Online News Consumption, Social Media Use and Political Polarization in the 2018 Ontario general election

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1 Introduction

In the following we use the 2018 Ontario Provincial Election Study to examine the extent to which digital and social media consumption is implicated in any perceivable level of polarization - affective or policy-based - in Ontario. We deploy several measures of each construct and find that overall there is limited evidence that social media usage or digital media consumption is directly implicated in increasing polarization. There is a weak, albeit consistent curvilinear relationship whereby moderate users of social media are less affectively polarized than those who never use social media or those who are heavy users. Instead, we find that political interest is a much more powerful predictor of polarization and in fact partially interacts with social media usage to reduce affective polarization. High interest individuals who regularly use social media are less affectively polarized than high interest individuals

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who never use social media.

However, for policy polarization, we find a different pattern. High interest individuals who consume only legacy media for news about the campaign are as polarized as high interest individuals who only consume digital media. However, low-interest individuals who consume only legacy media are barely polarized in policy terms, while low-interest individuals who consume online digital news are as polarized as high-interested individuals.

First, we survey the literature on polarization and its relationship with different types of polarization. Second, we describe the conditions of the Ontario 2018 provincial election and explain why we might expect to see high levels of polarization in that election campaign. Third, we describe the Ontario Provincial Election Survey and various measures of polarization. We conclude with our results and discussion.

2 Digital Media Consumption And Political Polarization

2.1 What is Polarization

It is a truism that political life is polarized, but it is surprisingly difficult to measure this phenomenon. Some American scholars argue that ideological, or policy polarization, has been increasing for both political elites and the electorate more broadly (Abramowitz & Saunders, 2008). Another group argues that partisan sorting has led party electorates to become more ideologically homogeneous, while party elites have become more polarized, which leads to the perception that the electorate is becoming more polarized (Fiorina et al., 2011; Mason, 2015). Finally, a third group argues that despite holding similar policy views, opposing partisans simply increasingly dislike and distrust people who support a different political party (Iyengar et al., 2019; Mason, 2018a). These different understandings of political polarization have led studies on polarization to differentiate between what is called called issues based

polarization and affective polarization (Mason, 2018b, 2018a).

Beyond competing conceptualizations of measures, it is also not clear how much of this phenomenon applies in the Canadian context. There is clear evidence that the elite in the United States is ideologically polarized and that these ideological divisions have important consequences for American politics. However, there have been far fewer studies examining elite polarization in Canada. Cochrane (2015) has shown that the rise of the Reform Party and the Canadian Alliance on the right helped to transform the Canadian party system dominated by bland, a-ideological, brokerage parties into one organized more coherently on a left-right continuum. However, despite the rise of elite ideological polarization in Canada partisan consensus can still emerge during times of crisis such as the COVID-19 pandemic, while the United States was marked by more partisan conflict over these issues (Gadarian et al., 2021; Merkley et al., 2020).

Evidence of ideological polarization in the mass public is even less clear in both Canada and the United States. On the one hand, (Abramowitz & Saunders, 2008) have provided evidence that Americans are increasingly divided on various emotionally charged issues including abortion, gay marriage and religion. On the other hand, one of the bedrock foundations of public opinion literature is that people tend to not have constrained ideological belief systems, or stable attitudes (Converse, 1964). Even if issue-specific cleavages might emerge, this might limit overall ideological polarization However, some say that this feature of public opinion is changing, with the number of voters adhering to clear ideological systems or bundles of policies that "hang together" increasing dramatically, thus contributing to polarization (Wattenberg, 2019; See also Dalton, 2021). These competing definitions of ideological polarization have led to different conclusions on the scale of ideological polarization in the United States and other advanced industrialized democracies.

Additionally, there are far fewer studies that examine this phenomenon in Canada. The studies that do exist provide mixed evidence about the extent of ideological and policy-based polarization in Canada.

Lachapelle (2012) finds deep divisions in the Canadian electorate over climate change, with Conservative voters being less likely to believe in the existence of climate change in 2012]. However, Merkley (2022) finds virtually no systematic evidence that Canadians' attitudes are becoming more bimodal and drifting to ideological extremes. That said, it does appear that Canadians are sorting themselves into more consistent groups and more correctly aligning themselves with ideological parties (Kevins & Soroka, 2018). However, other studies have shown that policy polarization and partisan sorting only exists in certain regions of Canada. For example, McLay and Ramos (2021) found that Atlantic Canada is not experiencing the same levels of ideological polarization as the rest of Canada. Overall, there is some evidence that Canadians are becoming more ideologically polarized, particularly through increased sorting. However, this ideological polarization is not occuring to the same extent as in the United States.

Beyond the issue of increased ideological sorting, there is also evidence that Americans simply increasingly dislike partisans of the other party. While the evidence about policy-based polarization in the mass public is fairly mixed, evidence for increasing affective polarization seems to be clearer (Iyengar et al., 2019). Worse, affective polarization is perhaps an even greater threat to the viability of liberal democratic competition which requires that partisan competitors for power acknowledge that the other party, even if they are wildly misguided in the eyes of in-partisans, are at least legitimate participants in the system (Rosenblum, 2010). However, despite being recognized as one of the greatest threats to Liberal democracy (Kalmoe & Mason, 2022), affective polarization has been less studied in the Canadian context. Most studies that examine affective polarization in Canada include Canada as one of many cases when examining American polarization in a comparative perspective (Boxell et al., 2024; Garzia et al., 2023; Gidron et al., 2020). Using different measures, these studies had conflicting results regarding levels of affective polarization in Canada. Using the Canadian Election Study (CES) and a measure of affective polarization developed by Reiljan (2020), Garzia et al. (2023) find that levels

of affective polarization have been increasing in Canada but have not reached levels seen in the U.S. In contrast, Gidron et al. (2020) found that levels of affective polarization have actually decreased in Canada since 1995. This study used the Comparative Study of Electoral Systems (CSES) and measured the level of affective polarization as the difference between an individual's rating of their in-party and their average rating of all out-parties. Boxell et al. (2024) use the CES and their own novel measure of affective polarization similar to that developed by Reiljan (2020). This study also found that levels of affective polarization have been increasing moderately in Canada. Lastly, Johnston (2023) uses the standard deviations of feeling thermometers to conclude that feelings towards all of Canada's political parties have become more dispersed, that is to say, polarized, since 1965, with feelings towards the Liberal and Conservative Parties being the most polarized. Other Canadian studies have found that levels of affective polarization have been increasing in Canada since the 1990s (Merkley, 2022). Therefore, there is evidence that affective polarization is increasing in Canada, however the evidence is not as conclusive as in other countries such as the U.S.

