (2017-2018-2019-2020-2021) as a within effect, and news outlets' trustworthiness (0-100) and month (each month between July 2017 and July 2021) as between effects. We also allowed the slopes to vary over time for each news outlet, that is, we added news outlets as a random effect by month and intercept. This type of model allowed us to control for any natural increase in web traffic and Facebook engagement between 2017 and 2021 based on past trends, resulting from, for example, the growing number of consumers and producers.

We first describe the evolution of visits to news websites between 2019 and 2020. In 2020, traffic to news outlets increased on average by 22.06% compared to 2019 (+ 51B). Traffic to news outlets increased by 24.29% in the US (+ 39B), 24.58% in the UK (+ 7B), 26.00% in France (+ 3B), and 28.73% in Germany (+ 2B) (ps < .001).

We now describe the evolution of Facebook engagement between 2019 and 2020. In 2020, Facebook engagement with news outlets increased on average by 24.67% (3.5B engagements) compared to 2019. Facebook engagement with news outlets increased by 29.39% in the U.S. (+ 3.1B), 16.10% in the UK (+ 143.5M), 17.63% in France (+ 190M), and 35.54% in Germany (+ 88.4M) (ps < .001).

In every country, web traffic and Facebook engagement increased in 2020 compared to 2019 (ps < .001). This increase was particularly pronounced in the first half of 2020. News outlets generated more web traffic and Facebook engagement in the first half of 2020 than in the second half of 2020 (and the first half of 2021; ps < .001). Overall, the increase in Web traffic and Facebook engagement that we observe at the beginning of the pandemic (first half of 2020) shrinks or goes back to pre-pandemic levels in the first half of 2021.

RQ3. Did the change in web traffic and Facebook engagement in 2020 vary by news outlets' trustworthiness?

First, we investigate whether news outlets' trustworthiness predicts web traffic and Facebook engagement between 2017 and 2021. We find that in every country, news outlets' trustworthiness (from 0 to 100) is a positive predictor of both visits to news websites and Facebook engagement (ps < .001). Similarly, being categorized as 'generally trustworthy' is a positive predictor of visits to news websites and Facebook engagement (ps < .001, UK: p < .05). In other words, people preferentially turned to more trustworthy news outlets between 2017 and 2021.

In Table 5 below, we report the correlation coefficients between news outlets' trustworthiness (0 to 100) and web traffic and Facebook engagement by country. In every country, news outlets' trustworthiness is significantly correlated with web traffic and Facebook engagement. Yet, we observe some cross-cultural variability. The US is exhibiting particularly low correlations compared to other countries. And the UK displays a very high correlation between news outlets' trustworthiness and web traffic (which is likely driven by the BBC which dominates the UK market like no other news outlets).

Table 5. Spearman correlations coefficients between news outlets' trustworthiness (from 0 to 100), web traffic (left) and Facebook engagement (right).

	Web traffic	**Facebook engagement**
US	.03 ***	.04 ***
UK	.51 ***	.30 ***
France	.23 ***	.20 ***
Germany	.23 ***	.11 ***

Note. *** p < .001.

In the section above we have documented that web traffic and Facebook engagement with news outlets increased in 2020. Now, we investigate who benefited the most from this increase. Table 6 offers a descriptive overview of the increase in web traffic and Facebook engagement between 2019 and 2020.

Table 6. Increase in web traffic and Facebook engagement between 2019 and 2020.

		US	UK	FR	GER
Web traffic	**Trustworthy outlets**	+ 24% (37B) ***	+ 25% (7B) ***	+ 28% (3M) ***	+ 29% (2B) ***
	Untrustworthy outlets	+ 31.84% (2B) ***	- 10% (4M) *ns*	+ 0.12% (700k) *ns*	+ 42% (3M) *
Facebook engagement	**Trustworthy outlets**	+ 25% (2B) ***	+ 17% (150M) **	+ 18% (147M) ***	+ 34% (77M) ***
	Untrustworthy outlets	+ 51% (1B) ***	- 21% (6M) *ns*	+ 16% (43M) **	+ 59% (11M) *ns*

Note. The percentages reported here should be interpreted with caution, especially the ones for untrustworthy news outlets. For instance, the largest increase in relative terms reported in the table (Facebook engagement with untrustworthy news outlets in Germany) is not statistically significant ($p = .23$). *ns* $p > .05$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Web traffic

First, when considering only trustworthy news outlets, we find that in every country web traffic to trustworthy news outlets increased in 2020 compared to 2019 (ps < .001).

