

# Echo Chambers and Partisan Polarization: Evidence from the 2016 Presidential Campaign

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## **Abstract**

Where do partisans get their election news and does this influence their candidate assessments? We track web browsing behavior among a national sample during the 2016 presidential campaign and merge these data with a panel survey. We find that election news exposure is polarized; partisans gravitate to "echo chambers," sources disproportionately read by co-partisans. We document levels of partisan selective exposure two to three times higher than prior studies.

However, one-sided news consumption did not exacerbate polarization in candidate evaluation. We speculate this exposure failed to move attitudes either because partisans' ill will toward their political opponents had already reached high levels at the outset of the study, or because of modest differences in the partisan slant of the content offered by the majority of news sources. Audience segregation appears attributable less to diverging perspectives, and more to the perceptions of partisans—particularly Republicans—that non-partisan news outlets are biased against them.

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Fifty years ago, Americans' held generally centrist political views and their feelings toward party opponents, while lukewarm, were not especially harsh (Iyengar, Sood, and Lelkes, 2012; Haidt and Hetherington, 2012). Party politics did not intrude into interpersonal relations; marriage across party lines occurred frequently (Jennings and Niemi, 1974; Jennings and Niemi, 1981; Jennings, Stoker, and Bowers, 2009). During this era of weak polarization, there was a captive audience for news. Three major news outlets—the evening newscasts broadcast by ABC, CBS, and NBC—attracted a combined audience that exceeded eighty million daily viewers (see Iyengar, 2015). The television networks provided a non-partisan, point-counterpoint perspective on the news. Since their newscasts were nearly identical in content, exposure to the world of public affairs was a uniform—and unifying—experience for voters of all political stripes.

That was the state of affairs in 1970. Forty years later, things had changed dramatically. The parties diverged ideologically, although the centrifugal movement was more apparent at the elite rather than mass level (for evidence of elite polarization, see McCarty, Poole, and Rosenthal, 2006; Stonecash, Brewer, and Mariani, 2003; the ongoing debate over ideological polarization within the mass public is summarized in Abramowitz and Saunders, 2008; Fiorina and Abrams, 2009). The rhetoric of candidates and elected officials turned more acrimonious, with attacks on the opposition becoming the dominant form of political speech (Geer, 2010; Grimmer and King, 2011; Fowler and Ridout, 2013). Legislative gridlock and policy stalemate occurred on a regular basis (Mann and Ornstein, 2015).

At the level of the electorate, beginning in the mid-1980s, Democrats and Republicans increasingly offered harsh evaluations of opposing party candidates and crude stereotypes of opposing party supporters (Iyengar, Lelkes, and Sood, 2012). Party affiliation had become a sufficiently intense form of social identity to serve as a litmus test for personal values and world view (Mason, 2014; Levendusky, 2009). By 2015, marriage and close personal relations across party lines was a rarity (Huber and Malhotra, 2017; Iyengar, Konitzer, and Tedin, 2017). Partisans increasingly distrusted and disassociated themselves from supporters of the opposing party (Iyengar and Westwood, 2015; Westwood

et al., 2017). Out-group prejudice based on party identity exceeded the comparable bias based on race, religion, and other significant social cleavages (Iyengar and Westwood, 2015).

The intensification of partisan sentiment over the past three decades cries out for explanation. While the period in question encompasses multiple societal changes—greater ethnic and religious diversity, a declining manufacturing sector, and heightened income inequality, for example—it was also a time of seismic changes in the media environment. 24-hour cable news channels emerged as competitors to network news. The availability of cable television in the 1970s provided partisans their first real opportunity to obtain news from like-minded sources (Fox News first for Republicans, and MSNBC later for Democrats). The development of the Internet provided a much wider range of media choices, which not only greatly facilitated partisans’ ability to obtain political information and commentary consistent with their leanings, but also enabled the apolitical strata to focus on entertainment programming while tuning out all things political (Prior 2007).

In a break with the dominant paradigm of non-partisan journalism, a growing number of outlets, motivated in part by the commercial success of the Fox News network, offered reporting in varying guises of partisan commentary. The political blogosphere, with hundreds of players providing news and analysis—often vitriolic—developed rapidly as a partisan platform, with very little cross-party exposure (Adamic and Glance, 2005; Lawrence, Sides, and Farrell, 2010). The creation of vast online social networks permitted extensive recirculation of news reports, even to those not particularly motivated to seek out news. At the same time, in stark contrast to the captive audience of 1970, Americans who were predisposed to follow politics in 2015 enjoyed significant control over their consumption of news.

We demonstrate that enhanced media choice has contributed to a deep partisan divide in news consumption. We merge a two-wave panel survey administered before and after the 2016 election with survey respondents’ web browsing behavior over the course of the campaign. Our results indicate that many partisans gravitated to “echo chambers”—news sources read disproportionately by co-partisans, and which often delivered coverage

aligned in the direction of their audience’s party affiliation. We go on to show that the audience is more segregated for political than for non-political news, and that segregation peaks when news coverage conveys a clear partisan slant. However, despite such selective exposure, our evidence suggests that one-sided news consumption over the course of the 2016 campaign did not exacerbate polarization. We attribute this non-finding to two possible explanations. First, partisans’ hostility and ill will toward their political opponents had reached unusually high levels even at the onset of this study. Second, the availability of biased news is limited for the vast majority of news outlets continue to offer conventional, point-counterpoint coverage of the campaign.

## **Selective Exposure to Information: Theory and Evidence**

The availability of more choice in the media environment revived the concept of selective exposure, with the expectation that consumers would turn to news providers perceived as aligned with their party while ignoring others perceived as hostile. The more general argument—that people prefer confirmatory to disconfirmatory information—dates back several decades, to well before the onset of “new” media, and can be traced to the development of cognitive consistency theories of attitude change in the 1950s (see Abelson et al., 1967). Balance theory (Heider, 1958) and the theory of cognitive dissonance (Festinger, 1957) both stipulated that humans are averse to having their beliefs and attitudes challenged. Consumers of news therefore seek out information and evidence they expect to find consistent or agreeable.

Initial tests of the selective exposure hypothesis, typically carried out through experimental methods, yielded mixed results; only a few studies showed the expected preference for supportive information (for a review of the evidence, see Sears and Freedman, 1967). Communication researchers concluded that dissonance avoidance was, at best, a weak motivation for the acquisition of information (McGuire, 1968; Sears, 1968). This pattern was replicated when studies focused on political information; partisans did not seem especially averse to encountering information at odds with their attitudes (Sears and Freedman, 1967).

Stronger evidence for the selective exposure argument emerged from real-world, observational research. Since media coverage of politics in the 1960s was overwhelmingly non-partisan, meaning that the news audience could not access partisan news, scholars focused on exposure to presidential campaigns rather than news sources. Partisan voters reported greater exposure to events and messages from their preferred candidate or party (Lazarsfeld, Berelson, and Gurin, 1948; Schramm and Carter, 1959). In the words of Lazarsfeld and his co-authors, “In recent years there has been a good deal of talk by men of good will about the desirability and necessity of guaranteeing the free exchange of ideas in the market place of public opinion.... Now we find that the consumers of ideas, if they have made a decision on the issue, themselves erect high tariff walls against alien notions (Lazarsfeld, Berelson, and Gaudet, 1948, p. 89).<sup>1</sup>

In the current era of polarization, debate continues over the extent of partisan selective exposure. In contrast to the earlier era, large-scale and more generalizable web-browsing studies typically uncover only modest traces of one-sided news consumption, while experimental studies now show considerable self-selection, audience segregation, and polarizing effects of partisan media. In their pioneering analysis of Americans’ web browsing behavior (conducted in 2009), Gentzkow and Shapiro found that online audiences were only slightly more segregated than the audience for network or cable news, and exposure to one-sided information proved infrequent across all media platforms, at least in comparison with residential and inter-personal networks (Gentzkow and Shapiro, 2011). The authors concluded that “Internet news consumers with homogeneous news diets are rare. These findings may mitigate concerns.... that the Internet will increase ideological polarization and threaten democracy” (p. 1831).

A more recent study of web browsing behavior in 2013 obtained generally similar results showing the dominance of ideologically diverse sources of news (Flaxman et al. 2016). This study, however, also found varying levels of audience segregation under different pathways to news sites. When individuals arrived at sites via search engines and

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<sup>1</sup>As Freedman and Sears (1967) point out, the Lazarsfeld et al. conclusion on voters’ preference for supportive over non-supportive information is subject to several qualifications including errors in self-reported exposure, different levels of selectivity between Democrats and Republicans, and the failure of most survey studies to adjust for the frequency of messages from one candidate or the other.

links they encountered on social media, both of which feature personalized algorithms, the online news audience became more segregated or politically homogeneous.

The most recent study of web browsing behavior (Guess, 2016), drawing on the same data collection procedure used here, finds only limited evidence of selective exposure, even when individuals are encouraged to seek out politically relevant news with a randomly assigned treatment or due to an emerging political scandal. However, this study does not differentiate between visits to news reports with political and non-political content. Given the psychological mechanisms underlying selective exposure, we would expect greater use of selectivity when individuals encounter political content.

Finally, although they do not investigate patterns of web browsing, Lelkes et al. (2016) demonstrate that the diffusion of high speed Internet, in and of itself, contributed to polarization. In those areas with greater broadband availability, individuals surveyed in 2004 and 2008 expressed more hostile attitudes toward the presidential candidates of the opposing party. The authors also demonstrate that the broadband-polarization nexus is likely mediated through exposure to partisan news; partisans without access to broadband were far less likely to access partisan sites.

In contrast to the evidence from large-scale web browsing studies, recent experimental studies of news selection find considerable partisan segregation. Iyengar and Hahn (2009), for instance, manipulated news organizations' logos across the identical headlines and found that conservatives disproportionately selected Fox News, even when the subject matter in question was non-political. Liberals, on the other hand, displayed a strong aversion to Fox (for similar findings, see Stroud, 2010). In an important extension of this work, Levendusky (2013, 2013a) shows that the demand for biased news is concentrated among strong partisans. Despite their already strong sense of group identity, partisans exposed to congenial news providers develop even more extreme opinions on the issues and more negative views of their opponents (Levendusky, 2013a; also see Garrett et al., 2014). Note that these findings are at odds with evidence from other experiments in which partisans who gravitate to partisan news are already so polarized that news encounters

do little to move their views (Arceneaux and Johnston, 2013).<sup>2</sup>

## De Facto versus Motivated Selectivity

As originally formulated, the theory of dissonance avoidance applied to situations in which individuals could actively choose between different messages or arguments that either coincided or diverged from their opinions. Later researchers pointed out, however, that exposure to information could be affected more by situational than by motivational factors. Stock brokers reading the Wall Street Journal for economic analysis might happen to encounter conservative views on the editorial page. Casual dinner party conversations in affluent neighborhoods more frequently conveyed pro-conservative rather than liberal cues. This form of incidental as opposed to intentional exposure to supportive information was dubbed “de facto selectivity” (Sears and Freedman, 1967).

In the current era, there are good reasons to anticipate de facto selectivity in exposure to political information. Interpersonal communication about political matters occurs rarely among individuals with differing political views (Mutz, 2006). As in the face-to-face case, online social networks, which have emerged as major information providers (Pew, 2016), are politically homogeneous (Messing, 2013) and the partisan slant of news circulating on social media closely matches the partisan composition of the network in question. For social media regulars, therefore, little effort is required to encounter supportive information; indeed, more effort may be needed to avoid such information. As already noted, a recent analysis of web browsing activity confirms that social media use does lead to audience segregation; there is greater concentration of partisans when individuals visit news sites in response to social media referrals (Flaxman et al., 2016). People seeking news on their own volition, on the other hand, display less partisan selectivity in their browsing behavior suggesting that motivation may be secondary to ease of access (Flaxman et al., 2016).

Finally, we note that selective exposure to information based on partisan preference

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<sup>2</sup>There is one point on which the micro and macro studies agree. The greater their level of political involvement, the more likely partisans are to exhibit a preference for supportive information (Iyengar and Hahn 2009; Davis and Dunaway 2016).

represents only one form of selectivity. We do not consider others including the tendency of people directly affected by government policies to pay more careful attention to those policy domains, or selection of news content over entertainment content on the basis of one’s political interest. These other genres of selective exposure clearly influence news consumption (see Iyengar et al., 2008 for evidence on different forms of selective exposure), but are less directly implicated as factors that may contribute to polarization. In this paper, we limit our attention to partisan selectivity in exposure to news.

## Research Design

We examine partisan selective exposure by tracking web browsing behavior within the context of a two-wave panel survey administered over the course of the 2016 general election. The browsing data were generated by an application installed by respondents after they completed the initial wave of the survey. As a third element of the design, we carried out a crowd-sourced content analysis of 55,000 election-related news articles visited by our survey respondents. This multi-pronged design enables a fine-grained examination of partisan selective exposure to online news, variation in partisan selectivity across different genres of news, and the attitudinal consequences of partisan news consumption during an important election. In the section that follows, we describe each element of the design in greater detail.

## Web Browsing

We measure web browsing behavior using the Wakoopa toolbar (<https://wakoopa.com/>). After participating in the initial survey wave, 1,303 respondents (14% of those who completed the first wave survey) agreed to install this toolbar on their primary web browser.<sup>3</sup> For the period between August 1 and November 8, the application passively tracked their web browsing behavior both in terms of the number of visits they made to different web

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<sup>3</sup>Respondents received YouGov points for keeping the toolbar active, but did have the option to turn it off if they wished. The analysis provided in Appendix A indicates that once they agreed to use the toolbar, non-compliance was not systematically related to their initial political views.



domains and the particular web pages (or URLs) they visited at these domains. All told, our respondents made 30 million visits to over 170,000 different web domains. Eventually, 1,076 (83%) of the individuals who installed the toolbar went on to complete the second survey wave. Our analysis focuses on this set of respondents, for whom we have both waves of survey data as well as their web browsing behavior.

As we document in Appendix A, after employing survey weights the respondents who installed the toolbar differed only slightly from the original nationally representative sample of survey respondents; they tended to be slightly more interested in politics. We also looked for evidence of selection bias in the timeline of individuals' web browsing activity. Those who kept the application active over the entire duration of the study did not differ, in terms of standard background characteristics, from those who used the application only briefly. Given the potentially concerning nature of the selection bias on political interest, we demonstrate in a later section describing a series of robustness tests that our findings on the extent of audience segregation hold up when we apply an alternative set of raking weights based on the level of political interest in the 2016 Cooperative Congressional Election Study.