It is often considered a forgone conclusion that the rise of digital and social media are implicated in these phenomena. Social media platforms are said to facilitate or create "echo chambers" or "filter bubbles" where users only encounter ideas and policies that they already agree with Raynauld & Greenberg (2014). However, the empirical evidence supporting the existence of echo chambers on social media, and its broader role in cultivating polarization, has been mixed. Most studies in the United States find that Republicans and Democrats have similar media diets, both online and offline (Guess, 2021). Similarly, using self reported social media usage, Dubois and Blank (2018) find that the majority of social media users encounter information they disagree with, use multiple sources, and often attempt to confirm the information they are presented in Canada. However, methodology often matters. Notably, Terren and Borge (2021) found that studies that used digital trace evidence provided more evidence of echo-chambers and polariza-

tion than studies that used self-reported data. Yet even here, using Facebook trace evidence,Bakshy et al. (2015) find that most users have Facebook friends who belong to the other party and that individuals are usually exposed to ideologically discongruent content.

Moreover, the evidence linking the presence of echo chambers to increased polarization is unclear (Kubin & von Sikorski, 2021). Some studies find that increased social media usage predicts increased polarization (Cho et al., 2018; Tucker et al., 2017). This relationship is also re-enforced by posting more on social media and sharing politically relevant content. However, other studies have found that social media usage has a small or no effect on polarization. Through a review of recent studies on the relationship between social media usage and polarization, Bavel et al. (2021) posit that although social media usage is unlikely to be the main driver of polarization it is often a key facilitator. Additionally, recent experimental evidence has found that individuals who de-activated their Facebook accounts became less polarized due to less exposure to polarizing political news and opinions (Allcott et al., 2020). Other studies have demonstrated that the "echo chamber" aspect of social media is not what drives polarization. Instead, exposure to hyper-partisan messages from the *opposing* party leads to a significant increase in levels of policy polarization for both Democrats and Republicans (Bail et al., 2018).

Lastly, using strictly observational data, Boxell et al. (2017) observe that adults over 75 years old are becoming polarized at a faster rate than those under 40 years old, while also being far less likely to use social media. Therefore, any account that links social media usage to increased polarization must also account for why individuals who do not use social media are becoming more polarized than social media users.

In contrast to the contested relationship between polarization and social media usage, there is clearer evidence that increased online news consumption is linked to increased polarization. Early studies on, online news media found that partisan online sources engage in greater partisan filtering of content than traditional news wires (Baum & Groel-

ing, 2008). Additionally, studies have found that individuals who consume news online are often more polarized than those who only use offline "legacy" news sources (Fletcher et al., 2020). Garimella et al. (2021) find that it is both the structure of news sites, and the behaviour of online news consumers that contributes to users only consuming news that reinforces their ideological priors. Specifically, they find that the online news environment allows users to actively seek out news sources that are ideologically aligned with their prior beliefs. Another potential explanation for the increased levels of polarization among online news users is through the comment section. Asker and Dinas (2019) find that exposure to emotionally intense comments on online news articles increases levels of polarization. These findings suggest that even when users are exposed to heterogeneous online news sources their levels of polarization increase.

Overall, the literature on polarization and social media usage in Canada suggests that Canadians have become slightly more affectively and ideologically polarized since the 1990s (Cochrane, 2015; Johnston, 2023; Merkley, 2022). Additionally, social media usage may be one of the factors that is contributing to higher levels of affective polarization in Canada (Kubin & von Sikorski, 2021). However, evidence is often mixed. Therefore, this study seeks to better understand the relationship between news consumption, social media usage, and polarization in Canada by drawing on data collected during the 2018 Ontario provincial election.

3 Ontario 2018 Summary

There are several reasons to think that the Ontario 2018 general election might feature some degrees of polarization. First, it was the fifth election since the Ontario Liberals were first elected in 2003. As with any government with such a long tenure, the government had endured the consequences of many decisions gone wrong. For example, the provincial government's attempts to increase the amount of renewable

energy in the provincial electricity supply had lead to an increase in electricity rates (Auditor-General., 2011). In 2011, the government suddenly cancelled the construction of two natural gas electricity plants in electorally-sensitive districts, incurring hundreds of millions of dollars in penalties (Auditor-General., 2013b, 2013a). Additionally, in 2012, it emerged that the provincial air transportation agency for patients had become embroiled in complicated contractual arrangements, incurring millions of dollars in liabilities (Auditor-General., 2012). Finally, in 2015, a new provincial sex education curriculum was adopted, including some controversial material incurring the wrath of social conservatives.

Second, the two primary party leaders in the election campaign, Kathleen Wynne for the Liberals and Doug Ford for the Progressive Conservatives were individuals with traits and backgrounds that might incur distinct enmity from out-partisans. Wynne is a gay woman, contributing to some of the hostility by social conservatives.[1] On the other side of the campaign, the PCs were led by leader Doug Ford, a new entrant to provincial politics, but a veteran of Toronto municipal politics. He was the brother of former Toronto mayor Rob Ford who had a tumultuous term of office featuring accusations of sexual assault, physical fights on the floor of city council, associations with purported gangsters and videotaped recordings of him consuming crack cocaine (Doolittle, 2014). All of these scandals developed after having built a reputation as a populist politician who profited from a reputation of being outside elite and regular circles of political participation (Kiss et al., 2020). While Doug Ford lacked his brother's substance abuse and crudity, he very much represented the populist strain and railed against elites in politics as much as his brother did (Budd, 2020; Perrella et al., 2020).