Second, when considering only untrustworthy news outlets, we find that, in the US and Germany, web traffic to untrustworthy news outlets increased in 2020 compared to 2019 (ps < .05), while we find no significant increase in the UK and France (ps > .34).

Next, we investigate whether the change in web traffic in 2020 varies by news outlets' trustworthiness by looking at the cross-level interaction between trustworthiness and year. We find that in the US, UK, and France, the increase in web traffic that occurred in 2020 was strongest for more trustworthy news outlets (ps < .001). See Figure 2 for a visualization of the interactions. This also holds true if we use a dichotomous measure of trustworthiness, that is, trustworthy news outlets benefited the most from the increase in web traffic compared to untrustworthy news outlets (ps < .001).

Facebook engagement

First, when considering only trustworthy news outlets, we find that in every country Facebook engagement with trustworthy news outlets increased in 2020 compared to 2019 (ps < .001). Second, when considering only untrustworthy news outlets, we find that, in the US and France, Facebook engagement with untrustworthy news outlets increased in 2020 compared to 2019 (ps < .01), while we find no statistically significant increase in the UK and Germany (p = 0.31 & p = 0.23).

Next, we investigate whether the change in Facebook engagement in 2020 varies by news outlets' trustworthiness by looking at the cross-level interaction between trustworthiness and 2020. In the UK, we find that the increase in Facebook engagement between 2019 and 2020 was larger for more trustworthy news outlets (p < .001). We find no statistically significant interaction in other countries. See Figure 2 for a visualization of the interactions. We reach the same conclusions with a dichotomous measure of trustworthiness. Overall, except in the UK, the increase in Facebook engagement that occurred during the pandemic benefited both trustworthy and less trustworthy news outlets.