## Content Analysis

After receiving the URLs for the web pages visited by panelists, we compiled information about the particular news articles they selected by scraping the URLs they visited from a set of 355 politically focused news domains. This list consists of the top 100 web domains for news based on overall traffic among our panelists and an additional 255 U.S.-based websites included on the Alexa list of most popular news domains, including the websites of mainstream newspaper and television outlets, web aggregators that bring together content from multiple other sources, as well as other online-only sources of news and political commentary.<sup>4</sup> Across this set of news domains, our respondents registered 1.1 million visits (4% of all their visits) to 212,000 unique news articles on these pages over the course of the campaign. Of these, 55,000 news stories referenced the presidential

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<sup>4</sup>Appendix F contains the full website list.

election.<sup>5</sup>

Following a procedure developed by Budak et al. (2016), we recruited coders from Amazon’s Mechanical Turk to classify the content of the articles dealing with the presidential election that appeared in our respondents’ browsing history. To ensure reliable classification of article content, we developed a coding scheme through an iterative process on a small sample of articles.<sup>6</sup> We also required coders to complete a political knowledge quiz before evaluating articles and, to limit the influence of any single coder, capped the number of articles that could be rated by one individual at 200.

Coders considered two aspects of each article. They first labeled the focus or primary topic of each report. This allows us to differentiate between articles about the issue positions of candidates, specific campaign events (e.g., one of the debates), the state of the horse race or some aspect of campaign strategy, or news about a scandal implicating one of the candidates.<sup>7</sup> Second, coders assessed the overall partisan slant of the article in terms of whether it was more favorable toward either political party.<sup>8</sup>

## Panel Survey

We measure changes in survey respondents’ political attitudes through a two-wave panel survey. During the 2016 election, 9,760 individuals completed a pre-election online survey focused on their evaluations of political figures, policy views, and degree of affective partisan polarization. The sample was drawn from the national online panel maintained by YouGov using an algorithm that matches sampled respondents to the voting-age population on key demographic characteristics (see Vavreck and Iyengar, 2011; Rivers and

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<sup>5</sup>We defined election-related news as stories that mentioned "Clinton" or "Trump" in the first hundred words of the article.

<sup>6</sup>We describe this coding scheme and a validation exercise based on a subset of articles rated by multiple coders in Appendix B.

<sup>7</sup>We define scandals as allegations of alleged moral, legal or financial wrongdoing by one of the candidates. The scandals focused on Trump included his comments on a leaked Access Hollywood Tape, his conflict with the Khan family, non-release of his taxes, his involvement in the birther controversy, the description of Mexican immigrants as rapists, and his derogatory reference to Senator McCain’s experience as a POW. Scandals implicating Hillary Clinton included the attack on the U.S. consulate in Benghazi, her reference to Trump supporters as a "basket of deplorables," her use of a private email server, and the ongoing FBI investigation into her treatment of classified material.

<sup>8</sup>In our sample of twice labeled articles, coders agreed about the direction of an article’s slant in 80% of cases once they labeled the article as non-neutral.

Bailey, 2009).<sup>9</sup> Following the election, 7,704 of these initial respondents completed a second survey that repeated questions from the first wave. Administration of the first wave was carried out between July 7 and September 26, and YouGov fielded the post-election wave between November 18 and December 7. As noted earlier, we are able to match survey responses to both waves with web browsing activity for 1,076 individuals.

This synthesis of survey and web browsing data with metrics on individuals' exposure to particular categories of news content offers a number of advantages for examining questions about the prevalence of partisan selective exposure and its attitudinal consequences, if any. The individual-level survey data allow us to measure the partisanship of the survey respondents at the start of the general election campaign. The use of behavioral browsing data alleviates concerns about measurement error inherent to self-reported media consumption (see e.g., Prior 2009). The content analysis permits investigation of variation in browsing behavior across the particular news articles selected by respondents in addition to their overall domain-level choices. Finally, the panel structure of the survey data permits an examination of the consequences of partisan news consumption for changes in individuals' political attitudes over the final months of the 2016 presidential campaign.

## Results: The Extent of Partisan Selective Exposure

We begin by documenting the prevalence of partisan selective exposure during the 2016 presidential election. First, to compare our results with prior studies, we operationalize selective exposure using an indicator of media consumption based on the partisanship of visitors to various political news domains. Second, we compare this indicator of audience partisanship across categories of news content so as to observe variation in partisan segregation for different types of election-related news. This allows us to examine an anticipated gradient of partisan selective exposure that increases as news content becomes more political, and more valenced in terms of favoring one candidate over the other. Given the logic of partisan selectivity, we would expect partisans to experience less dissonance

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<sup>9</sup>To ensure that the respondents in the panel are as diverse as possible, they are recruited by multiple means, mostly through different forms of online advertising, but also by telephone-to-web and mail-to-web recruitment.

Table 1: Top Ten News Domains

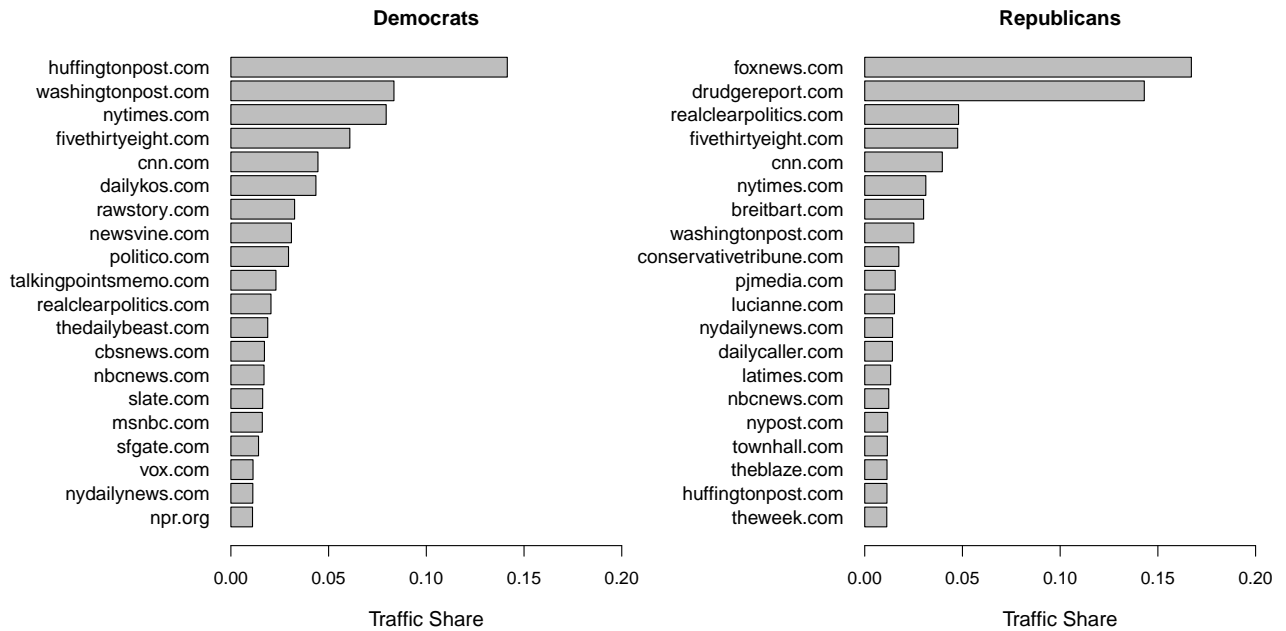
Domain	Republican Share	Total Pageviews
drudgereport.com	86%	34,809
foxnews.com	71%	60,102
fivethirtyeight.com	49%	60,573
Yahoo News	48%	55,234
cnn.com	36%	43,835
MSN News	35%	43,566
nytimes.com	27%	75,023
washingtonpost.com	13%	71,592
dailykos.com	8%	36,210
huffingtonpost.com	5%	109,028

when encountering a news report describing the preparations for an upcoming debate than a news report focusing on some controversy about a candidate’s fitness for office. Accordingly, our expectation is that when the news features valenced or one-sided content (i.e., slant), partisans will be especially motivated to seek out friendly sources (i.e., sources biased in their favor).

We begin by presenting the Republican share of the audience, specifically the share of a domain’s overall pageviews from Republicans, for the ten most frequently visited news domains (see Table 1). Strikingly, eight of the ten sites—including venerable mainstream news organizations—have a clearly partisan audience. For example, Fox News has a 71% Republican share, and the *Washington Post* has only 13%. Among the top ten sites, only Yahoo News and FiveThirtyEight have audiences with approximately equal numbers of Democrats and Republicans.

As an alternative measure of audience segregation, we compare the top twenty sites visited by Democrats and Republicans respectively (see Figure 1). Fox News is the premier source for Republicans. Together, Fox News, Drudge Report, and Breitbart News account for a third of all Republican news visits. For Democrats, The *Huffington Post* is the leading source of news, followed by the *Washington Post* and the *New York Times*. As with Republicans, just three sites account for a third of Democrats’ news visits. Also notable is the fact that the top sites for each party—Fox News for Republicans and the *Huffington Post* for Democrats—have cultivated a reputation for partisan commentary,

Figure 1: Share of Traffic to Individual Sites by Party



in contrast to the point-counterpoint paradigm of traditional journalism.

The partisan divide in online news is, in part, a consequence of greater overall news consumption by Democrats: 53% of all news visits are accounted for by Democrats with 35% coming from Republicans and 12% from independents that do not lean towards one of the parties.<sup>10</sup> Democrats are more likely to visit the sites of major daily newspapers, the three major television networks, CNN, PBS, and various non-partisan online news sources than Republicans. But by itself, this difference in total exposure cannot explain the levels of segregation we observe, with popular sites such as the *Huffington Post* receiving a minuscule share of their traffic (5%) from Republicans.

Clearly, partisans from both sides of the political spectrum have taken advantage of the availability of friendly news providers. But the subset of liberal sources is not so large, giving Democrats fewer opportunities to engage in selectivity; in practice, therefore, they remain dependent on traditional news organizations—like the *Washington Post*, the *New York Times*, and CNN—known for point-counterpoint reporting. Republicans, in contrast, have gravitated en masse to right-leaning sites, with the top two outlets they frequent having plain ideological orientations.

<sup>10</sup>This pattern of heavier online news consumption by Democrats is consistent with past studies of web browsing behavior (see, e.g., Flaxman et al., 2016).

While our study is the first to focus on news consumption during a presidential campaign, the set of news websites with the highest traffic and the ordering of these sites in terms of the partisan composition of their audience both largely parallel prior research on web browsing behavior in non-campaign contexts. For example, six of the websites in Table 1 overlap with the top ten most visited news sites in 2009, as reported by Gentzkow and Shapiro (2011).

Focusing on high-traffic websites in our dataset (the 42 news domains visited by at least 300 unique panelists), the 2016 partisan ordering of websites also correlates well with previous orderings of domain-level partisanship ( $r=.59$  with the ordering in Flaxman et al., 2016), with alternative approaches to assessing the partisanship of media audiences such as patterns of content sharing on Facebook ( $r=.78$  with the ordering in Bakshy et al., 2015) and with our own coder-based ratings of the partisan slant of election news delivered by particular websites ( $r=.67$ ).<sup>11</sup>

## Comparison to 2009 Web Traffic

To benchmark our results relative to Gentzkow and Shapiro (2011) we use the *isolation index* – the average Republican audience share of web visits made by Republicans minus the average Republican audience share of web visits made by Democrats – which captures the partisan divide in exposure to news sources.<sup>12</sup> In the equation below  $rep_j$  and  $dem_j$  indicate the number of Republican and Democratic visits to web domain  $j$ . The sum of these Republican and Democratic visits is referred to with  $visits_j$ . The terms  $rep_m$  and  $dem_m$  refer to the total number of web visits made by Republicans and Democrats.

$$\text{Isolation Index} = \sum_{j \in J} \left( \frac{rep_j}{rep_m} \times \frac{rep_j}{visits_j} \right) - \sum_{j \in J} \left( \frac{dem_j}{dem_m} \times \frac{rep_j}{visits_j} \right)$$

This isolation index is bounded between zero and one with intuitive interpretations of these end points. If both partisan groups received all their news from the same source, the index score would be zero, indicating a lack of partisan isolation. Higher scores indicate

<sup>11</sup>We explore this validation exercise further in Appendix B.

<sup>12</sup>When assessing partisan isolation we employ sample weights provided by YouGov to weight our sample back to a nationally representative sample frame.

greater divergence between the news preferences of the two sets of partisans. At the other extreme, an isolation index of one would indicate no common exposure whatsoever.

To ensure a clear comparison with earlier research, we mirror the approach used in Gentzkow and Shapiro (2011). We employ the same level of web traffic aggregation when computing the isolation index by aggregating traffic to the level of the unique daily visit (i.e., an indicator variable for whether or not a panelist visited the news domain at least once on a given day). We utilize the same adjusted version of the isolation index for our primary analysis which corrects for a bias that arises when the number of visitors to a web domain is small to avoid potentially inflating partisan isolation.<sup>13</sup> Finally, we follow the same procedure to impute the partisanship of "pure" independents who do not declare a party affiliation by assuming the Republican share among this group when visiting a given outlet is equal to the Republican share among visitors to the outlet that declare a partisan leaning.

During the 2016 election, respondents' overall news browsing behavior yielded an isolation index of 0.21. Republicans, on average, visited news websites with an average audience share that was 55% Republican, while Democrats visited domains with an audience share of only 34% Republican. Note that this level of isolation represents far from a complete partisan divide in online news consumption. As noted in prior research, the dominance of a few heavily trafficked websites with heterogeneous audiences (e.g., Yahoo News) facilitates overlap in the browsing behavior of partisans.

Table 2: Partisan/Ideological Segregation By Domain

Domains	Variable	2009 Isolation Index	2016 Isolation Index
All News Domains	Party	0.07	0.21
Top 10 (2009 list)	Party	-	0.22
Top 10 (2016 list)	Party	-	0.21
All News Domains	Ideology	0.08	0.24
Top 10 (2009 list)	Ideology	-	0.25
Top 10 (2016 list)	Ideology	-	0.26

While our measure of audience polarization is some distance away from the maximum,

<sup>13</sup>The formula for this adjusted index is available in Appendix D. Appendix D also shows that our findings are similar when using the unadjusted isolation index.

comparing the isolation index in 2016 with the same measure in 2009 reveals a sizable increase in the degree of partisan selective exposure. At 0.21, our estimate of partisan segregation is 3 times higher than the comparable figure based on web browsing in 2009 (0.07 in Gentzkow and Shapiro 2011, Table VIII). As Table 2 indicates, this finding of substantially increased segregation in domain-level news consumption is stable to several alternative methods for constructing the isolation index including sub-setting the data to the ten most popular news domains in our panel, using the 2009 list of ten most popular news outlets (from Gentzkow and Shapiro 2011), or basing the isolation index on respondent ideology rather than partisanship.<sup>14</sup>

## Comparison to 2013 Web Traffic

The differences noted above between the 2009 and 2016 results may be driven by an uptick in the general level of mass polarization, by changes in context (our study coincided with the final stages of a closely contested presidential election whereas the 2009 study occurred in a non-election period), or by a combination of the two.<sup>15</sup> However, we also find that the level of partisan segregation in 2016 is more pronounced than in 2013, as reported by Flaxman et al. (2016). That study of 2013 browsing patterns differs from ours primarily in its reduced proximity to the electoral calendar.