All this is to say that the Ontario 2018 election featured an incumbent government that many voters harbored strong feelings against and two party leaders with unique sets of traits and ideologies. As a result, the campaign was likely to feature a polarized electorate with voters

[1] Rana and Perrella (2021) provide an excellent summary of the online campaign that targeted Liberal leader Kathleen Wynne.

holding strong opinions about out-partisans.

4 Data and Methods

4.1 The 2018 Ontario Post Election Study

The Laurier Institute for the Study of Public Opinion and Policy commissioned an online consumer sample of voters from SSI with quotas established to match the sample to the Ontario population on age, education and gender. One of the merits of the survey is that the questionnaire included detailed questions on self-reported media consumption habits, including consumption of specific media outlets. It was fielded between the dates of May 28-June 07, 2018. The initial sample size was 2327. We removed 62 respondents who did not consent to the survey, and 562 respondents who straightlined on any of five batteries of questions.[2] We also removed 187 respondents who did not respond to a question on social media usage, one of our key variables of interest. This left 1516 respondents.

As an initial validation strategy, we show the distribution of respondent vote intention over the whole period compared with the final vote results in the 2018 election (see Table 1). Although our sample overreresented NDP voters (42% of those with a committed vote intention compared to 34% in the final election, this is not perhaps unreasonable. The NDP did in fact lead during a two-week period in the election campaign and 16% of the respondents in the OPES were undecided in our data-set, plausibly mirroring at least a pool of voters in the electorate who subsequently voted for the PCs.

[2]For each battery, the we measured the intra-rater variability using the `careless` package in R. Subsequently, any respondent with an IRV of 0 on any of the four batteries was excluded from the study.

Table 1: Vote intention of all respondents.

Party	OPES	Election
Liberal Party of Ontario	17%	20%
Progressive Conservative Party of Ontario	35%	40%
New Democratic Party of Ontario	42%	34%
Green Party of Ontario	6%	5%

4.2 Independant Variables

In order to test the relationship between social media usage and affective polarization we created two main independent variables, `primary media` source and `social media usage`. The first variable measures what news sources respondents used to receive information about the 2018 Ontario election. The 2018 Ontario Election Study asked respondents "What is/are your primary source(s) of information about the 2018 Ontario provincial election?" and provided respondents with the options to select "Television," "Radio," "Print Newspaper," "Online Newspaper," "Other online news source," "Your Facebook Feed," "Your Twitter feed," "none," or "other". Those who responded that they **only** received news from radio, television, and/or print newspaper were coded as legacy media users, respondents who **only** selected that they received news from online newspapers and/or other online news sources were coded as online media users, and individuals who **only** selected that they received news about the 2018 Ontario election from their Facebook or Twitter feed were coded as social media users. Finally, respondents who selected sources from multiple categories were coded as mixed media users.

Our other `social media` variable measures how often respondents use social media *in general* and does not explicitly capture respondent usage of social media for news about politics or the 2018 election campaign. Respondents were asked "How often do you use social media?" and could respond with options from "several times a year" to "several

times a day." We coded individuals who said they not use social media as "never" using social media, those who responded that they use social media "several times a year" to "several times a month" as using social media "less than once a week", those who use social media and left the other categories as they were in the original variable. In some analyses, we reduced this variable further, grouping individuals who use social media once a month or less as rarely using social media, and those who use social media more than once a month as using social media often. Table 2 shows a cross-tabulation of these two variables.

Table 2: Cross-tabulation of primary source of election news by frequency of general social media usage. Spearman's Rho correlation coefficient is 0.24

	Legacy	Mixed	Online	Social_Media	Total
Social_Use2					
Never	172 (31%)	112 (14%)	26 (19%)	0 (0%)	310 (20%)
Less than once a week	17 (3.1%)	20 (2.6%)	3 (2.2%)	0 (0%)	40 (2.6%)
About once a week	23 (4.1%)	24 (3.1%)	3 (2.2%)	0 (0%)	50 (3.3%)
Several times a week	50 (9.0%)	46 (5.9%)	7 (5.1%)	2 (4.3%)	105 (6.9%)
About once a day	116 (21%)	141 (18%)	31 (23%)	6 (13%)	294 (19%)
Several times a day	177 (32%)	433 (56%)	66 (48%)	39 (83%)	715 (47%)
Unknown	0 (0%)	1 (0.1%)	1 (0.7%)	0 (0%)	2 (0.1%)
Total	555 (100%)	777 (100%)	137 (100%)	47 (100%)	1,516 (100%)

One immediate pattern that emerges is that respondents report general social media usage patterns that are very different from patterns of news consumption via social media. Only 3% respondents report using social media as their primary source of news about the election while 85% report using social media in general at least once a day.

4.3 Polarization Variables

4.3.1 Affective polarization

We measure affective polarization using a measure developed by Wagner (2021) to measure affective polarization in multi-party democracies. It creates an individual affective polarization score for each respondent based on the *spread* of party-like scores from their mean like score for each respondent. Like scores for the parties are drawn from feelings thermometers that ask respondents to rate the parties on a scale from 0 to 5 (See the Supplemental Materials for full question wordings). Formally the Weighted Affective Polarization (WAP) equation measured spread is:

$$Spread_i = \sqrt{\sum_{p=1}^{P} v_p(like_{ip} - \overline{like_i})^2}$$

where v_p is the vote share of each party measured as proportion with a range of 0 to 1, and the mean affect scores are weighted by party using the following equation:

$$\overline{like_i} = \sum_{p=1}^{P}(v_p * like_{ip})$$

The WAP scores are then used in OLS regression with the independent variables discussed above to determine understand the relationship between social media usage, political interest and affective polarization.

4.3.2 Policy polarization

In order to measure policy polarization we create ideological distributions based 11 policy issues.[3] All the measures were re-coded so that 0 indicates the most left-wing position and 1 indicates the most right-wing position.