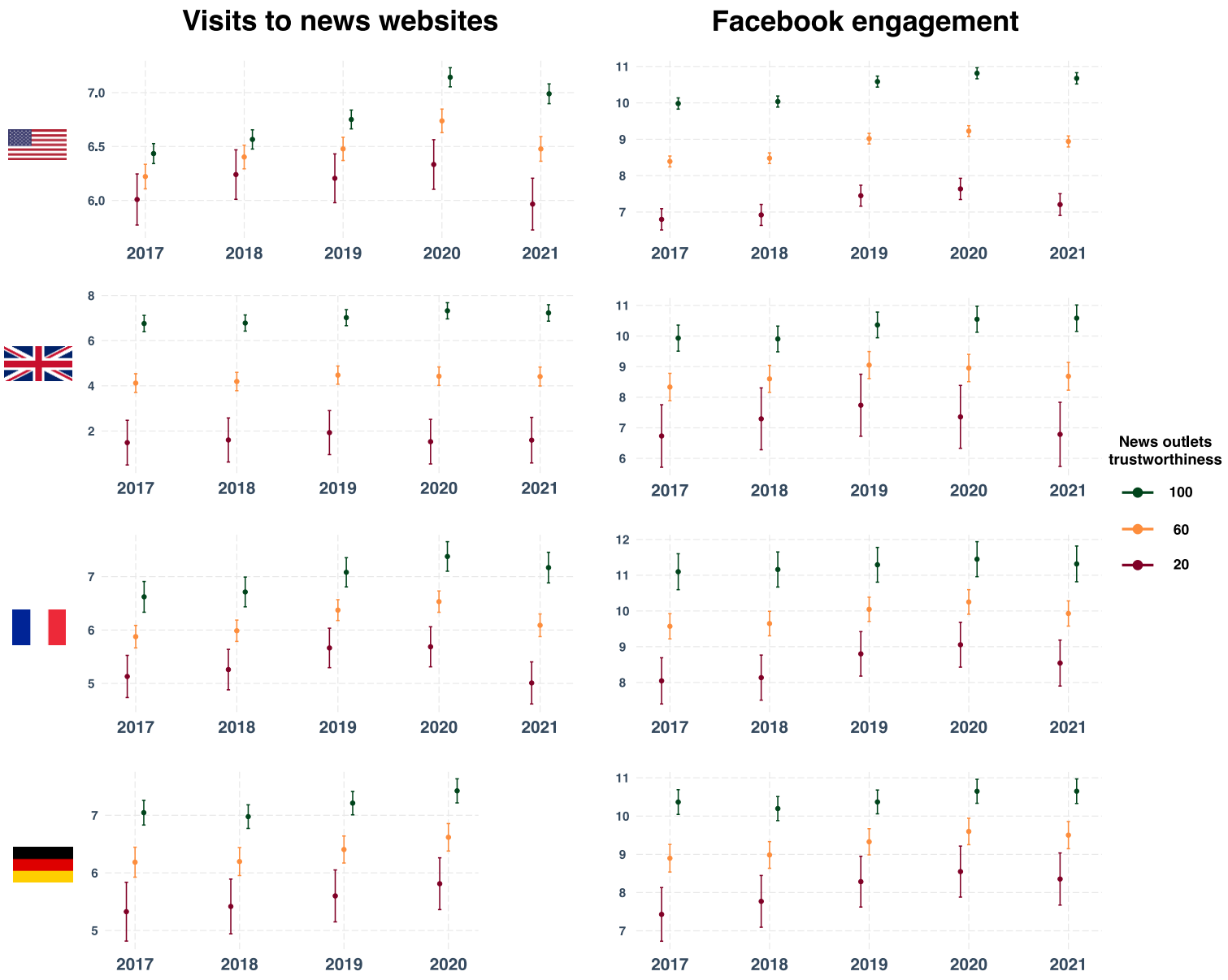

Figure 2. Number of visits to news websites (left) and engagement generated by news outlets' Facebook pages (right), by their NewsGuard score of trustworthiness, between 2017 and 2021. Contrary to Figure 1, visits to news websites and Facebook engagement

have been natural log-transformed, and the predicted values are based on the models described above. Thus, the raw values of the y-axis are not informative and should not be compared between countries or between web traffic and Facebook engagement.

In Figure 2 above, we can see that when it comes to web traffic, the distance between the most trustworthy news outlets in green, and the least trustworthy news outlets in red, increased in 2020 compared to 2019. Thus, the increase in web traffic that occurred in 2020 benefited trustworthy news outlets the most. This is much less clear for Facebook engagement, where the distance between more and less trustworthy news outlets remains relatively constant between 2019 and 2020—except in the UK where Facebook engagement with the least trustworthy news outlets decreased in 2020. We can also see that the UK is the only country where both web traffic and Facebook engagement with the least trustworthy news outlets decreased in 2020.

Discussion

Our study sheds light on how people used news on the web and interacted with it on Facebook, the most widely used social media platform, during the 2020 pandemic. Fleshing out the WHO’s diagnosis of an ‘infodemic’, where people are exposed to a lot of information, and not all of it is reliable, we demonstrate (a) that there was indeed a large surge in online news use, both in terms of web traffic and Facebook engagement in the US, UK, France and Germany, (b) that trustworthy news outlets accounted for most of the increase in web traffic, while (c) in most countries both trustworthy and untrustworthy news outlets benefited from the increase in Facebook engagement.

Overall, these results are consistent with survey data during the pandemic, according to which people consumed more news (Nielsen et al., 2020; Van Aelst et al., 2021) and tended to turn to trustworthy sources (Newman et al., 2021). While some individuals and communities no doubt engaged more with problematic information during

the pandemic, we find no evidence of a structural shift in the direction of untrustworthy sources.