Instead of the isolation index, Flaxman et al. (2016) report an alternative measure of segregation: the scaled standard deviation of partisan news exposure  $R_i$  among members

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<sup>14</sup>Another area in which our findings diverge from Gentzkow and Shapiro (2009) concerns the level of partisan homophily in individuals' social milieu. In their analysis, they benchmark partisan segregation in web browsing to segregation at the level of US counties (and zip codes), finding that the isolation index at the level of the county exceeds isolation in web browsing. We do not have a large enough sample to derive stable estimates of segregation at the zip code level. (When we calculate the isolation index based on respondents' place of residence it is only .06 for zip codes and .05 for counties, both considerably lower than the level of isolation in web browsing.) While our dataset is inadequate to provide reliable metrics on partisan homophily within residential areas, there is an abundance of evidence showing that American households have become increasingly homogeneous in their partisanship over the past several decades. For instance, current rates of spousal partisan agreement exceed 80 percent (Iyengar, Konitzer, and Tedin, 2017). If it is appropriate to compare partisan homophily in family and inter-personal relations with the tendency to seek out supportive news reports, we agree with Gentzkow and Shapiro that the former is a more polarizing influence than the latter.

<sup>15</sup>National survey data indicate some increase in partisan animus post-2008, meaning that the motivation to engage in partisan selectivity may have strengthened post-2009. The feeling thermometer ratings of the political parties in the 2016 ANES, for instance, show more extremity than ratings from 2008.



of their sample.<sup>16</sup> This measure classifies the partisanship of political domains based on the composition of their audience and then averages over this measure of domain partisanship for all the visits made by an individual to news domains.

Specifically, for each individual  $i$  we compute

$$R_i = \frac{1}{N_i} \sum_{j=1}^{N_i} r(d_{ij}),$$

where  $N_i$  is the number of URLs (on news domains) visited by individual  $i$ ,  $d_{ij}$  is the domain of the  $j$ -th URL visited by individual  $i$ , and  $r(d)$  is the Republican share of domain  $d$ .<sup>17</sup>

Flaxman et al. (2016) report that audience segregation for news websites in 2013 was 0.11. Using the same measure, we find that the level of segregation has reached 0.23 for traffic to all news domains in 2016. That partisan selectivity has more than doubled since 2013 points to the importance of the electoral context; a closely contested presidential campaign makes partisans significantly more motivated to rely on news providers thought to be congenial to their point of view.

Comparisons with the 2013 study also allow us to pursue a further explanation for the increased segregation of news audiences. This explanation concerns the "channel" or routing by which individuals arrive at news sites. Flaxman et al. (2016) examine the level of partisan segregation across four different pathways to the news. First, individuals might be referred to a news site from a news aggregator, such as Google News. Second, individuals might arrive at the site in question directly, without any intermediation. Third, individuals might visit the site because they encountered the link to the site in question in their social media (Facebook and Twitter) news feeds. Finally, some might access news sites through the use of search engines. The extent of segregation across these four distinct pathways to the news is shown in Table 3.

The finding of increased segregation in news audiences holds across all channels. The increase is most pronounced, however, in the case of visits emanating from social media

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<sup>16</sup>Specifically, the measure is  $\sqrt{2\text{Var}(R)}$ .

<sup>17</sup>For this analysis we follow Flaxman et al. (2016) and use individual visits to a web domain rather than the aggregated daily version used by Gentzkow and Shapiro (2011).

Table 3: Partisan Segregation by News Consumption Channel

Channel	Segregation (2016)	Visit Share (2016)	Segregation (2013)	Visit Share (2013)
Aggregator	0.17	0.01	0.07	0.01
Direct	0.22	0.83	0.11	0.76
Social	0.30	0.08	0.12	0.06
Search	0.21	0.08	0.12	0.13

(0.30 during the 2016 election and 0.12 during 2013, compared to an average segregation of 0.20 and 0.10 for the three other channels). While there is increased segregation across time periods, the distribution of visits that stem from each channel shows little change, with small decreases in the use of search engines and similar increases in direct visits and visits via social media. Greater segregation in 2016 is not attributable to changes in the general structure of web browsing.

While the prominence of social media as gatekeepers has remained modest over time, the degree of partisan segregation associated with this channel is clearly greater in 2016. It is unlikely that the partisan homogeneity of individuals' online social networks, considerable to begin with (Messing 2013), has changed over this period. Instead, we surmise that the increased segregation associated with social media stems from the polarizing nature of the 2016 campaign. As we show below, news coverage of the campaign frequently featured controversies surrounding the two candidates. Given the media's penchant for covering "bad news," partisans had many opportunities in 2016 to exercise selectivity so as to limit encounters with information damaging to their preferred candidate.

Overall, the data on domain-level visits reveal levels of partisan selective exposure during the 2016 election that are two to three times higher than those observed in prior research. This finding is robust to alternative measures of partisan segregation in news consumption and persists when considering different subsets of news websites. Increased segregation during the 2016 campaign does not reflect any change in the cartography of web browsing; instead, the pattern holds up across the multiple pathways to online news reports.

## Selective Exposure Across News Content

Thus far we have only considered selective exposure and partisan segregation in terms of visits to particular web domains. This is an incomplete diagnostic test of selective exposure since it glosses over differences in news content. Most major news organizations provide coverage of both political and non-political subject matter and individuals do not necessarily encounter political content when they visit news sites. Even when they are seeking political information, they can typically screen content at the level of individual articles. Accordingly, opposing sets of partisans may gravitate to a different set of stories even when visiting the same news outlet.

Based on the expectation that the partisan divide in exposure to news is likely to widen as news content becomes more valenced—either favorably or unfavorably—toward a political party or candidate, we leverage the content analysis component of the study to examine partisan segregation across different types of election news. The basic intuition, noted at the outset, is that partisans will be especially threatened by (and attempt to avoid) content that is damaging to their favored candidate’s prospects. Conversely, they will seek out news that appears unfavorable toward the opposition.

In the content analysis, our coders classified individual news reports into one of several topical categories. *Scandal* coverage focused on allegations of moral, legal or financial wrongdoing by either presidential campaign. Articles on the Trump *Access Hollywood* tape, the clash between Mr. Trump and the Khan family, Mrs. Clinton’s use of a private email server, and her role in the attack on the U.S. consulate in Benghazi all fell into this category. *Policy* coverage focused on the candidates’ issue positions. *Strategy* coverage focused on the overall state of the horse race and included discussion of political polling and campaign strategy. *Event* coverage examined specific campaign events, such as the debates or a particular rally or stump speech by one of the candidates. Finally, coders placed news stories that did not fit any of these content designations into a residual "other" category.

As shown in Table 4, coverage of scandals was the most prevalent category, accounting for 32% of the articles visited by respondents. The fact that there were more than twice

Table 4: Topics in Election-Related Coverage

Category	No. Articles	Share
Trump Scandal	9,999	18%
Event	8,781	16%
Strategy	8,285	15%
Clinton Scandal	7,589	14%
Issue	3,122	6%

as many reports on scandals than reports on any other facet of the campaign reflects the reality of the 2016 contest, in which the major candidates became ensnared in multiple controversies. The prominence of scandal coverage also reflects market pressures; controversial content is more likely to attract and hold consumer attention.

Reports falling into the event and strategy categories each made up approximately 15% of the coverage. In keeping with prior research (e.g., Iyengar et al., 2008), coverage of "hard news" such as the candidates' policy stances represented the smallest share of news coverage at only 6% of the articles.<sup>18</sup>

Coders also evaluated the net partisan slant of news reports. They applied a five-point scale to assess the extent to which content in the report was (1) clearly more favorable to Democrats, (3) even-handed or neutral with respect to the political parties, or (5) clearly more favorable to Republicans.

Table 5: Slant in Election-Related Articles

Article Slant	No. Articles	Share
Favors Democrats (1)	8,558	15%
(2)	11,815	22%
Neutral (3)	24,920	45%
(4)	6,723	13%
Favors Republicans (5)	3,576	6%

As shown in Table 5, the coders rated approximately half (45%) of the election-related stories as neutral. This finding is consistent with prior studies that use crowd-sourced human classification to assess media bias at the level of individual news reports (Budak et al., 2016). However, our respondents also selected a substantial number of articles that coders judged to favor, at least to some degree, one of the political parties or candidates.

<sup>18</sup>The remaining 32% of articles were placed in the "other" category.

These valenced articles represent especially fertile subject matter for detecting selective exposure, and we turn next to an examination of audience segregation across the categories of news content.

## Selective Exposure by Topic

We computed the isolation index for each of the designated content categories, again using the same level of visit aggregation as prior research that employs the isolation index (Gentzkow and Shapiro 2011). In the top panel of Figure 2, we present partisan isolation for two baseline categories: all visits to any of the 355 news domains that appeared in our study, including those only to the home page of a site, and all visits to election-relevant news reports. The latter consists of stories viewed by respondents from this set of news domains that mentioned either of the candidates and were subsequently rated by coders as focusing primarily on the presidential election.<sup>19</sup>

We then disaggregated the level of isolation within the different election-related topical categories, recomputed the Republican share of site visits, and produced a content-specific measure of partisan segregation for each news category. We follow prior work by Gentzkow and Shapiro (2011) and compute confidence intervals for the isolation index based on the bootstrap.<sup>20</sup>

As shown in Figure 2, relative to all visits to news sites, partisan isolation increased for exposure to election-focused news. The partisan divide expanded from 0.21 for all news visits to 0.33 for visits to election-focused stories identified in the content analysis. The 12 point difference in the isolation index between these categories (95% Confidence Interval [0.03, 0.22]) indicates that when information is relevant to the election, partisans' news choices become more divergent.

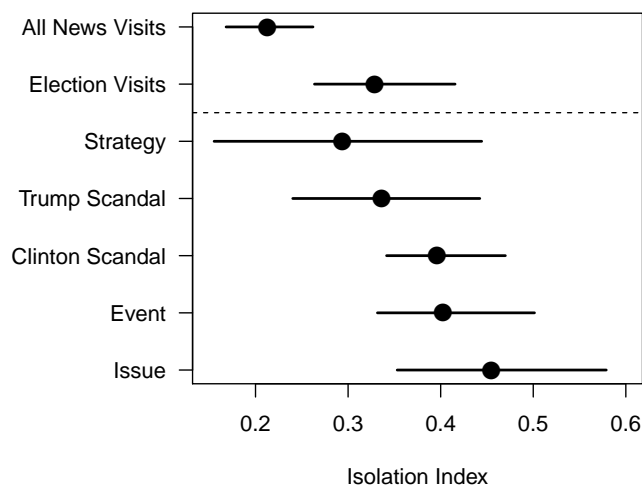
Turning to the variation in selectivity across the different types of election-related news, the results proved ambiguous. We had anticipated that coverage of scandals would elicit stronger dissonance among supporters of the candidate implicated in the scandal,

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<sup>19</sup>This consists of stories identified as election-related using a keyword search that are subsequently identified as focusing on the election by coders.

<sup>20</sup>This is a cluster bootstrap in which we re-sample at the level of respondents and use all their visits when estimating the isolation index.

Figure 2: Partisan Divide by Article Content



leading them to focus on other stories, thereby strengthening the partisan divide. In fact, scandal news implicating either of the candidates elicited no different a level of partisan segregation than the baseline of all election-related news. Scandal, strategy and event-oriented news elicited generally similar levels of partisan segregation; if anything, segregation tended to increase for coverage of political issues. In one general sense, however, these results conform to expectations: in comparison with news coverage overall, partisans react more selectively to news reports about the election. These estimates are far from precise, making it difficult to draw firm conclusions.<sup>21</sup>

## Selective Exposure by Article Slant

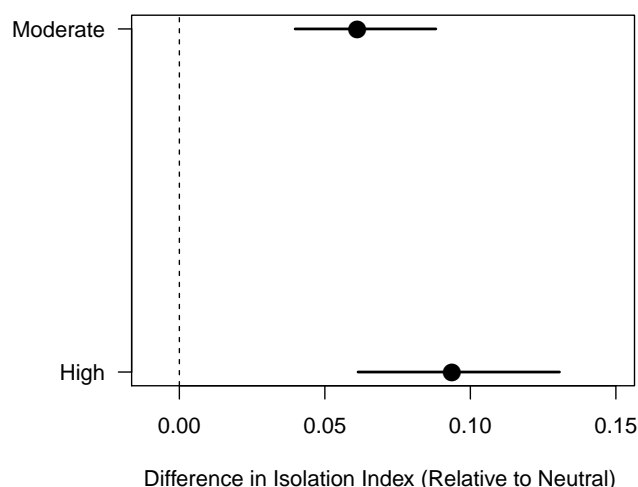
Do news consumers behave as partisans when the content of election-related news is slanted explicitly in favor of one party or the other? Figure 3 displays differences in the isolation index for content seen as conveying a *moderate* degree of partisan slant (a 2 or 4 on the scale, 33% of visits) and a *high* degree of partisan slant (a rating of 1 or 5 on the scale, 23% of visits) relative to the set of articles rated as *neutral* by the coders (a 3 on the rating scale, 43% of visits).<sup>22</sup>

For neutral articles the isolation index is 0.33. The degree of partisan isolation is 6

<sup>21</sup> With the exception of "strategy" articles, the difference in the isolation index between these election news categories and all news visits to these news domains is statistically significant.

<sup>22</sup> These visit share numbers differ slightly from Table 6 as we now focus on total views rather than unique articles.

Figure 3: Change in Partisan Divide by Partisan Slant



points greater for articles with a moderate degree of slant (an isolation index of 0.39) and 9 points greater for articles with a high degree of partisan slant (an isolation index of 0.42) relative to this baseline.<sup>23</sup> Not surprisingly, isolation is highest when news coverage clearly favors one party over the other.

In documenting the effects of news content, we have advanced the literature on selective exposure to news in two important ways. First, it is clear that coverage of election campaigns is more polarizing than news in general. Second, when we incorporate partisan slant into the analysis, the partisan divide in news exposure expands. Partisans are especially motivated to avoid content that favors the out party and, conversely, are attracted to stories slanted in favor of their preferred party. While news with slant clearly elicits partisan selectivity, it is important to point out that the most commonly encountered news report conveys no slant. In the case of the typical election story, therefore, partisans are under less pressure to engage in selective exposure.

## Robustness Tests

Before examining the attitudinal consequences of these partisan divides in news consumption, we first subject the evidence in the preceding section to a series of robustness tests.

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<sup>23</sup>The difference in the isolation index between high and moderate slant articles falls short of statistical significance (3.3 points, 95% CI [-1, 8]).