Following Lelkes (2016) we generate bimodality coefficients for respondents' policy attitudes for each category of our independent variables of interest. These are derived using the formula below.[4]

$$BC = \frac{s^2 + 1}{k + 3 * \frac{(n-1)^2}{(n-2)(n-3)}}$$

Here, s represents the skewedness of the distribution, k represents the distributions excess kurtosis, and n refers to the sample size. A BC of 0 indicates a unimodal distribution and a BC of 1 indicates a distribution is considered **completely** bimodal. A distribution is typically considered bimodal when $BC \geq 0.55$ (Pfister et al., 2013). To put these in context, Figure 1 shows theoretical distributions that are unimodal, somewhat bimodal, and completely bimodal. In order to measure the relationship between social media usage and ideological polarization using the BC, we calculate the BC for the ideological distributions of individuals who primarily receive news from legacy media, online media sources, social media, and those who primarily use a mix of the three. Additionally, we compare the BC for those who use social media regularly and those who do not. We then compare the bimodality coefficients by primary media source and for those who use social media often and those who use social media rarely.

[3]Factor analysis revealed that these 11 items measure three distinct ideological constructs. However, for the sake of parsimony we only present a global measure of respondent policy polarization, summed from scores on all 11 items. Future research should definitely distinguish patterns of polarization by these specific ideological constructs.

[4]The BC is calculated using the `bimodality_coefficient` function from the `mousetrap` package in `R` (Wulff et al., 2023).

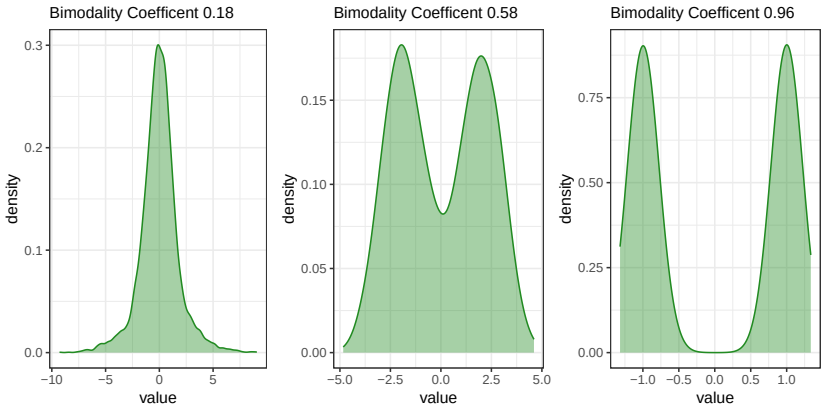

Figure 1: Theoretical distibutions representing various levels of bimodality

4.3.2.1 Overlap Coefficent

We also use the calculate the overlap coefficient (OVL) This measure compares the overlap of the ideological distributions of two groups using the following formula Levendusky & Pope (2011):

$$OVL = \int_{-\infty}^{+\infty} |f(x) - g(x)|dx$$

where $f(x)$ is the probability density function (PDF) of one ideological distribution and $g(x)$ is the PDF of another (Pastore & Calcagnì, 2019).[5]

For this measure, we compare the distributions of those who voted for the Liberal and NDP parties (left-leaning parties) to those who voted for the Conservative Party (right-leaning party) between those who primarily receive news from legacy media, online media sources,

[5]We calculate the the OVL using the `overlap` function from the `overlapping` package in `R` (Pastore et al., 2022).

social media, and those who primarily use a mix of the three and for those who use social media regularly and those who use social media rarely.

5 Results

5.1 Media Consumption and Affective Polarization

Table 3: Summary of weighted affective polarization by media use

Characteristic	**N = 1,516**
Primary_media	
Legacy	0.45 (0.10)
Mixed	0.46 (0.11)
Online	0.43 (0.10)
Social_Media	0.43 (0.11)
Social_Use2	
Never	0.45 (0.10)
Less than once a week	0.45 (0.10)
About once a week	0.43 (0.12)
Several times a week	0.44 (0.10)
About once a day	0.45 (0.10)
Several times a day	0.46 (0.11)
Unknown	2

First, we examine levels of affective polarization by primary media source and general social media usage. Table 3 displays the mean levels of affective polarization and standard deviations of the WAP scores for these variables. For primary media source those who only received news

about the 2018 Ontario election from legacy news sources or from a mixed media environment had the highest average affective polarization scores (0.45 and 0.46 respectively) and those who only used social media had the lowest average levels of affective polarization (0.43). The subgroup analyses indicate that those who use social media several times a day have the highest WAP scores ($\mu = 0.46, \sigma = 0.11$)(comparable to those who *never* use social media ($\mu = 0.45, \sigma = 0.1$)) while those who use social media several times a week have the *lowest* WAP scores ($\mu = 0.43, \sigma = 0.12$).

Table 3 also shows a curious relationship between affective polarization and social media usage in that those who only used social media to receive news about the 2018 election had fairly low levels of affective polarization. However, those who reported using social media multiple times a day had one of highest levels of average affective polarization, equal to those who only received news about the 2018 Ontario from legacy media sources. We investigate this further in the following sections.

We next explore correlates with weighted affective polarization in OLS regressions. Figure 2 visually displays the coefficients from ordinary least squares (OLS) regression models with WAP scores as the de-

pendent variable and primary media consumption as the independent variable. In all these models the dependent variable is standardized with a mean of 0 and a standard deviation of 1 and all the continuous independent variables are scaled from 0 to 1. Therefore, the coefficients represent the change in the dependent variable correlated with a full change in the independent variable.[6]

First we estimate a model with only `primary media` as an independent variable. In this model respondents who received their news through social media or online platforms are very slightly less polarized than legacy media consumers, while respondents with a mixed media diet are slightly more polarized. We extend this with a series of models adding an additional control variable each time. We note two major findings. First, political interest is a much more significant predictor of affective polarization than media consumption is, with polarization increasing between 1 and 1.5 standard deviations from the least interested to the most interested respondent. This is completely contradictory to the conclusions implicated in research by Dubois & Blank (2018) and we address this more in depth below. Second, contrary to what has been shown about polarization by age, here age is negatively related to

[6]All models visualized are printed in Section 9.

polarization. We return to this finding below (see Boxell et al., 2017).