Our findings contradict the view that in times of crisis people increase their consumption of unverified information more than their consumption of more reliable information (Allport & Postman, 1947; Caplow, 1947; DiFonzo & Bordia, 2007; Festinger et al., 1948; Prasad, 1935; Schachter & Burdick, 1955). If anything, at least when it comes to news, our data shows that the opposite is true in terms of web traffic, while in most countries both trustworthy and untrustworthy news outlets benefited from the increase in Facebook engagement. There has been a surge in misinformation during the pandemic, but we show that in absolute terms the latter received little attention compared to more reliable information, and that in relative terms the far greater surge in reliable information consumption has been at least as important, if not more important. All in all, our results support the theoretical account according to which people keep turning to established news media and official sources in times of crisis (Lowrey, 2004; Shibutani, 1966; Van Aelst et al., 2021). However, trust in the media does not account for the differences that we observe between countries. Despite having low trust in the media, the UK is more similar to Germany, where untrustworthy news outlets do poorly, than France and the US, where untrustworthy news outlets do much better both on the web and, especially, on Facebook.

How do our pre-pandemic estimates of news consumption from untrustworthy websites compare to previous work? Regarding web traffic, our US estimate of 3.22% in 2019 is broadly consistent with previous estimates of 0.7% to 6% (Allen et al., 2020b; Guess et al., 2018; Guess et al., 2020), and our French estimate of 5.73% in 2019 is consistent with past work (5%; 16). Our estimates for the UK and Germany are, to our knowledge, the first. Regarding Facebook engagement, our US estimate of 17.42% in 2019 is consistent with past estimates of Facebook clicks (19%) and impressions (15%; Allen et al., 2021; Guess et al., 2021). These estimates of misinformation on Facebook in the US are much higher than on Twitter (between 4% and 5%; Grinberg et al., 2019; Osmundsen et al., 2021), underlining the variation in how well problematic information does on

different social media platforms. Our German estimate of 0.93% in 2019 is consistent with the 1.1% of fake news and conspiracy theories found on Facebook in 2020 (Boberg et al., 2020). In the UK and France, we know of no similar estimates that are specific to Facebook. Yet, in France, our 25.11% estimate in 2019 is much higher than the proportion of so-called "junk news" on Twitter (4%; Marchal et al., 2019).

Overall, our findings highlight the importance of comparative research, both across countries and across different forms of news use. Untrustworthy sources do much better in France and the United States than in Germany and the UK, and much better in terms of Facebook engagement than in terms of web traffic. They also do better in terms of Facebook engagement than previous work focused on Twitter might have led one to expect. Our findings show that one cannot simply assume results from one country, or one platform, will generalize across countries and platforms. For instance, it is often assumed that the US is an outlier in terms of prevalence of online misinformation. Yet, because of a lack of comparative analyses this claim rest largely untested. Here, we show that in this regard the US is very similar to France. And the same could be true for other countries, such as Brazil, India, or Poland, but only data will tell. That's why more cross-countries and cross-platforms investigations are needed.

This study has some important limitations. First, the Facebook API does not allow us to measure impressions generated by the posts and their actual reach. Untrustworthy news outlets could do better in terms of impressions than interactions, but it is unlikely since Facebook pages of trustworthy news outlets have five times more page likes than Facebook pages of untrustworthy news outlets (1.2B versus 213M for the sites in our dataset). Second, our Facebook data only speaks to engagement on news outlets' Facebook page, and Crowdtangle does not allow us to access data of Facebook pages that have been banned, which may lead us to underestimate engagement with misinformation on the platform. Third, the volume of web traffic and Facebook interactions does not fully capture the distribution of misinformation and information exposure across the public (Grinberg et al., 2019). Fourth, our data speak to the misinformation debate at the source level (e.g. The

New York Times), not at the content level (i.e. individual articles, where even trustworthy news sources sometimes convey untrustworthy information), and our analysis is limited to news sources and thus does not include other pages, personal posts, group discussions, or memes. Fifth, despite our focus on online news, it is important to keep in mind that news content represents a very small portion of posts on Facebook and that people on average spend little time consuming news online (Allen et al. 2020).