We do so by comparing our measures of website traffic to a widely used alternative source, estimating partisan isolation using an alternative set of raking weights that reduce the overall level of political interest in our panel to align with other surveys conducted during the 2016 election and considering several alternative explanations for increased partisan isolation.

## Comparison to Comscore Data

The patterns of web traffic we observe are closely related to traffic measures from Comscore, an alternative source of browsing data collected through a large national panel. Web traffic patterns among panelists in our study during October 2016 converge with traffic estimates based on individual-level data from Comscore’s web panel for the same time period. Focusing on the measure of web traffic used to construct the partisan isolation index – the average daily share of panelists who visited a domain at least once on a given day – the two sources correlate at 0.82 when considering the 500 most-visited sites of any type among our panelists and 0.84 when comparing only the political domains that contribute to estimates of partisan isolation (See Appendix A for further comparisons).

## Robustness to Selection Bias

Our sample of panelists was collected using YouGov’s standard procedure – an approach which has been incorporated into a variety of other studies of public opinion.<sup>24</sup> As a result we conduct our primary analysis of partisan isolation using weights that adjust for deviations of our final sample from an initial nationally-representative sampling frame due to both non-response to the initial survey and non-compliance with the installation of the tracking toolbar after taking the survey.

After applying these weights, the sample closely resembles the composition of two other surveys conducted during the 2016 election – the American National Election Study and the Cooperative Congressional Election Study – in terms of both respondent demographics

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<sup>24</sup>First, YouGov created an initial target sample of respondents using Census data. Second, members of the YouGov panel were matched to this target sample using proximity matching. Third, YouGov generated survey weights to weight these matched respondents back to the initial target sample.



and political attitudes (See Appendix A for a detailed analysis). Even after including these weights, however, self-reported political interest is substantially higher in our sample relative to the same measure in the 2016 CCES (3.55 to 3.25 on a 4-pt political interest scale).

We address this potential source of bias by generating an alternative set of raking weights that weight our sample to match the marginal distributions of age, education, gender, partisan identification, race, region and, importantly, self-reported political interest in the 2016 Cooperative Congressional Election Study. If the higher levels of political interest in our sample contribute to the elevated levels of partisan isolation we observe, this re-weighting exercise should produce a substantial reduction in our estimates of isolation. Instead, these estimates remain stable across the alternative sample weights. The partisan isolation index is 0.21 when using the YouGov weights and 0.22 when using the raking weights that down-weight the overall level of political interest among the panel. In both cases, we continue to observe substantially higher levels of partisan isolation than prior research.

## Potential Alternative Explanations

We also note that this increased segregation is not an artifact of sorting (i.e., that the parties have become more distinct on numerous social cleavages). When we examine differences in browsing behavior based on gender, race and education (see Table 6), we find minimal traces of segregation.<sup>25</sup> Partisan segregation in news browsing is not a byproduct of segregation deriving from other social dimensions associated with partisan preference.

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<sup>25</sup>Here we follow the same approach used in Gentzkow and Shapiro (2011) for determining segregation in web traffic between two groups (e.g., College educated v. Non-College educated, White v. Non-White).

Table 6: Isolation Index By Trait

Trait	Isolation Index
Race	0.00
Gender	0.03
Education	0.03
Party	0.21
Ideology	0.24

Our results are also not driven by geographically-based demand for local news. When we compare aggregate levels of partisan segregation, we find that local news websites are less segregated (0.06) relative to other news domains (0.24). De facto selective exposure due to reliance on local news sites does not explain our findings.

## Attitudinal Consequences of Selective Exposure

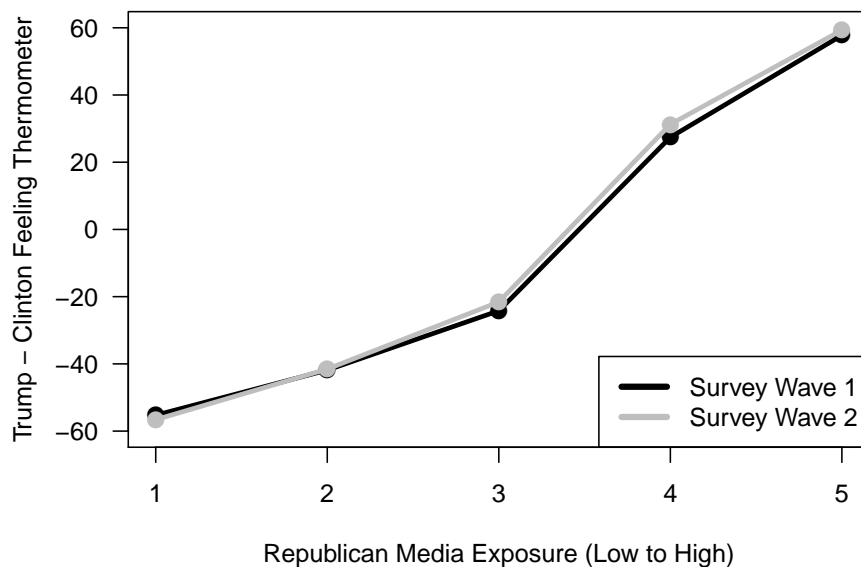
Finally, we turn to the consequences of partisan divides in news consumption for political attitudes. Given the panel structure of the survey, we examine changes in a respondent’s partisan sentiment over the course of the campaign as a function of their exposure to partisan news. Did partisans who encountered a steady diet of partisan news reports change their views about the presidential candidates?

### Exploratory analysis

First, we visually examine whether changes in candidate assessments between the two panels of the survey are linked to partisan news exposure. We divide panelists into five evenly-sized bins based on the distribution of individual-level partisan news exposure. From low to high, these bins are ordered in terms of the average Republican audience share of the news visits made by an individual. Figure 4 displays one measure of candidate sentiment — the average difference between respondents’ feeling thermometer evaluations of Trump and Clinton — within each of these news consumption bins and does so separately for the first and second waves of the survey.

The relative candidate evaluations within each quintile of partisan media exposure

Figure 4: Candidate Evaluations by Partisan News Exposure and Survey Wave



move in the expected manner. Individuals who consume election news primarily from domains visited by Democrats (Bin 1) evaluate Clinton much more positively than Trump. Individuals who consume election news primarily from domains visited by Republicans (Bin 5) evaluate Trump much more positively than Clinton. However, given the overlapping nature of the lines for the first and second survey waves, there is little indication that more pronounced patterns of partisan news consumption contributed to polarization in candidate assessments over the course of the campaign. The initial divides in candidate assessments between individuals with different patterns of news consumption that are present in August persist through the end of the election, but those with one-sided patterns of news consumption do not move further apart over this time period.

## Regression Analysis

Moving beyond this visual evidence, we examine the consequences of partisan news consumption using regression models which take the following form:

$$Y_2 - Y_1 = \beta_0 + \beta_1 \times \textit{Partisan News Exposure} + \textit{Controls} + \epsilon.$$

Here the outcome variable is the change in an individual's attitudes toward the can-

didates between the two waves of the panel. We examine three indicators of candidate affect. These consist of feeling thermometer ratings of Clinton and Trump, a battery of trait ratings for each candidate,<sup>26</sup> and items measuring emotional reactions to the two candidates.<sup>27</sup> Across these sets of indicators we compute the relative ratings of the two candidates (e.g., the difference in a respondent's feeling thermometer placement of Trump relative to Clinton). In combination, these variables allow us to observe the effect of media exposure on both overall candidate assessments and less crystallized elements of candidate evaluation (e.g., ratings of candidate competence) that may be more amenable to media influence.

The *Partisan News Exposure* variable is operationalized in two different ways. First, we use the audience-based measure of exposure to partisan content from the previous section. Second, we construct a content-based measure of partisan news exposure by averaging the coder-rated slant of all election-related articles that a respondent encountered.

Finally, the *Controls* included in the model are a variety of respondent attributes measured in the first wave of the survey—level of education, income, partisanship, gender, and age among other variables. Their inclusion means we examine the influence of media exposure that is not otherwise explained by an individual's demographic characteristics.

To our knowledge, this is the first study to link validated measures of online media exposure to changes in political attitudes. By observing *shifts* in attitudes in a panel (within-subject) design, we can be more confident that any association between attitudes and web browsing behavior does not simply reflect an endogenous relationship between attitudes and news consumption in which individuals who already hold strongly partisan views subsequently seek out media content that aligns with their views. While our media exposure variables are continuous, this approach is analogous to observing a difference in differences (Morgan and Winship 2007, Ch. 9; Angrist and Pischke 2009, Ch. 5).

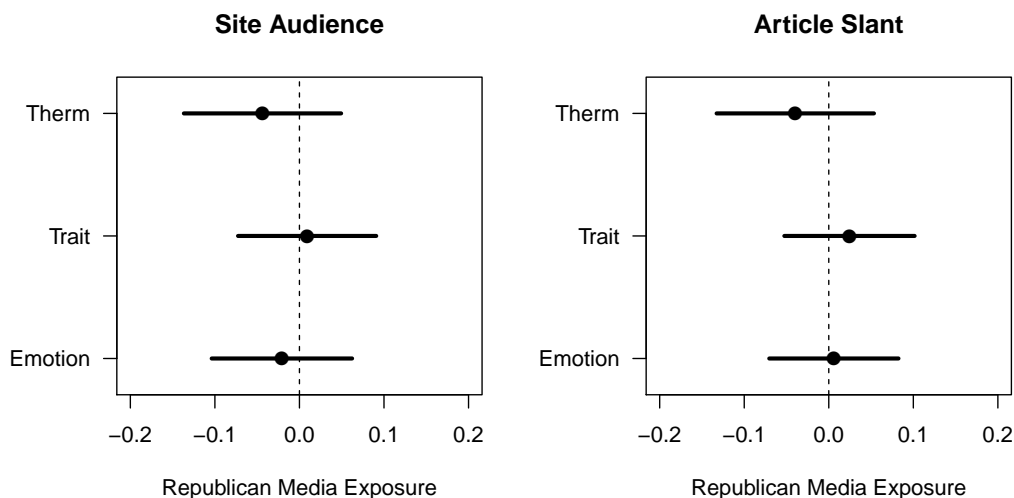
In presenting these results we orient the outcome measures so that higher values indi-

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<sup>26</sup>The trait battery consists of seven different traits applied to each candidates: intelligence, trustworthiness, "tells it like it is," compassion, morality, stability and willingness to compromise. Full question wording for these items is available in the Appendix.

<sup>27</sup>The measure consists of six emotion ratings directed at each candidate: did the candidate make the respondent feel anger, hopefulness, fear, disgust, pride and inspiration. Question wording for these items is available in the Appendix.

Figure 5: Effects of Partisan Media Exposure on Candidate Evaluations



cate favorable shifts in assessments of Donald Trump relative to Hillary Clinton between the two waves of the panel. Similarly, we construct both media exposure measures so that higher values indicate a more Republican news diet. Finally, we rescale both sets of measures to have mean zero and standard deviation one to facilitate comparisons across different operationalizations of media exposure and candidate outcomes.

In all cases, we find no evidence that news consumption contributed to attitude change over the course of the campaign.<sup>28</sup> The left panels of Figure 5 trace changes in our indicators of candidate evaluation to our audience-based measure of individuals' exposure to partisan news (the average Republican audience share of their news visits). The top point focuses on the difference in the candidate feeling thermometers, the middle point repeats the analysis for net trait ratings of the two candidates, and the bottom point examines shifts in a measure of net candidate affect. Higher values on all three measures indicate shifts in a more Republican direction (i.e., a shift towards more favorable evaluations of Donald Trump relative to Hillary Clinton). The right hand panels of Figure 5 repeat the analyses, this time substituting the content-based measure of slant as the measure of exposure to partisan news.

Figure 5 displays the coefficients on Republican media exposure from these regressions.

<sup>28</sup>We present additional analysis using a lagged dependent variable approach in the Appendix. Here we find more precisely estimated, but substantively small, effects of media exposure. These results are generally consistent with the evidence based on raw change scores presented in Figure 5.

Across these different model specifications, differences in exposure to partisan news sources exerted no detectable influence on changes in candidate evaluations. A one standard deviation increase in Republican media exposure resulted in a change of -0.04 standard deviations in the net thermometer rating, a change of 0.01 standard deviations in the net trait rating, and -0.02 in the affect score. In all cases these shifts are not statistically significant, with 95% confidence intervals that contain zero.

We observe similar results when employing our measure of election-related article slant. Here there are shifts of -0.04, 0.02 and 0.01 standard deviations on the thermometer, trait and emotional evaluations in response to a one standard deviation increase in exposure to articles with a favorable slant toward Donald Trump. As in the audience-based measure of exposure to partisan information, these relationships are not statistically significant. In general, we observe little, if any, attitude change due to partisan media exposure between August and November of 2016.

Do these null findings suggest that partisan news exerts minimal influence? We are reluctant to offer any firm conclusions given the context in which this particular study occurred, namely a highly polarized campaign. One plausible explanation for the stability of attitudes across different news sources and degree of slant is that public opinion was already divided at the outset of this study. The percentage of partisans in our sample whose initial thermometer rating of their preferred candidate was less than 75 was only 41 percent. More strikingly, the percent rating the out party higher than 25 was only 10 percent. The distribution of the trait and emotion scores at the first wave proved similarly skewed with relatively few partisans expressing weak or ambivalent sentiment toward Trump and Clinton.

A second possible explanation concerns the supply of biased news. Although those who seek partisan vitriol can find it, the overwhelming majority of online media outlets provide dispassionate, relatively balanced coverage of campaigns. Fox News may be the Republican outlet of choice for good reason, but this network's online slant score, based on the election-focused Fox stories included in our content analysis, was 3.2, not substantially different from the scores for *USA Today* (2.7), CBS News (2.6), or the *New York Times*

(2.6). It appears that the most extreme forms of partisan coverage are limited to a handful of outlets, most having only small market shares.

## Discussion

Over the course of the 2016 campaign, Democrats and Republicans occupied distinct media enclaves. Republicans relied disproportionately on Fox News and a handful of other partisan providers. While Democrats also gravitated to partisan outlets, (e.g. The Huffington Post), they continued to receive most of their news from news organizations that practice non-partisan journalism.

Given the circumstances surrounding the 2016 campaign, an obvious explanation for Republicans' browsing behavior is their candidate's well-publicized tirades directed at the mainstream media. From "fake news" to "enemy of the people," Trump made hostility to the press a key ingredient of his appeal to the Republican base. Given what we know about the persuasive effects of elite rhetoric on the rank and file (see Zaller, 1992), one possible explanation of our results is that Republicans avoided non-partisan outlets because they perceived them to be anti-Trump.