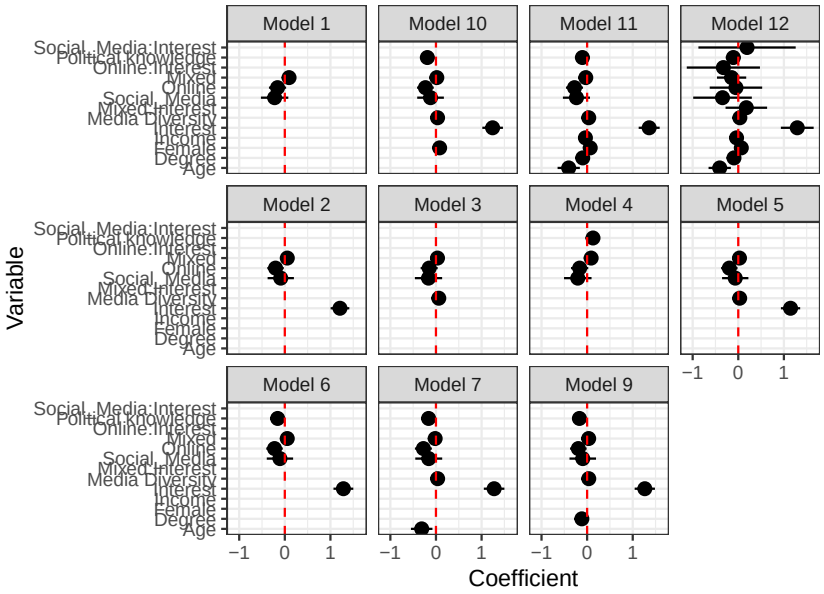

Figure 2: OLS Regression Models for Weighted Affective Polarization Scores by Media Consumption of Campaign News and Control Variables

We then re-estimate the same models that we estimated above using social media usage as the primary independent variable (See Figure 3). In these models, a slight but consistent curvilinear relationship is evident in that respondents who use moderate levels of social media are less polarized than those who do not, respondents who use it multi-

ple times a day are *more* affectively polarized than those who do not. The effect here is slight, but it is consistent through the models Again, however, when we compare polarization to social media usage in general, we find that interest in politics is a similarly strong predictor of polarization.

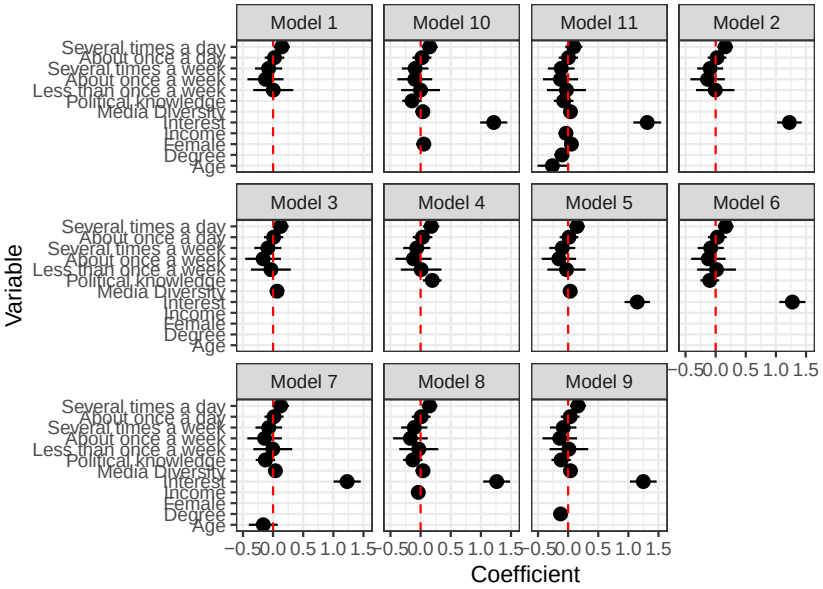

Figure 3: OLS regression models coefficients for weighted affective polarization scores by social media usage and control variables. "Never" using social media is the reference category for self-reported social media usage.

It is worth noting that the positive relationship between political interest and affective polarization is somewhat at odds with Dubois and Blank's (2018) finding that interest in politics moderates the likelihood of citizens being in an echo chamber. The standard story about polarization echo chambers and polarization, which is *not* what Dubois and Blank find, is that high levels of interest would lead to selective exposure to similar views and increased polarization. Our initial results about the relationship between political interest and polarization fit that story. However, it is not clear whether and how political interest and polarization *interact* with media consumption. In fact, we find a significant *negative* interaction between political interest and social media usage that is more compatible with what Dubois and Blank find. Specifically, heavy users of social media in general who are interested in politics tend to have lower levels of polarization than people with similar levels of political interest but who never use social media at all. fig-interactions visualizes the effects. At lower levels of political interest, heavier users of social media are more polarized.

We can explore this further be counting the number of media outlets respondents report reading regularly, admitting that number of media outlets is not a perfect measure of media diversity. A visualization of

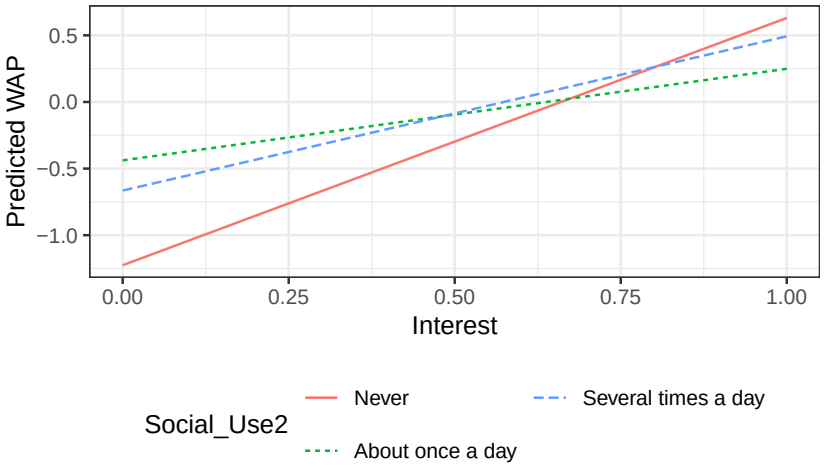

Figure 4: Predicted values of affective polarization by selected levels of social media use and interest in politics.

the effects of social media usage, political interest on the number of media outlets is in Figure 5 and shows that at high levels of interest, those who use social media every day consume more media outlets than those who never use social media, which would be consistent with the echo chamber thesis, that on social media, users can expose themselves more news content that reinforces pre-existing beliefs about political parties, contributing to greater polarization.