Despite these limitations, our results are robust to a variety of alternative metrics, including individual NewsGuard rating metrics ('Does not repeatedly publish false content', 'Gathers and presents information responsibly', 'Regularly corrects or clarifies errors', 'Distinction between news and opinion', 'Avoids deceptive headlines', 'Clearly labels advertising', 'Opinion or advocacy journalism', 'Political Orientation'), individual Facebook metrics (shares, likes, comments and Facebook reactions), and alternative Comscore metrics (using the total number of unique visitors/viewers or total minutes spent on news websites; see SI section 3). Our results are also robust to the exclusion of large popular news outlets, such as Fox News, and of governmental websites such as the CDC (see SI section 7).

In conclusion, we found that online news consumption increased during the 2020 pandemic and that more trustworthy news outlets benefited the most from the increase in web traffic. In the UK more trustworthy news outlets also benefited the most from the increase in Facebook engagement, but in other countries both trustworthy and untrustworthy news outlets benefited from it. Despite widespread public concern about the reliability of online news, and real problems with various kinds of misinformation, untrustworthy news outlets accounted for a small minority of web traffic to news sites in 2020. In the UK and Germany, untrustworthy news outlets also accounted for a minority of Facebook engagement, but in the US and France they accounted for almost a quarter of all engagement with news outlets. The WHO was right that people sought out a huge amount of information during the pandemic. While some of it clearly was not reliable,

especially on Facebook, our results suggest that most of it was from trustworthy news outlets.

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Supplementary materials

Comscore matching

The list of sources provided by Newsguard was matched with Comscore by domain name. Some of the sources that couldn't be matched automatically were matched manually (~100). In the US 2442/5178 sources were matched, in the UK 346/423 sources were matched, in France 282/340 sources were matched, and in Germany 231/272 sources were matched. Most of the unmatched sources were untrustworthy and either didn't exist anymore or generated so little traffic that it was not reported by ComScore (for more info see SI section 1). Overall, untrustworthy news websites represented 10.8% of the matched news websites in the US, 4.4% in the UK, 28.1% in France and 13.2% in Germany.

Facebook matching

The list of NewsGuard sources was matched with the CrowdTangle dataset using the Facebook page name and domain name provided by NewsGuard. Some of the sources that couldn't be matched automatically were matched manually (~200). In the US 2798/5178 sources were matched, in the UK 323/423 sources were matched, in France 287/340 sources were matched, and in Germany 243/272 sources were matched. Most of the unmatched sources were untrustworthy (except in the UK, 23%) and had no Facebook page (see SI Section 1). Indeed, some prominent misinformation Facebook pages have been banned, which prevented us from collecting their data (e.g. the Infowars Facebook page was deleted by Facebook in 2019 so Infowars was excluded from the Facebook analysis). For both Facebook and web traffic, we made sure that no prominent news website, whether it is trustworthy or not, was left unmatched. The list of unmatched sources per country is available on OSF.

Table S1. Total number of news outlets matched with the NewsGuard dataset.

	US	UK	France	Germany	Total
Web traffic	2442	346	282	231	3301
Facebook interactions	2754	318	280	240	3592

Table S2. Number of news outlets repeatedly publishing false content out of the total number of news outlets.

	US	UK	France	Germany
Web traffic	128/2450	6/340	51/282	28/228
Facebook interactions	310/2754	14/305	56/280	35/240

Table S3. Number of page likes by country for trustworthy and untrustworthy news outlets.

	Trustworthy news outlets	Untrustworthy news outlets
US	849 489 112 (Median: 33 297)	173 694 162 (Median: 40)
UK	163 682 459 (Median: 40 735)	8 189 783 (Median: 29 318)
France	159 644 063 (Median: 183 579)	32 120 797 (Median: 42 576)
Germany	34 190 896 (Median: 72 239)	2 831 805 (Median: 14 718)
Total	1 207 006 530	216 836 547