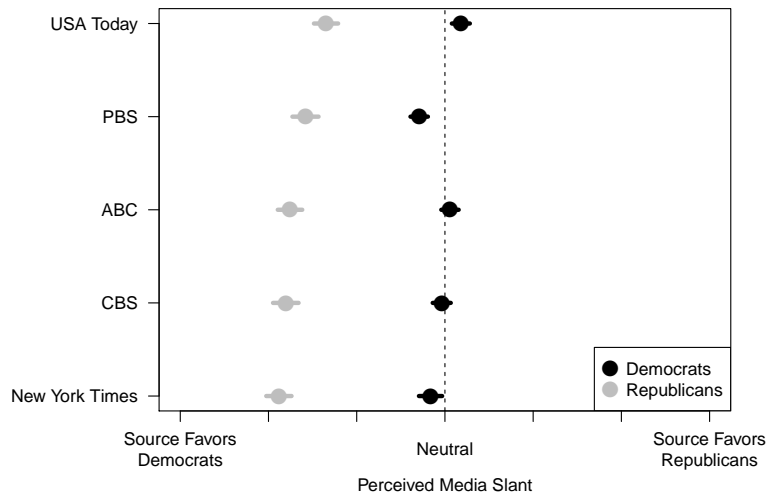
Attractive as the opinion leadership explanation may be, it does not fit the survey evidence on perceived media bias. In fact, the partisan divide in evaluations of the credibility of major news organizations predates the emergence of presidential candidate Trump by many years. As early as 2004, the Pew Research Center reported sizable gaps between Democrats and Republicans in the "believability" ratings of major news organizations (Pew Research Center, 2004). Republicans typically perceived the mainstream media as pro-liberal.

In 2011, we replicated the Pew study by asking a national sample (also recruited from the YouGov panel) to indicate the extent to which they perceived various well-known mainstream news organizations as biased or unbiased.<sup>29</sup> Respondents were asked to use a scale that ranged from (1) "liberal or pro-Democratic bias" to (7) "conservative or pro-

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<sup>29</sup>The 2011 study was funded by a Google Research Award to Yphtach Lelkes (now at the University of Pennsylvania) and Shanto Iyengar.

Figure 6: Perceptions of Media Bias



Republican bias," with a mid-point of 4 indicating "no bias at all." They applied the scale to the *New York Times*, ABC News, CBS News, *USA Today*, and PBS.

As shown in Figure 6, Republicans placed these news outlets toward the liberal extreme. Averaged across all five outlets, the Republican rating was 2.3. In Republican eyes, the mainstream media clearly tilt against them, a classic case of the hostile media phenomenon (Vallone, Ross, and Lepper, 1985). Democrats, on the other hand, viewed these news organizations as unbiased; their average rating was almost exactly 4.0 (3.95). Given that the outcome measure ranges between 1 and 7, the observed partisan divide of 1.6 points is a chasm—representing nearly 30 percent of the maximum possible difference.

The mainstream media have been caught up in the maelstrom of party polarization. Today, source credibility is very much a matter of partisan affiliation with Republicans attributing an anti-conservative bias to most major news outlets. Given the historical context, candidate Trump's message in 2016 is unlikely to have changed many Republican minds for he was already "preaching to the choir."

The intensely polarized state of our politics also makes it more difficult to observe changes in voters' partisan sentiment over the course of the campaign. Despite the significant divide between Democrats and Republicans in the news sites they visited, and some slight differences in the slant they encountered, browsing behavior did not result in any significant movement in evaluations of the candidates. The presence of two highly



controversial candidates in 2016 likely contributed to this non-finding; we will need to investigate the effects of news consumption on partisan attitudes under different contexts and circumstances before reaching any conclusions about the potential effect of exposure to partisan news on biased beliefs (misinformation), partisan animus, and vote choice.

In closing, we return to the question of what explains our main finding of increased partisan segregation. Based on our evidence, we suspect that segregation is attributable less to the supply of distinctively biased content and more to the politicization of source credibility. Especially important is the skepticism shown by Republicans toward mainstream news organizations. Notwithstanding the significant changes in the media environment we noted at the outset, the U.S. market for news remains dominated by sources dedicated to conventional journalism. Of the political news domains considered in our study, by our count only 33—representing less than ten percent of all sources—deliver news with an explicitly partisan perspective. On balance, therefore, we suspect that the increased segregation of the online news audience is the result of biased beliefs about the motives of journalists rather than any fundamental change in the content of campaign news.

## Bibliography

- Abelson, Robert P., William J. McGuire, Theodore M. Newcomb, Milton Rosenberg and Percy H. Tannenbaum. 1967. *Theories of Cognitive Consistency: A Sourcebook*. Rand McNally.
- Abramowitz, Alan I. and Kyle L. Saunders 2008. "Is Polarization a Myth?" *Journal of Politics* 70(2): 542-555.
- Adamic, Lada A. and Natalie Glance. 2005. "The Political Blogosphere and the 2004 U.S. Election: Divided They Blog." *Proceedings of the 3rd International Workshop on Link Discovery*.
- Angrist, Joshua D. and Jorn-Steffen Pischke. 2009. *Mostly Harmless Econometrics*. Princeton University Press.
- Arceneaux, Kevin and Martin Johnson. 2013. *Changing Minds or Changing Channels? Partisan News in an Age of Choice*. University of Chicago Press.
- Budak, Ceren, Sharad Goel and Justin M. Rao. 2016. "Fair and Balanced? Quantifying Media Bias through Crowdsourced Content Analysis." *Public Opinion Quarterly* 80(S1): 250-271.
- Davis, Nicholas T. and Johanna Dunaway 2016. "Party Polarization, Media Choice, and Mass Partisan-Ideological Sorting." *Public Opinion Quarterly* 80(S1): 272-297.
- Festinger, Leon. 1957. *A Theory of Cognitive Dissonance*. Row & Peterson.
- Fiorina, Morris and Samuel Abrams. 2008. "Political Polarization in the American Public." *Annual Review of Political Science* 11: 563-588.
- Flaxman, Seth, Sharad Goel and Justin M. Rao. 2016. "Filter Bubbles, Echo Chambers and Online News Consumption." *Public Opinion Quarterly* 80(S1): 298-320.
- Fowler, Erika Franklin and Travis Ridout. 2013. "Negative, Angry and Ubiquitous: Political Advertising in 2012." *The Forum* 10(4): 51-61.
- Geer, John G. 2010. "Fanning the Flames: The News Media's role in the Rise of Negativity in Presidential Campaigns." *Joan Shorenstein Center on the Press, Politics and Public Policy Discussion Series*.
- Gentzkow, Matthew and Jesse M. Shapiro. 2010. "What Drives Media Slant? Evidence

- from U.S. Daily Newspapers.” *Econometrica* 78(1): 35-71.
- Gentzkow, Matthew and Jesse M. Shapiro. 2011. “Ideological Segregation Online and Offline.” *Quarterly Journal of Economics* 126(4): 1799-1839.
- Grimmer, Justin and Gary King. 2011. “General Purpose Computer-Assisted Clustering and Conceptualization.” *Proceedings of the National Academy of Sciences* 108(7): 2643-2650.
- Guess, Andrew M. 2016. “Media Choice and Moderation: Evidence from Online Tracking Data.” Working Paper.
- Haidt, Jonathan and Marc J. Hetherington. 2012. “Look how far we’ve come apart” *New York Times*.
- Heider, Fritz. 1958. *The Psychology of Interpersonal Relations*. Wiley.
- Huber, Gregory A. and Neil Malhotra. 2017. “Political Homophily in Social Relationships: Evidence from Online Dating Behavior.” *Journal of Politics* 79(1): 269-283.
- Iyengar, Shanto. 2015. *Media Politics: A Citizen’s Guide*. W.W. Norton & Company.
- Iyengar, Shanto, Kyu S. Hahn, Jon Krosnick and John Walker. 2008. “Selective Exposure to Campaign Communication: The Role of Anticipated Agreement and Issue Public Membership.” *Journal of Politics* 70(1): 186-200.
- Iyengar, Shanto, Gaurav Sood and Yphtach Lelkes. 2012. “Affect, Not Ideology: A Social Identity Perspective on Polarization.” *Public Opinion Quarterly* 76(3): 405-431.
- Iyengar, Shanto and Sean J. Westwood. 2015. “Fear and Loathing Across Party Lines: New Evidence on Group Polarization.” *American Journal of Political Science* 59(3): 690-707.
- Iyengar, Shanto, Tobias Konitzer and Kent Tedin. 2017. “The Home as a Political Fortress; Family Agreement in an Era of Polarization.” Working Paper.
- Iyengar, Shanto and Kyu S. Hahn. 2009. “Red Media, Blue Media: Evidence of Ideological Selectivity in Media Use.” *Journal of Communication* 59(1): 19-39.
- Jennings, M. Kent and Richard Niemi. 1974. *The Political Character of Adolescents*. Princeton University Press.
- Jennings, M. Kent, Laura Stoker and Jake Bowers. 2009. “Politics Across Generations:

- Family Transmission Reexamined.” *Journal of Politics* 71(3): 782-799.
- Lawrence, Eric, John Sides and Henry Farrell. 2010. “Self-Segregation or Deliberation? Blog readership, Participation and Polarization in American Politics.” *Perspectives on Politics* 8(1): 141-157.
- Lazarsfeld, Paul, Bernard Berelson and Hazel Gaudet. 1948. *The People’s Choice: How the Voter Makes Up His Mind in a Presidential Campaign*. Columbia University Press.
- Levendusky, Matthew. 2009. *The Partisan Sort: How liberals became Democrats and conservatives became Republicans*. University of Chicago Press.
- Mann, Thomas and Norman Ornstein. 2012. *It’s Even Worse Than It Looks*. Basic Books.
- Mason, Lilliana. 2015. “ ‘I Disrespectfully Agree’: The Differential Effects of Partisan Sorting on Social and Issue Polarization.” *American Journal of Political Science* 59(1): 128-145.
- McCarty, Nolan, Keith T. Poole and Howard Rosenthal. 2005. *Polarized America: the Dance of Ideology and Unequal Riches*. MIT Press.
- McGuire, William. 1968. “Selective Exposure: A Summing Up” in *Theories of Cognitive Consistency: A Sourcebook*, (Eds. Robert Abelson, Elliot Aronson, William McGuire, Theodore Newcomb, Milton Rosenberg, and Percy Tannenbaum). Rand McNally.
- Schramm, Wilbur and Richard F. Carter. 1959. “Effectiveness of a Political Telethon.” *Public Opinion Quarterly* 23(1): 121-127.
- Stonecash, Jeffrey M., Mark D. Brewer and Mack D. Mariani. 2003. *Diverging Parties: Social Change, Realignment, and Party Polarization*. Westview Press.
- Sears, David O. 1968. “The Paradox of De Facto Selective Exposure Without Preference for Supportive Information.” in *Theories of Cognitive Consistency: A Sourcebook*, (Eds. Robert Abelson, Elliot Aronson, William McGuire, Theodore Newcomb, Milton Rosenberg, and Percy Tannenbaum). Rand McNally.
- Sears, David O. and Jonathan L. Freedman 1967. “Selective Exposure to Information: A Critical Review.” *Public Opinion Quarterly* 31(2): 194-213.
- Stroud, Natalie. 2010. “Polarization and Partisan Selective Exposure.” *Journal of Com-*

- munication* 60(3): 556-576.
- Levendusky, Matthew. 2013. *How Partisan Media Polarize America*. University of Chicago Press.
- Messing, Solomon. 2013. *Friends That Matter: How Social Transmission of Elite Discourse Shapes Political Knowledge, Attitudes and Behavior*. Doctoral Dissertation. Stanford University
- Mutz, Diana C. 2006. *Hearing the Other Side: Deliberative versus Participatory Democracy*. Cambridge University Press.
- Pew Research Center. 2016. "The Modern News Consumer." Pew Research Center Report. July 7, 2016.
- Prior, Markus. 2009. "Improving Media Effects Research through Better Measurement of News Exposure" *Journal of Politics* 71(3): 893-908.
- Rivers, Douglas and Delia Bailey. 2009. "Inference from Matched Samples in the 2008 U.S. National Elections." *Proceedings of the Joint Statistical Meetings* Yougov/Polimetrix. Palo Alto.
- Vavreck, Lynn and Shanto Iyengar. 2011. "The Future of Political Communication Research: Online Panels and Experimentation." in *Oxford Handbook of American Public Opinion and Media* (Eds. George C. Edwards III, Robert Shapiro and Lawrence Jacobs.)
- Westwood, Sean, Shanto Iyengar and Stefaan Walgrave. 2017. "The Tie That Divides: Cross-National Evidence of the Primacy of Partyism." *European Journal of Political Science* Forthcoming.

# Appendix A: Wakoopa Toolbar Uptake and Compliance

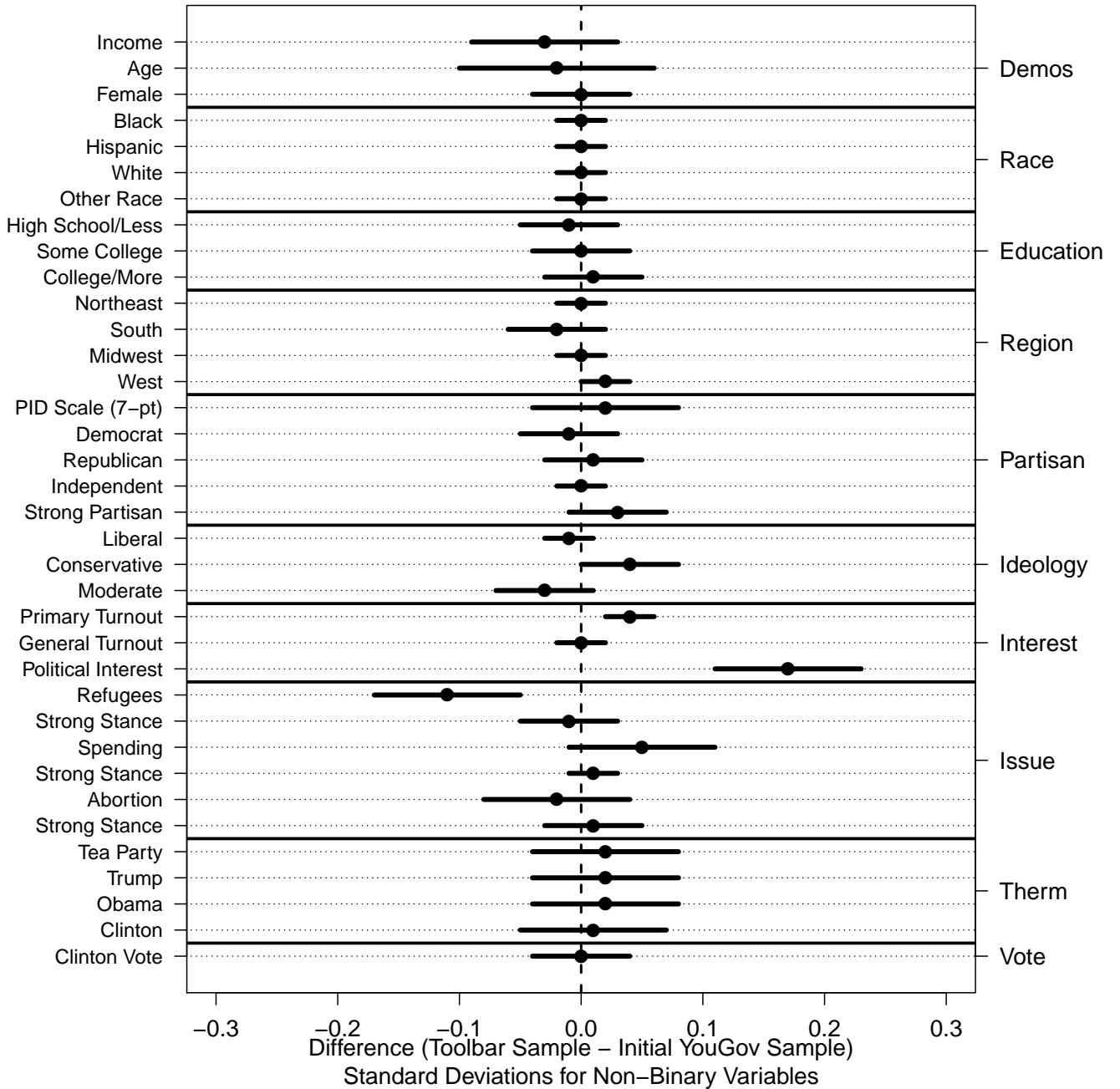
## Initial Toolbar Uptake

Figure 7 compares the sample of individuals who installed the toolbar (n=1,076) to the overall survey sample (n=7,704). In each case we use survey weights provided by YouGov when making these comparisons. This mirrors the approach we use in our analysis when assessing partisan segregation throughout the paper.