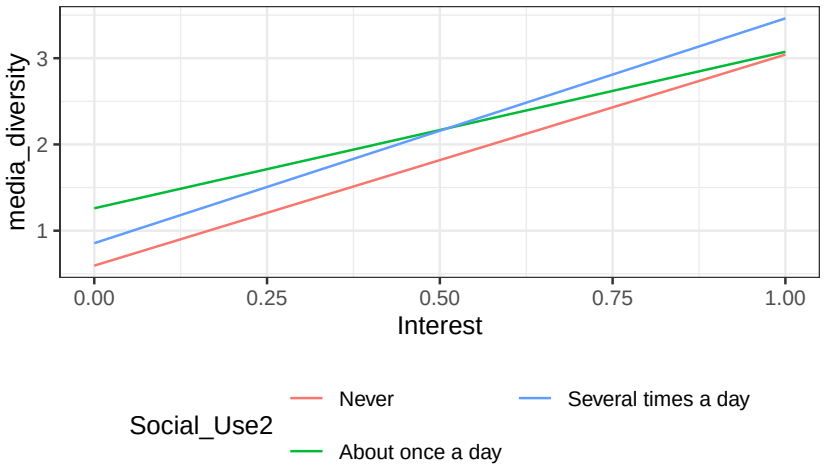

Figure 5

As a last analysis, we also investigate the negative relationship we have found between age and levels of polarization. Specifically, we fit a regression with age transformed into a polynomial term. The model

is formally expressed in the following formula:

$$Y_i = \beta_0 + \beta_1(Age)_i + \beta_2(Age)_i^2 + \beta_3(Interest)_i + \gamma \boldsymbol{M_i} + \varepsilon_i$$

Where Y_i is an individual's level of affective polarization and $\gamma \boldsymbol{M}_i$ is matrix of coefficients for the primary media source variables. Figure 6 reports predicted levels of affective polarization for individuals aged 18 to 100 that received news about the 2018 Ontario election exclusively from legacy news sources, online news sources, social media news sources, and a mix of news sources. These results indicate that there is a non linear relationship between age and levels of affective polarization. Specifically, as individuals get older they become less affectively polarized until they reach 65 when they start becoming more affectively polarized. This partially reflects earlier findings by Boxell et al. in the United States that polarization is primarily a phenomenon of older voters (Boxell et al., 2017).

5.2 Media Consumption and Policy Polarization

To investigate the relationship between media consumption and *policy polarization*, we first calculate the mean policy positions of individuals by primary media source, social media usage, and vote choice in the

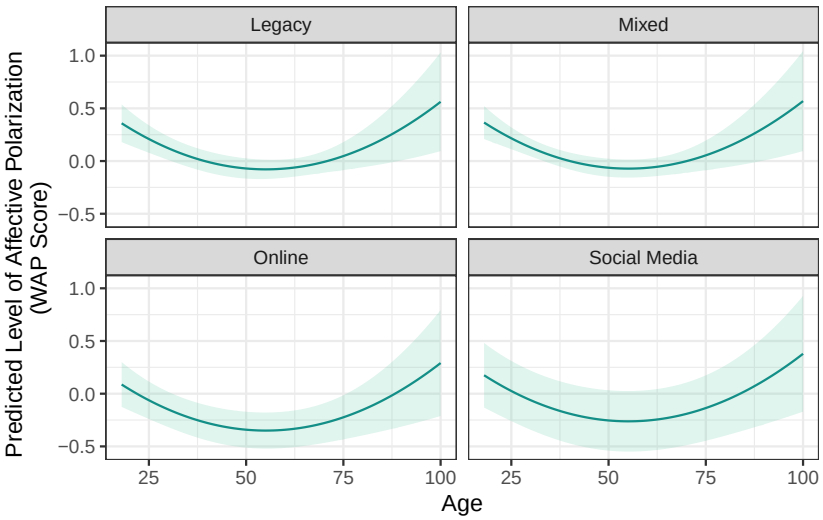

Figure 6: Predicted Levels of Affective Polarization by Age

2018 election.[7] To reiterate, these run from 0 to 11, with 0 being left-wing and 11 being right-wing. The results are in Table 4 and show that those who report getting news about the provincial from legacy media exclusively are the most conservative (5.58) while those who report getting news only from social media are the most liberal (4.87). A similar pattern holds for self-reports of social media usage in general. Respondents who report never using social media are the most conservative while those who are the most frequent users of social media are the most left-wing.

Table 4: Summary of ideology by media consumption and vote choice.

Characteristic	**N = 1,516**
Primary_media	
Legacy	5.58 (1.47)
Mixed	5.21 (1.69)
Online	5.39 (1.85)
Social_Media	4.87 (1.37)
Social_Use2	
Never	5.71 (1.67)

[7]Policy position distributions are commonly referred to as issue based ideology.

Table 4: Summary of ideology by media consumption and vote choice.

Characteristic	**N = 1,516**
Less than once a week	5.40 (1.44)
About once a week	5.43 (1.69)
Several times a week	5.63 (1.42)
About once a day	5.50 (1.62)
Several times a day	5.09 (1.62)
Unknown	2
Vote	
Liberal	4.75 (1.08)
Conservative	6.69 (1.56)
NDP	4.56 (1.36)
Green	5.01 (1.46)
Unknown	377

To assess the level of polarization by media consumption more formally, we calculated bimodality coefficients for individuals who received news about the 2018 Ontario election exclusively from social media, online media sources, legacy media sources and a mix of media sources.

Table 5

The raw distributions of policy attitudes and the corresponding bimodality coefficients are in Figure 7. Overall there is not really any evidence of significant bimodality in any of these distributions. None of these distributions surpass the threshold of 0.55 to be considered bimodal. Ontario voters were not overly polarized by policy issues in the 2018 election campaign. These findings also demonstrate that degrees of bimodality in Ontario were similar to the overall levels of bimodality in Canada measured using Canada Election Study data (Merkley, 2022). That said, it is noteworthy that bimodality differed by news consumption pattern. We find a linear reduction in bimodality from online consumption of news to legacy media and social media consumption of news about the campaign.