Supplementary figures

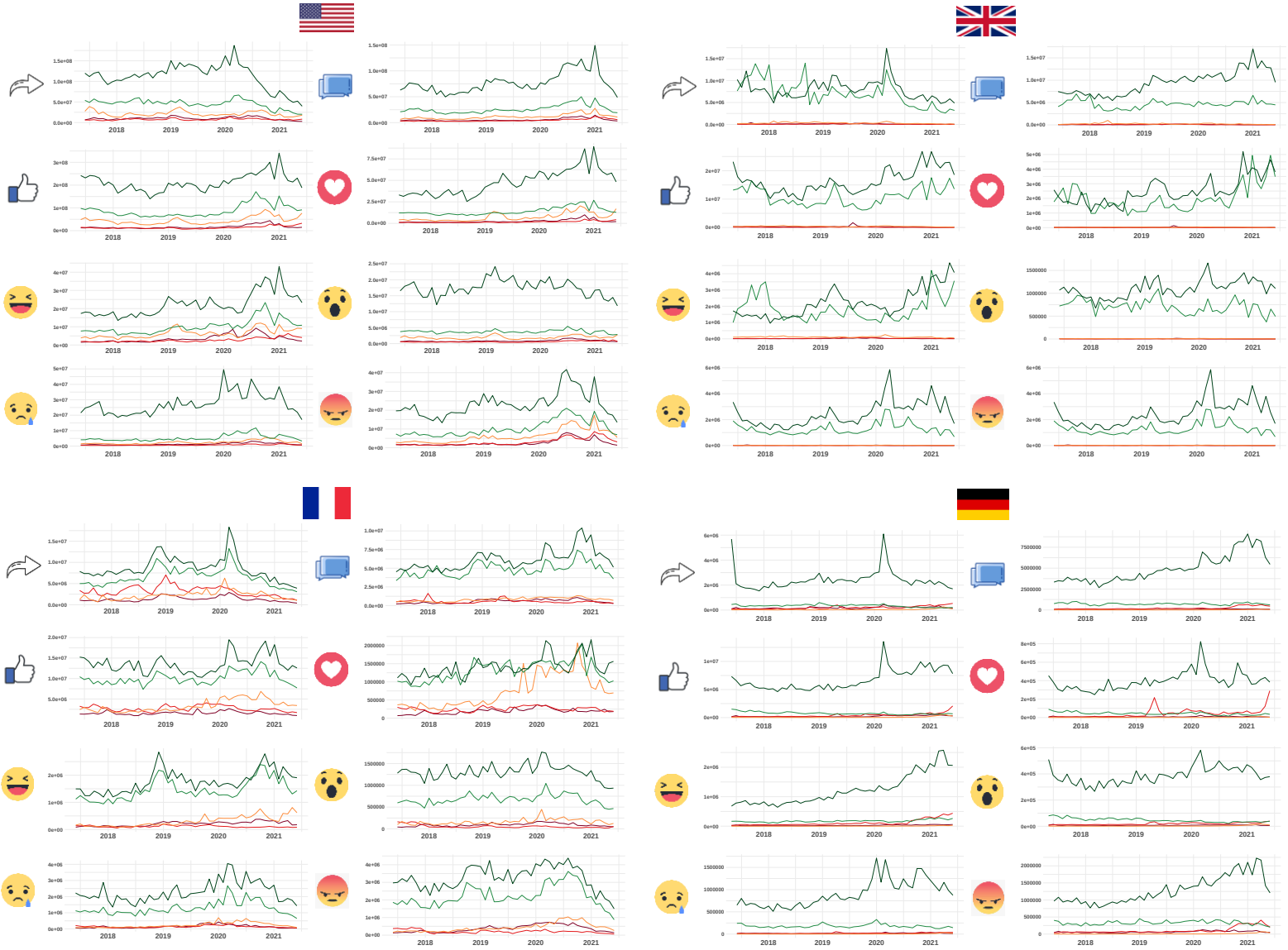

Figure S1. Facebook interactions generated by news outlets' Facebook pages, as a function of their NewsGuard score of trustworthiness, between 2017 and 2021. The colors of the lines refer to NewsGuard's classification of news outlets trustworthiness. Green indicates generally trustworthy news outlets, while orange and red indicate generally untrustworthy news outlets (see the legend of Figure 1).

Below we report a version of Figure 1 with only untrustworthy news outlets.