The differences between these groups are small across a variety of indicators. The primary exception is that the toolbar sample has a higher degree of political interest than the initial survey sample. Based on this imbalance, we conduct additional robustness checks that re-weight the toolbar sample to reduce this imbalance at the end of this appendix section.

Figure 7: Demographic Differences by Toolbar Installation

## Differences in Toolbar Sample Relative to YouGov Sample



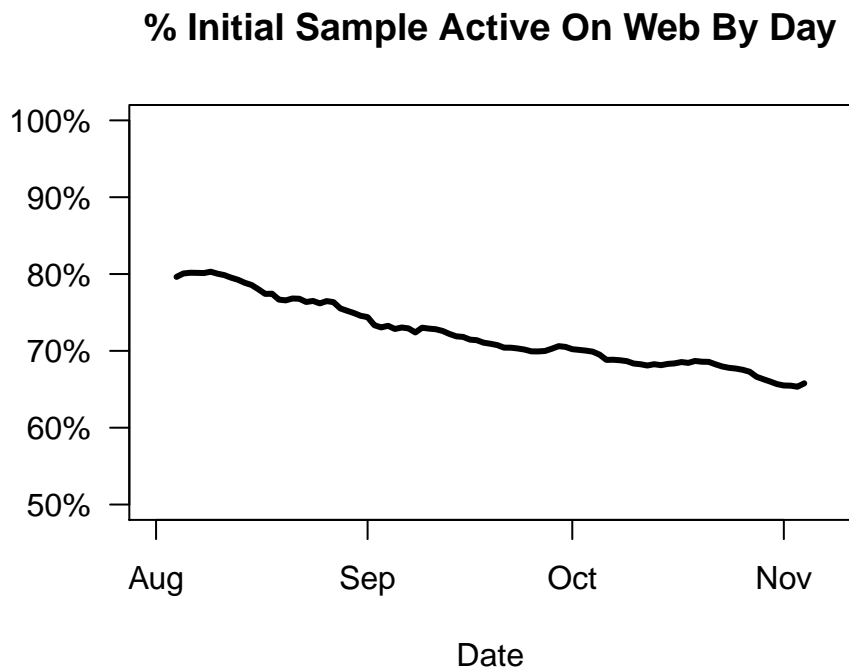
### Toolbar Use Over Time

While individuals who installed the toolbar were incentivized to continue using it throughout the study time period, we observed a modest degree of attrition in use of the Wakoopa toolbar over the study. During the first week of data collection, 94% of the individuals we analyze in the toolbar dataset registered at least one site visit. By the final week of

data collection 76% of these respondents visited at least one website during the week.

Figure 8 below displays the percentage of active users by day (based on a 7-day rolling average) over the period of data collection.

Figure 8: Toolbar Use Over Time

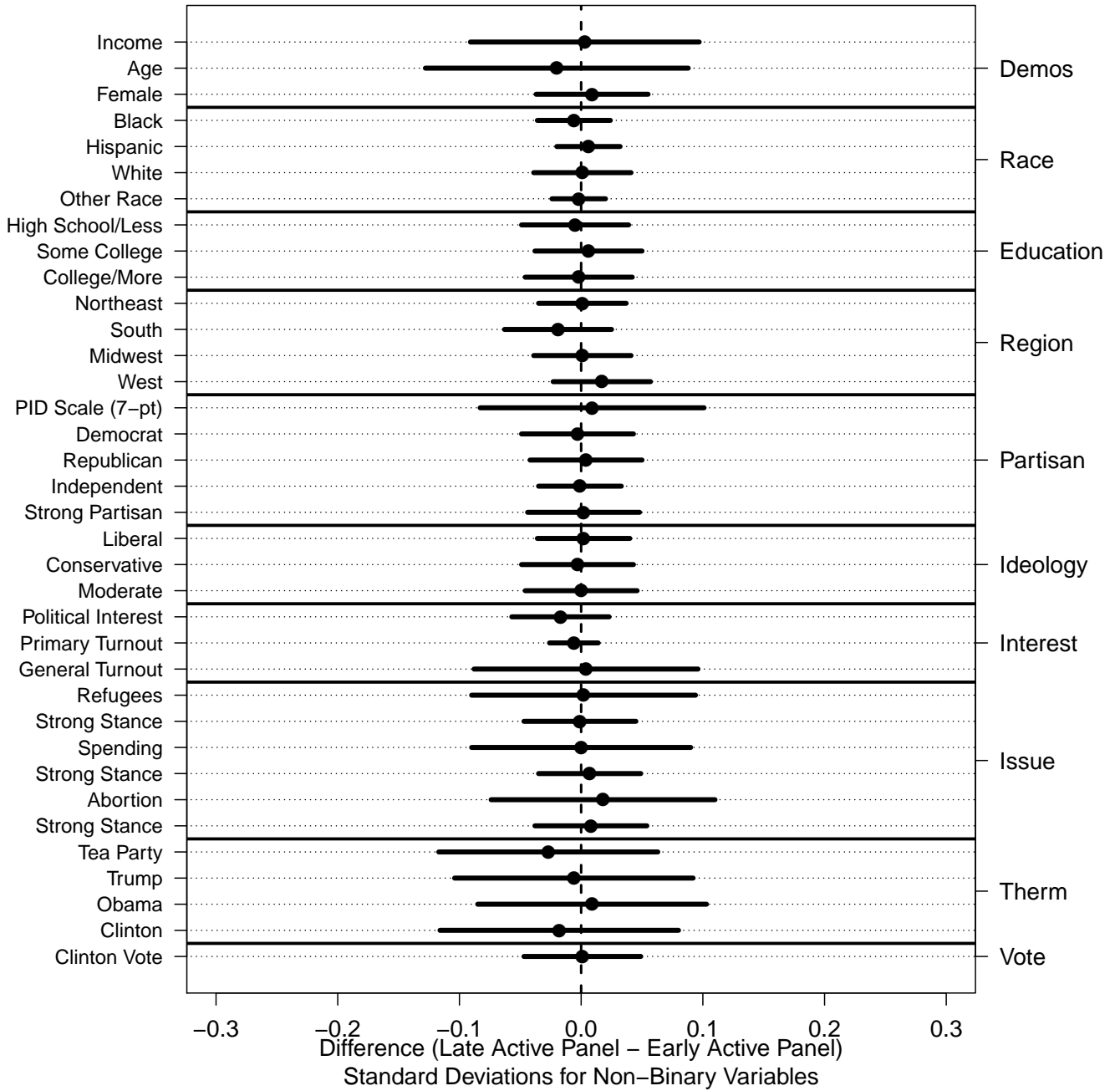


In Figure 9 (see below), we examine differences in the demographic profile of individuals who remained active on Wakoopa upto the last week of data collection (i.e., they have at least one website visit per week during this time period) relative to those who became inactive at this point (i.e., who visit zero sites during this week).



Figure 9: Demographic Differences by Wakoopa Activity

## Over-Time Differences in Active Toolbar Sample



The results offer only limited evidence that attrition in toolbar use is systematically linked to these covariates.

## Comparison To Other Surveys

We also benchmark the final sample of web panelists we consider to a set of other political surveys that took place during the 2016 election. The next three plots display differences in the sample composition of our toolbar sample after incorporating the sample weights relative to three other studies: 1) the 2016 American National Election Study Face to Face Interviews, 2) the 2016 American National Election Study Online Interviews and 3) the 2016 Cooperative Congressional Election Study (an online-only sample). This enables comparisons across a variety of different demographic and attitudinal characteristics. Because there are differences in the survey items and question format in each of these other surveys, not every toolbar item can be compared to all three other surveys.

These comparisons reveal a high degree of similarity between our sample and these other data sources on important dimensions like partisanship and Presidential vote choice. That being said, even after including these weights two departures stand out. First, self-reported political interest is substantially higher in our sample, even after including the weights, than it is for the 2016 CCES where a comparable 4-pt political interest measure is available (3.55 to 3.25). Second, self-reported turnout in the 2016 Presidential primaries and caucuses is substantially higher among the toolbar sample (76% among our panelists relative to: 40% for ANES Face to Face, 44% for ANES Online, 61% for CCES). Based on this differences, we conclude this section by presenting results which show that our overall findings are not altered by reweighting our data to reduce this discrepancy in political interest.