When we partial these results out by political interest, it becomes apparent that this increased bimodality associated with consuming news strictly online mostly affects those who report low levels of political interest in the election. We show this relationship in Table 6 which calculates bimodality coefficients by those with high (low) levels of political interest, defined as the average level of political interest, +/- 1

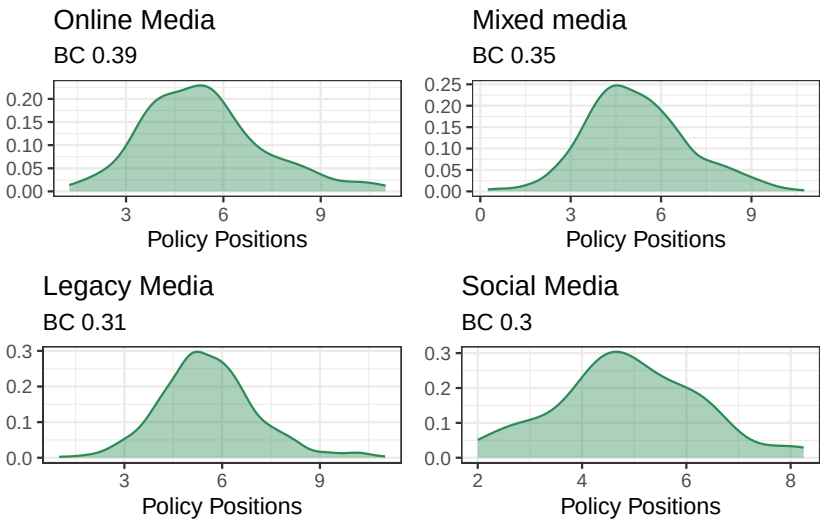

Figure 7: Probability distributions of policy positions by primary media source

standard deviation. These findings are consistent with the findings in Figure 4 that showed that social media usage moderated the relationship between political interest and polarization. In this case, however, it is online news consumption about a provincial election campaign that does the moderating. Specifically, at low levels of interest, online news consumers are more polarized by policy than legacy media consumers; but at high levels of interest, the relationship is reversed. These findings are in line with Merkeley (2022) who found larger rates of ideological polarization for those with high levels of political interest than for those with low levels of political interest although there was a greater *increase* amongst those with low levels of political interest. Our data may help explain Merkeley's observation that bimodality in the Canadian electorate is increasing as more individuals are now consuming news through strictly online news media.

Table 6: Policy polarization bimodality coefficients by media consumption and political interest.

Primary_media	Bimodality
Low	
Legacy	0.28

Mixed	0.39
Online	0.56
Social_Media	0.29
High	
Legacy	0.58
Mixed	0.40
Online	0.60
Social_Media	NaN

Second, we calculated bimodality coefficients by self-reported social media usage which are reported in Table 7. There is minimal evidence of any polarization. Moreover, we also did not see the pattern noted above whereby polarization increased with online news consumption for voters with low levels of interest.

Table 7

Social_Use2	Bimodality
About once a day	0.35
Never	0.33
Less than once a week	0.33

Table 8Policy polarization bimodality coefficients by general social media usage and political interest.

Several times a day	0.33
About once a week	0.29
Several times a week	0.27

As a last measure, we also estimated the overlap coefficients for the policy position distributions of for people who exclusively receive news from social media, online news sources, legacy news sources, and a mix of news sources. For these analyses, the measure runs in the opposite direction to the bimodality coefficient; a larger overlap coefficient indicates that the distributions overlap more and distribution of policy attitudes are *less* polarized. The plots presented in Figure 9 indicate that individuals who primarily use online media are the most polarized (OVL 0.45) and those who primarily use social media were the least polarized (OVL 0.74).

We also calculated the overlap coefficient for individuals who use social media often and those who use social media rarely. The results presented in Figure 10 contradict the results from the bimodality coefficients. These results indicate that individuals who rarely use social

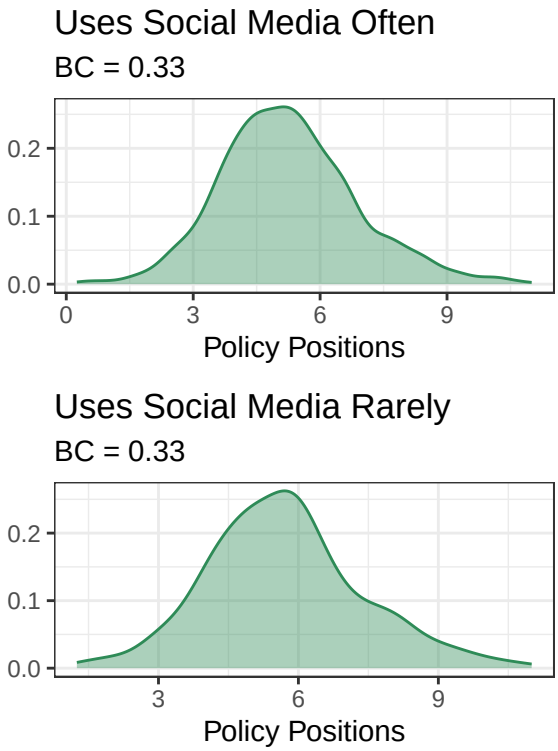

Figure 8Bimodality Coefficents and policy position distributions by social media usage

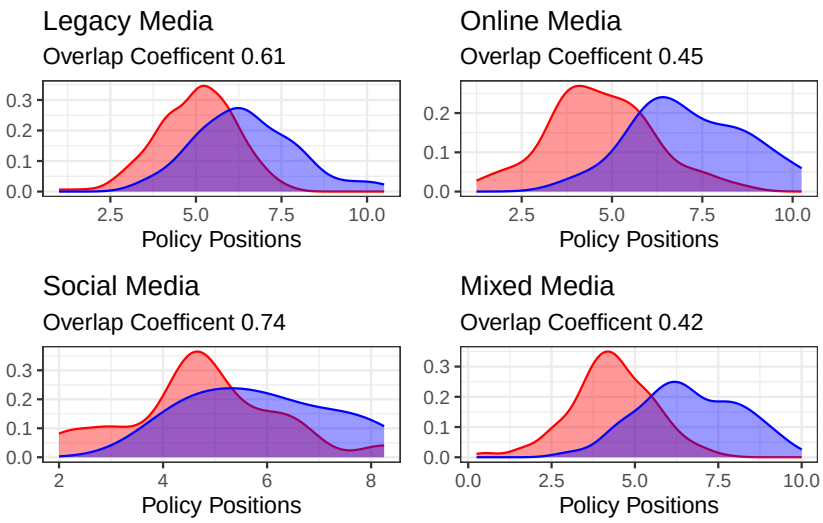

Figure 9Overlap coefficents by primary media source for news about the provincial election.

media are less polarized (OVL 0.57) than individuals who use social media often (OVL 0.47).