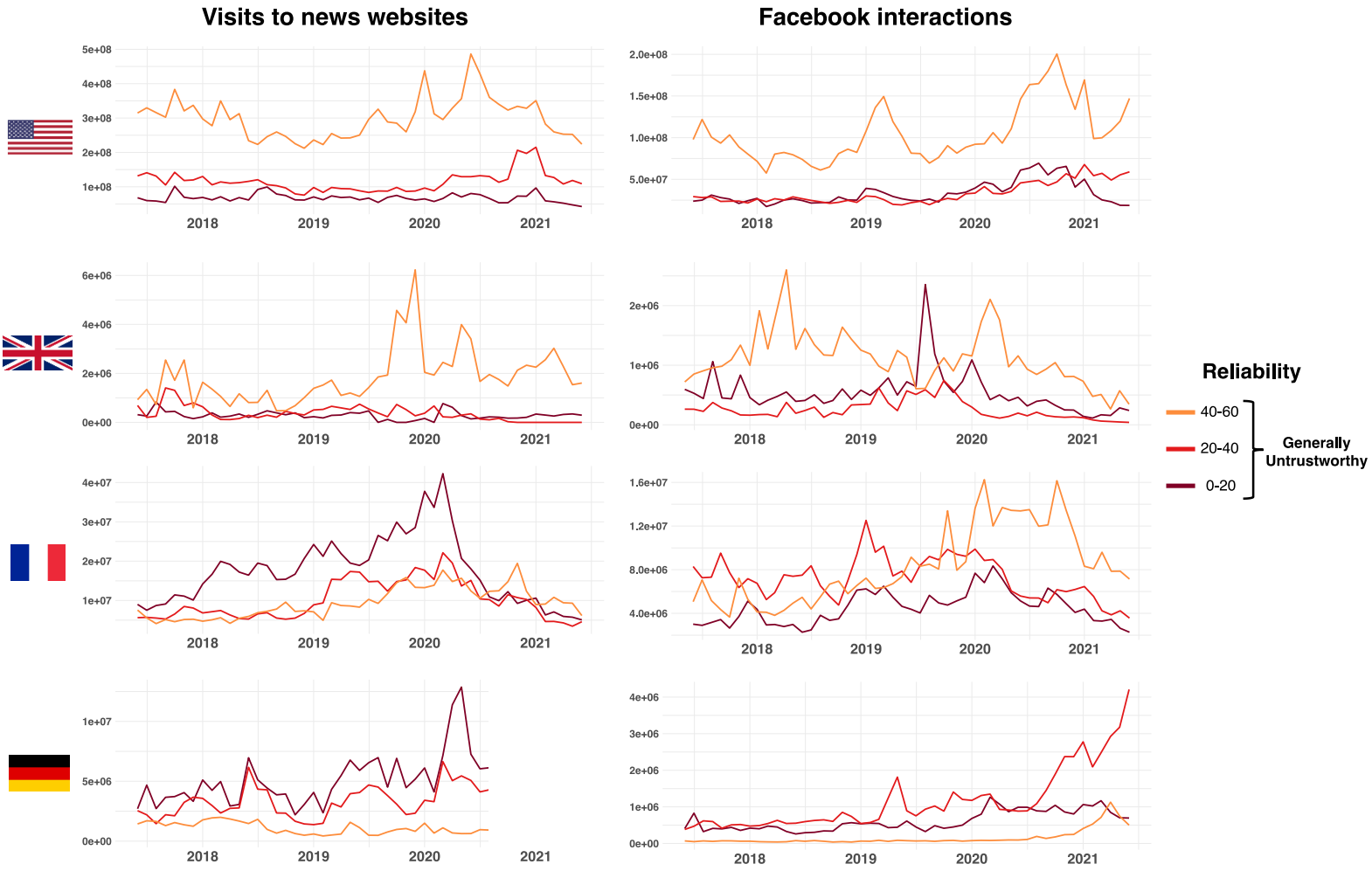

Figure S2. Number of visits to news websites (left) and engagement generated by news outlets’ Facebook pages (right), among untrustworthy news outlets, between 2017 and 2021.

The R code, statistical models, robustness checks, and some of the materials used in this manuscript are available here https://osf.io/kfvy2/. Unfortunately, all the materials

cannot be shared publicly because they are owned by private companies (Comscore, Newsguard and CrowdTangle) selling data access or providing selective access.