Figure 10: Trait differences between ANES 2016 Face to Face and Toolbar Sample

### Differences in Sample Composition Relative to NES Sample

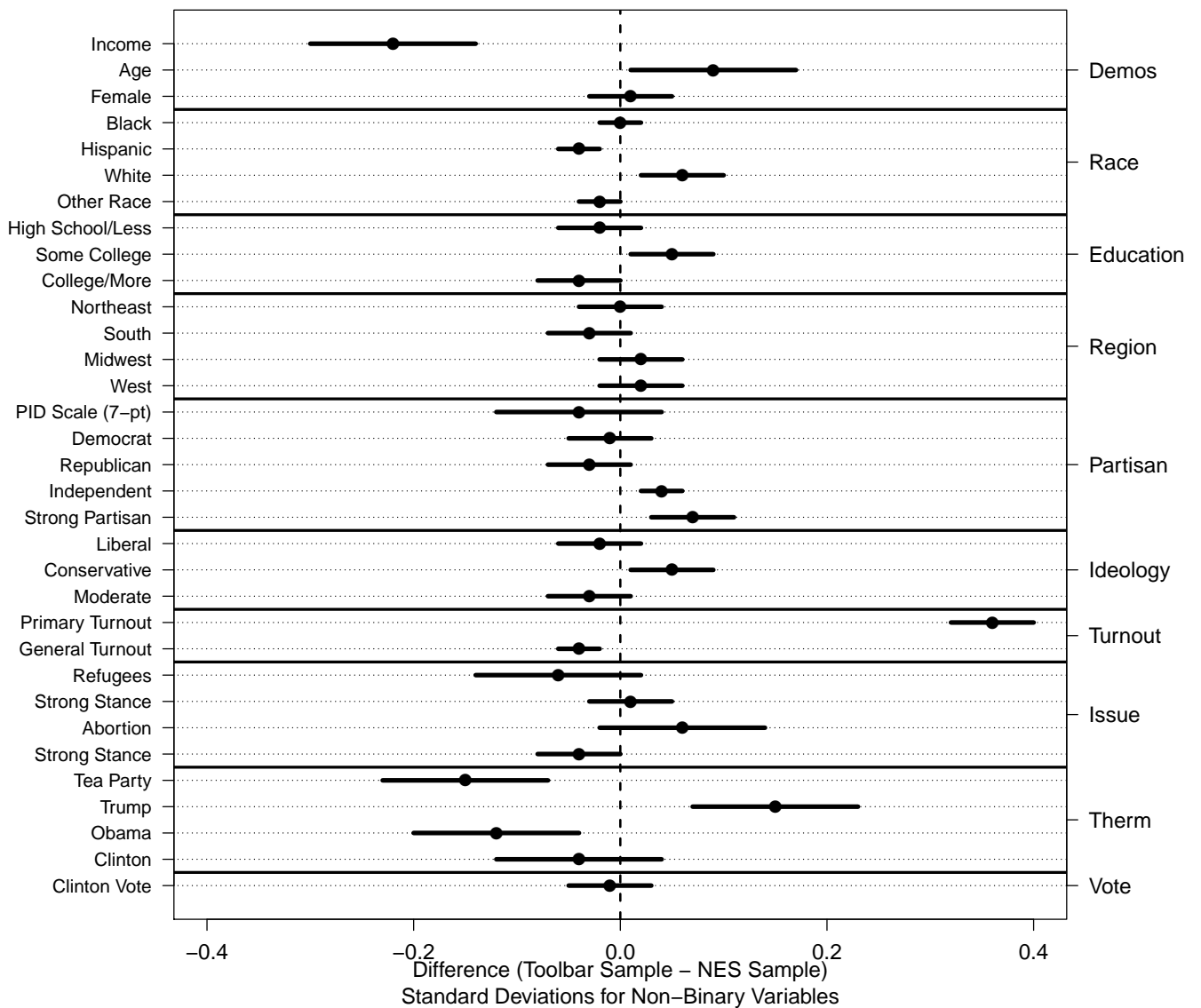


Figure 11: Trait differences between ANES 2016 Online and Toolbar Sample

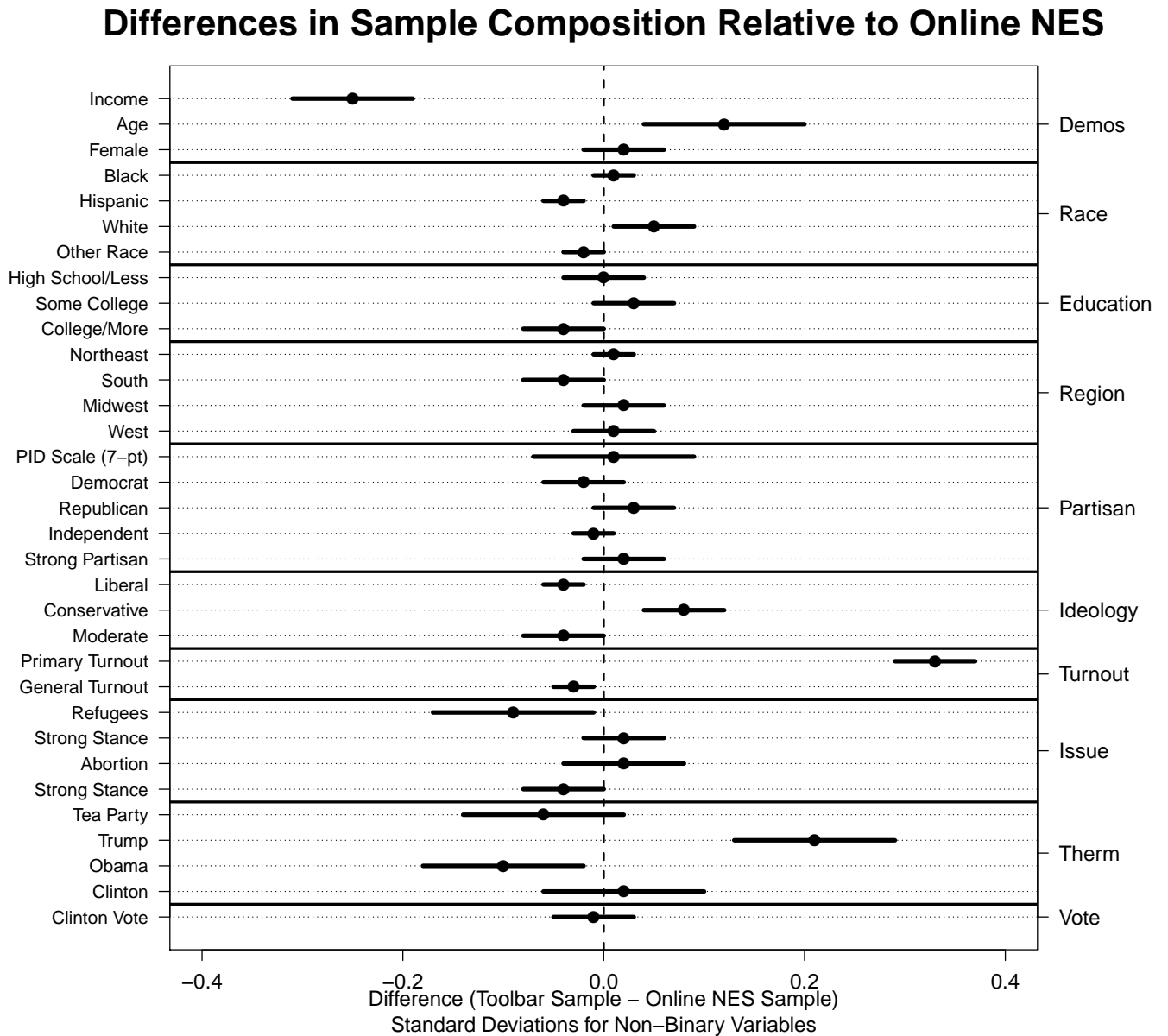
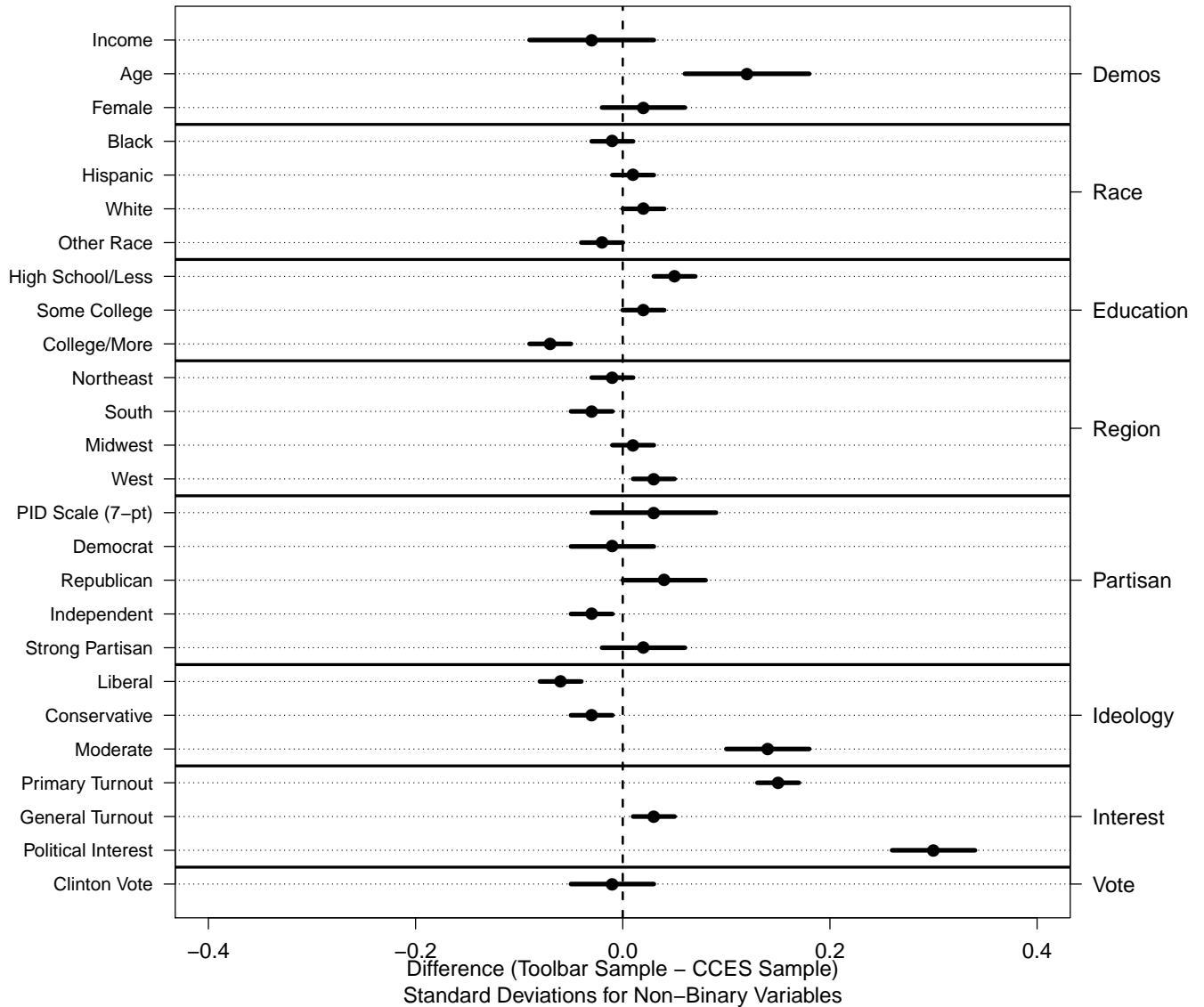


Figure 12: Trait differences between CCES 2016 and Toolbar Sample

### Differences in Sample Composition Relative to CCES Sample



### Comparison To Other Web Traffic Sources

To compare the web traffic data from Wakoopa panelists to other sources, the table below pairs this traffic data for Wakoopa panelists during October 2016 to estimates of website traffic during this same time period obtained from individual-level data from Comscore’s web panel over the same period of time.

We paired aggregate traffic data from our set of Wakoopa panelists to Comscore traffic data for two sets of websites a) the top 500 websites of any type in the Wakoopa dataset and b) the 255 political websites that are the primary focus of this study. We compared web traffic patterns for three different measures including a) the share of active panelists with at least one visit to a domain on a given day (closest to the approach used in Gentzkow and Shapiro 2011), b) the share of all web traffic to different web domains (closest to the approach used in Flaxman et al 2016) and c) the overall volume of traffic to various web domains. This approach allows us to benchmark our traffic sample to these other data sources.

Table 7: Wakoopa and Comscore Web Traffic Comparison

	Daily Visitor Share (1 or More Visits)	Traffic Share	Visits per Panelist
Top 50 (All Sites)	0.82	0.95	0.95
Top 500 (All Sites)	0.82	0.95	0.95
Top 50 (Political Site List)	0.74	0.55	0.54
Full Political Site List	0.84	0.67	0.67

Across these comparisons the correlation between the share of users visiting a domain at least once on a given day exceeds .8 for the entire website list and .7 when focusing just on political websites. In terms of traffic share there are stronger relationships between the two sources of data for the entire website list (above .9) than when just focusing on the political website list (above .5).

## **Robustness: Weighting To Account For High Levels of Political Interest**

One potential concern raised by these benchmarking exercises is that the evidence of greater levels of partisan isolation in our sample relative to previous research is attributable to the higher levels of political interest in this sample relative to other election surveys. Adding to this concern, when we reestimate partisan isolation separately for

respondents with high and low levels of political interest based on either their survey responses to a political interest question (those who pay attention to politics “A great deal” relative to other panelists) or their amount of browsing on these political news domains (above or below median number of visits to these news domains), panelists with low levels of political interest exhibit lower levels of partisan isolation.

Table 8: Partisan Isolation Index By Political Interest

Trait	Adjusted Isolation Index
2016 (Low Interest-Survey Based)	0.04
2016 (Low Interest-Traffic Based)	0.09
2016 (High Interest-Survey Based)	0.25
2016 (High Interest-Traffic Based)	0.23

We address this concern by reestimating our key comparison with a new set of respondent weights obtained by raking the set of Wakoopa panelists to the population marginal distributions of age, education, gender, partisan identification, race, region and self-reported political interest from the 2016 Cooperative Congressional Election Study. Applying these alternative weights lowers the average political interest of the Toolbar sample from 3.6 when using the YouGov weights to 3.3, matching the distribution of political interest in the CCES sample.

Applying these alternative weights when assessing partisan isolation does not substantially alter partisan isolation index or the substantial increase in partisan isolation relative to prior research. The partisan isolation index is 0.21 when using the YouGov weights – the results presented in the main text – and 0.22 when using these alternative raking weights to downweight the overall level of political interest among the panel. In both cases, we continue to observe substantially higher levels of partisan isolation than prior research.

-

## Appendix B: Crowd-Sourced News Article Labels

After identifying news articles that mentioned “Clinton” or “Trump” within the first 150 words of the article, we used crowd-sourced classifications of article content from workers on Amazon’s Mechanical Turk to provide further information about the articles.

Coders were provided with the instructions below when rating the articles.

Figure 13: Rating Instructions

Please categorize the below news article from the 2016 Presidential Campaign based on its **Topic**.

If multiple categories are appropriate, use the topic that **most prominently** appears in the text excerpt.

See the **Definition** below for more details on each category and **Examples**

Topic	Definition	Examples
Clinton Scandal	Alleged moral/legal/financial wrongdoing by Hillary Clinton or Democratic Party. This includes critiques of Clinton's <b>character</b> or <b>personal behavior</b> .	Coverage/Discussion of Hillary Clinton's health after fainting at campaign event. FBI investigation of Clinton's email server. <i>(Press Clinton Scandal button for additional examples)</i>
Trump Scandal	Alleged moral/legal/financial wrongdoing by Donald Trump or Republican Party. This includes critiques of Trumps's <b>character</b> or <b>personal behavior</b> .	Coverage/Discussion of Trump's comments about women on leaked "Access Hollywood" tape. Lawsuit brought against Trump University. <i>(Press Trump Scandal button for additional examples)</i>
Candidate Policy	Policy positions of either candidate.	Trump proposal to increase military spending. Clinton position on Trans-Pacific Partnership trade agreement.
Campaign Strategy	Overall state of the campaign. Includes candidate targeting/outreach efforts, predictions about election outcomes or discussions of polls.	Discussion of Clinton purchasing TV advertising in Florida. News report about a public opinion poll.
Campaign Event	Focus on specific campaign event (e.g., a speech, coverage of a presidential debate, an endorsement for one of the candidates).	Coverage of specific Trump campaign speech. Story about one of the presidential debates. News about an endorsement received by one of the candidates.
Other	Coverage that does not fall into the above categories.	

They then rated the articles using the following interface.



Figure 14: Rating Interface

**\$(header)**

\$(body)

**1) Choose a category:**

Clinton Scandal

Trump Scandal

Candidate Policy

Campaign Strategy

Campaign Event

Other

Unreadable/Garbled Text

**2) What type of article is this?**

Descriptive Reporting

Something Else

**3) Is this article generally more positive towards the Democratic Party, more positive towards the Republican Party, or is it neutral?**

1 More Positive towards the Democratic Party
2
3 Neutral
4
5 More Positive towards the Republican Party

After selecting a high-level category, they were then presented with several sub-category labels for each article. For instance, “scandal” articles could be labeled as discussing allegations of wrongdoing by the Clinton Foundation or Hillary Clinton’s earnings from speaking engagements among other sub-categories. Similarly, “issue” articles could be labeled as focusing on national security or the economy among other options.

We took several steps to ensure coding reliability. Raters were required to complete a 3-item political knowledge quiz prior to rating any articles and needed to have 95% of their prior HITS approved and more than 500 successful prior HITS. We also limited the amount of work that could be done by an individual rater to 200 total articles so that no individual rater could influence the final results. Finally, We removed ratings from workers who “sped” through assessments in the first round of coding (coders who took an average of less than 20 seconds per article to complete their ratings). These reports were re-labeled in a second round of coding.

## Assessing Label Quality

We developed this coding scheme after extensive pilot testing of the labeling process involving iterative labeling from multiple workers. After finalizing our coding scheme we conducted a final pilot test with 1,000 articles assigned to two different workers to assess the inter-coder reliability in article labeling.

In the section below, we present measures of inter-coder reliability from this final pilot for the classification of articles according to both topic and slant.

### Article Topics

Our analysis focuses on “Event”, “Issue”, “Strategy”, “Scandal” and “Other” coverage categories. Across all categories, the two coders labeled articles consistently in 56% of the cases. This level of agreement is no different from results reported in prior work that employs crowd-sourced labeling to identify article topics (e.g. Budak et al. 2016 report agreement in 53% of articles).

As a second check we asked 100 coders to classify two news reports that clearly focused on prominent political controversies — the Trump Access Hollywood Tape and Hillary Clinton’s fainting scare. Coding agreement on these “exemplar” cases was high; the correct scandal label was assigned in 88 percent of the cases and the appropriate sub-label (Clinton Health or Trump Tape scandal) in 81 percent of all cases.

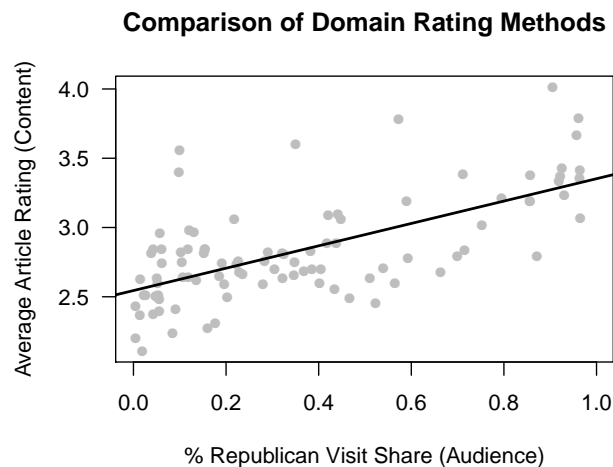
### Article Slant

For the article-level slant ratings, we obtained a correlation of .23 between the Rater 1 and Rater 2 assessments. Coders disagreed on the partisan direction of the slant (cases in which one rater coding the article as Pro-Republican and the other as Pro-Democratic) in only 5% of cases (the comparable figure is 3% in Budak et al. 2016). In cases where both raters categorized an article as non-neutral (20% of the pilot articles) they were rated in the same direction 77% of the time.

## Appendix C: Comparing Measures of News Domain Partisanship

We follow previous research in using both audience-based and content-based indicators of news slant. Our audience-based measure characterizes the partisanship of different political news domains based on the partisanship of their audience. Our content-based measure is based on assessments of article-level slant made by coders on Amazon’s Mechanical Turk.

Figure 15: Domain Partisanship Ratings



The two measures of slant are strongly correlated, suggesting some degree of convergent validity. Figure 15 below displays the relationship between the audience-based indicator of website partisan slant (the share of Republican pageviews) and the content-based rating (the average coder rating of slant for articles on that site). This analysis includes all websites visited by at least 50 panelists (217 domains in our data).

Both measures also correlate well with alternative indicators of news sources’ ideological or partisan leanings. The table below focuses on the 42 most visited websites in our data. These are sources visited by at least 300 panelists and represent the top 20% of websites by traffic in our sample. There are generally strong correlations between our two operationalizations of website slant and these alternative measures used in prior studies.

Particularly strong overlap occurs between the audience measure used in this study and one produced by studying patterns of content sharing on Facebook (Bakshy et al. 2015) and the content measure used in this study with the audience-based measure constructed from users of a web toolbar (Flaxman et al. 2016).

Table 9: Correlation Between Site Partisanship/Ideology Measures

Measure	Audience	Content
Audience(This Study)	-	0.67
Content (This Study)	0.67	-
Audience (Flaxman et al., 2016)	0.60	0.82
Audience (Bakshy et al., 2015)	0.78	0.67

## Appendix D: Partisan Isolation - Robustness and Alternative Measures

### Formula for Adjusted Isolation Index

To introduce the isolation index measure in the main text, we present the relatively concise formula for the unadjusted isolation index. However, to follow Gentzkow and Shapiro (2011) we employ an “adjusted” isolation index throughout our primary analysis. We do so to avoid inflating partisan isolation due to a small-sample bias that occurs when web domains receive relatively few visitors.

The formula for the adjusted isolation index is presented below.

$$\begin{aligned} \text{Adjusted Isolation Index} &= \sum_{j \in J} \left( \frac{\widehat{rep}_j}{\widehat{rep}_m} \right) \left( \sum_{i \in I_{rep}} w_{ij} \frac{\widehat{rep}_j - x_{ij}}{\widehat{visits}_j - x_{ij}} \right) \\ &\quad - \sum_{j \in J} \left( \frac{\widehat{dem}_j}{\widehat{dem}_m} \right) \left( \sum_{i \in I_{dem}} w_{ij} \frac{\widehat{rep}_j}{\widehat{visits}_j - x_{ij}} \right) \end{aligned}$$

Here  $\widehat{rep}_j$  refers to the number of republican daily visitors to outlet  $j$ , divided by the share of all daily visitors to outlet  $j$  with non-missing partisanship.  $\widehat{dem}_j$  is defined the same way for Democratic visits to a domain. The total number of domain visits is defined as  $\widehat{visits}_j = \widehat{rep}_j + \widehat{dem}_j$ , while the total number of visits made by a partisan group is  $\widehat{rep}_m$  for Republicans and  $\widehat{dem}_m$  for Democrats.

In this equation  $x_{ij}$  refers to a respondent’s YouGov sampling weight times the number of daily visits made by the respondent to outlet  $j$ .  $w_{ij} = \frac{x_{ij}}{\sum_{k \in I_{rep}} x_{kj}}$  for Republicans and  $\frac{x_{ij}}{\sum_{k \in I_{dem}} x_{kj}}$  for Democrats.

## Comparing Results Using Adjusted/Unadjusted Isolation Index

The table below displays the partisan isolation index across a variety of sets of websites using both the adjusted isolation index and the unadjusted isolation index measure (the results of which were not presented in the main text). Across a variety of different sets of web domains/content types, these two measures produce similar depictions of partisan isolation. They differ primarily when considering visit patterns to the large number of non-political domains in the data set (“All Web Traffic” and “All Non-Political Domains.”). Because many web domains used in that analysis receive only a small number of visits from the panelists in our data, the unadjusted isolation index is much higher than the adjusted measures.

This table also helps to demonstrate the robustness of the partisan isolation index to a variety of changes. This includes using all traffic to the set of three large political news aggregators (aol.com,msn.com,yahoo.com) instead of focusing just on news-based visits as in the primary analysis (“Political Domains - Include All AOL/MSN/Yahoo Traffic”) or removing all visits of any type to these three sites (“Political Domains - Exclude All AOL/MSN/Yahoo Traffic”).

Table 10: Partisan Isolation Index

Data	Unadjusted Isolation	Adjusted Isolation
All Web Traffic	0.28	0.06
All Non-Political Domains	0.28	0.05
Political Domains - Include All AOL/MSN/Yahoo Traffic	0.22	0.18
Political Domains - Exclude All AOL/MSN/Yahoo Traffic	0.28	0.24
Political Domains - Baseline	0.25	0.21
Political Domains - Top Ten (2016 List)	0.22	0.21
Political Domains - Top Ten (2009 List)	0.24	0.22
All Election Articles	0.36	0.33
Election Articles - Strategy	0.36	0.29
Election Articles - Trump Scandal	0.39	0.34
Election Articles - Clinton Scandal	0.44	0.40
Election Articles - Issue	0.53	0.45
Election Articles - Neutral Slant	0.38	0.33
Election Articles - Moderate Slant	0.43	0.39
Election Articles - High Slant	0.47	0.42

We also present estimates of partisan isolation by various levels of geography using the

full YouGov survey and just those respondents who were also included in the Wakoopa sample where web traffic is available. Like previous research that employs this metric (Gentzkow and Shapiro 2011, Table IV), we observe limited partisan isolation at these levels of geography using the adjusted isolation index.

Table 11: Partisan Isolation Index by Geography

Sample/Geography	Unadjusted Isolation	Adjusted Isolation
Full Yougov - County	0.63	0.05
Full Yougov - Zip Code	0.89	0.06
Wakoopa Panel - County	0.79	-0.03
Wakoopa Panel - Zip Code	0.96	0.04

We also present both the unadjusted and adjusted isolation index for the other traits examined in the main text.

Table 12: Isolation by Other Traits

Trait	Unadjusted Isolation	Adjusted Isolation
Ideology	0.28	0.24
Education	0.07	0.03
Gender	0.07	0.03
Race	0.05	-0.00

Using both the adjusted and unadjusted isolation index, there is substantially more isolation by ideology than these other variables.

## Appendix E: Lagged DV Model

This section explores an alternative model specifications for the analysis of attitude change over the course of the campaign. The first includes a lagged version of a dependent variable as a covariate, an alternative to the differenced outcome variable used in the main text.

The figure below displays point estimates of the effect of partisan news exposure on candidate evaluations from the within-subject approach presented in the main text (black points) as well as an alternative specification that instead uses a respondent's first-wave political views as a lagged dependent variable in the regression model (gray points).

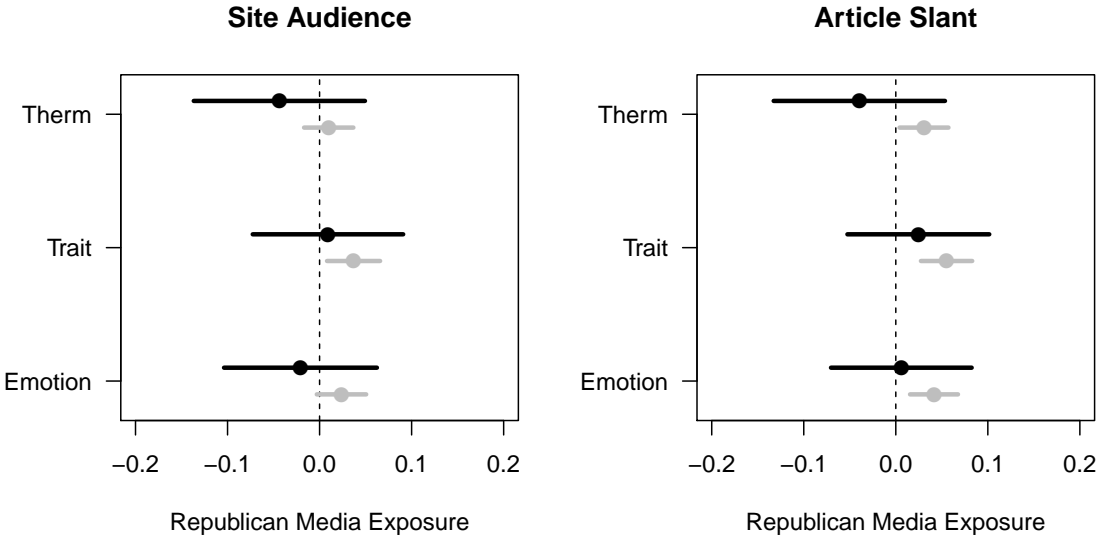
This alternative approach produces more precise estimates of the effect of media exposure on candidate evaluation, but does so at the added cost of less confidence in the estimates of causal effects (i.e., this approach no longer accounts for unobservable, time-invariant confounders, see Angrist and Pischke 2009, 243-246.).

$$Y_2 = \beta_0 + \beta_1 \times \textit{Partisan News Exposure} + \beta_2 \times Y_1 + \textit{Controls} + \epsilon$$

These two estimation approaches produce largely similar results. In several cases, estimates on the effect of partisan media exposure reach conventional levels of statistical significance in predicting shifts in supportive views of Donald Trump over the course of the panel, but effects are substantively small and are consistent with the interpretation of the findings included in the main text.



Figure 16: Effects of Partisan Media Exposure on Candidate Evaluations (Change Score and Lagged DV Models)



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## Appendix F: Political Website List

Table 14 on the next page contains the list of political websites we focus on in this study. These were determined by examining the top 100 websites offering news coverage by traffic among the Wakoopa panelists and an additional 255 U.S.-based websites included on Alexa’s list of most popular news domains.

For three large websites – aol.com, msn.com, and yahoo.com – we focus on only traffic to their news content in our primary analysis to avoid non-news related web traffic (e.g., individuals checking their email at mail.aol.com, conducting a web search at yahoo.com or playing online video games at zone.msn.com) that would otherwise be included in the analysis if only traffic to the top-level domain was examined. Appendix D shows that alternative approaches to treating visits to these three pages produces largely similar estimates of partisan isolation.

Table 13: List of Political Websites

abcnews.go.com	denverpost.com	lacrossetribune.com	palmbeachpost.com	sun-sentinel.com
abqjournal.com	deseretnews.com	lancasteronline.com	pantagraph.com	suntimes.com
ajc.com	deseretsun.com	lansingstatejournal.com	patch.com	syracuse.com
al.com	desmoinesregister.com	lasvegassun.com	patriotledger.com	talkingpointsmemo.com
altnet.org	detroitnews.com	latimes.com	pbs.org	tallahassee.com
aol.com/news	disinfo.com	ledger-enquirer.com	pe.com	tampabay.com
ap.org	diversityinc.com	lehighvalleylive.com	people-press.org	tbo.com
argusleader.com	drudgereport.com	livemint.com	pewresearch.org	tcpalm.com
arkansasonline.com	duluthnewstribune.com	ljworld.com	philly.com	telegram.com
aspennews.com	durangoherald.com	lohud.com	phoenixnewtimes.com	telegraph.co.uk
austinchronicle.com	dw.com	lubbockonline.com	pilotonline.com	tennessean.com
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baltimoresun.com	eastbaytimes.com	marketwatch.com	pjstar.com	theatlantic.com
bbc.co.uk	economist.com	mcall.com	politico.com	theblaze.com
bbc.com	endingthefed.com	mcclatchydc.com	politicususa.com	theconversation.com
beforeitsnews.com	enterpriseneeds.com	mediamatters.org	politifact.com	thecrimson.com
bellinghamherald.com	esquire.com	mediapost.com	postandcourier.com	thedailybeast.com
billoreilly.com	factcheck.org	mercurynews.com	postbulletin.com	theday.com
bipartisanreport.com	financialexpress.com	metrotimes.com	poynter.org	thedp.com
bismarcktribune.com	firstknow.com	metrowestdailynews.com	pressdemocrat.com	theepochtimes.com
bizjournals.com	fivethirtyeight.com	miamiherald.com	pressofatlanticcity.com	theeventchronicle.com
bloomberg.com	floridatoday.com	michaelmoore.com	prnewswire.com	theguardian.com
bnd.com	forbes.com	milforddailynews.com	project-syndicate.org	thehill.com
bostonglobe.com	fortune.com	militarytimes.com	providencejournal.com	theledger.com
bostonherald.com	foxbusiness.com	mirror.co.uk	prweb.com	thenewsherald.com
bradenton.com	foxnews.com	mlive.com	qctimes.com	thenewtribune.com
breakingnews.com	freep.com	monroenews.com	rasmussenreports.com	thepoliticalinsider.com
breitbart.com	fresnobee.com	motherjones.com	rawstory.com	therealnews.com
buffalonews.com	frontpagemag.com	msn.com/en-us/news	realclearpolitics.com	theroot.com
burlingtonfreepress.com	gainesville.com	msnbc.com	redding.com	thestar.com
business-standard.com	gannett.com	mysanantonio.com	registerguard	thestate.com
businessinsider.com	gastongazette.com	naplesnews.com	reuters.com	thestranger.com
buzzfeed.com	gazette.com	nationalreport.net	reviewjournal.com	thetimesnews.com
c-span.org	globalissues.org	nationalreview.com	rgj.com	theweek.com
carbonated.tv	good.is	nbcsnews.com	richmond.com	thinkprogress.org
cbn.com	governing.com	newbernsj.com	roanoke.com	time.com
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cbsnews.com	greeleytribune.com	news-gazette.com	rrstar.com	townhall.com
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chron.com	guardianlv.com	newsday.com	sandiegoreader.com	tucson.com
citypages.com	harpers.org	newsherald.com	sandiegouniontribune.com	twincities.com
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cjr.org	heraldextra.com	newsobserver.com	santacruzsentinel.com	upi.com
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