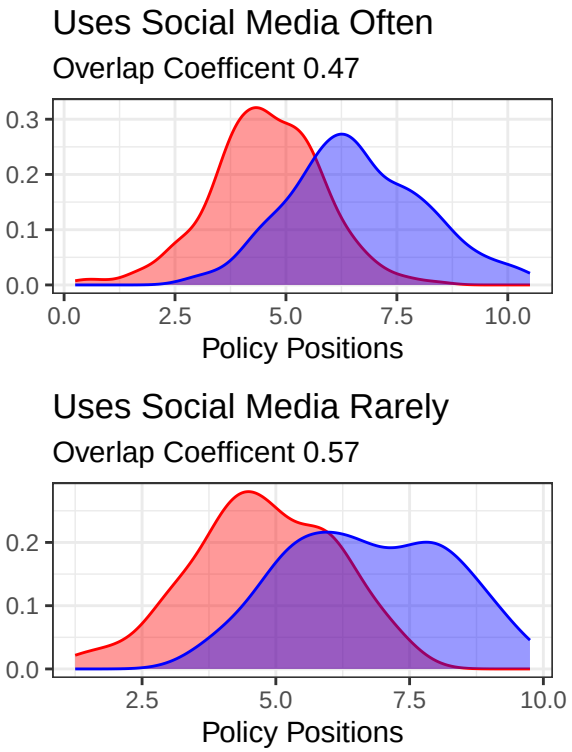

Figure 10Overlap Coefficents by Social Media Usage

6 Discussion

Overall these analyses have demonstrated some evidence of polarization - affective or policy-based - in a sample of Ontario voters during the 2018 provincial election. Voters who consumed online news were slightly less affectively polarized than voters who consumed legacy news media about the campaign. However, the heaviest users of social media, those who used social media multiple times per day, were more affectively polarized than those who reported never using social media. However, both of these were dwarfed by the relationship between interest in politics and affective polarization.

Moreover, interest in the campaign did interact with general social media usage such that the relationship between interest and affective polarization was *weaker* for heavy social media users than it was for others. High interest, heavy social media users were less polarized than high interest voters who reported never using social media media users while low interest heavy social media users were *more* polarized than low interest voters who never used social media. We observed the same pattern in terms of policy polarization and online news consumption. At low levels of interest, online news consumers were much more polarized than low interest voters; but at high levels of interest this gap

disappeared and online and legacy news consumers were equally polarized.

Therefore, our findings provide a different understanding of Dubois and Blank's (2018) findings about echo chambers. They found that political interest reduces the likelihood that an individual finds themselves in an echo chamber. They argue in fact that political interest leads their respondents to consume a diverse range of news sources. Upon first glance it appears that our findings would contradict those of Dubois and Blank. Specifically, if echo chambers are a primary mechanism whereby social media use leads to increased levels of polarization, then it would be expected that the individuals who are the least likely to be in echo chambers are the least polarized. However, our study demonstrated that those who are the most interested in politics are the most polarized, on two measures. When we examine the relationship between political interest, media consumption, and affective polarization further we find that low interest individuals who use social media are more likely to be polarized than low interest individuals who do not use social media, which is more consistent with the echo chamber hypothesis. However, among high interest individuals those who never use social media are more likely to be affectively polarized. When we

try to assess the degree to which low interest respondents are in fact in an echo chamber by modelling the number of news outlets consumed on a daily basis as a function of social media use and political interest, the echo chamber hypothesis the results are consistent with an echo chamber hypothesis. Frequent social media usage is positively related to the number of media outlets that respondents regularly consume at high and low levels of political interest. We do not have a direct measure that respondents are consuming ideologically proximate news in this analysis, although the Ontario Provincial Election Study has questions that might shed light on this question.

In terms of policy polarization, the picture was similar we found that voters who consumed news about the election campaign from online news sources were more polarized than voters who consumed legacy media, although by most standards, it did not qualify as a bimodal distribution. The source of this increased polarization appeared to come from voters who were the least interested in politics but who only consumed news online. Specifically, low interest individuals who exclusively consumed news about the 2018 Ontario election from online news sources were significantly more polarized that un-interested voters who exclusively consumed news from other media sources. These findings

provide some evidence that the nature of the online news environment is related to an increase in levels of policy polarization.

Overall, this study indicates that individuals who are uninterested in politics are more likely to fall into and become polarized by echo-chambers. In contrast, voters who are interested in politics and use social media appear to be less likely to become polarized by their social media usage. Therefore, these results indicate that in order to depolarize voters an approach that focuses on creating more interest in politics and/or targets online and legacy media sources may be more effective than one that targets those who primarily receive news from social media.

7 Conclusion

This paper examined patterns of affective and policy-based polarization in a sample of the Ontario electorate during the 2018 provincial election campaign. It found that while rates of affective and policy-based polarization are low, overall, there is evidence that frequent self-reported social media use and online news consumption facilitate polarization, particularly among low interest voters. In so far as echo chambers are responsible for polarization, our results contadict Dubois and Blank's

(2018) findings which found that interest in politics was negatively correlated with the probability that respondents would be in an echo chamber. Our evidence presented here suggests that interest in politics and online or social media consumption is in fact related to polarization. We also find evidence that shows that for both low and high levels of interest, social media use is related to greater numbers of media outlets consumed regularly. While this is normally seen as evidence of *not* being in an echo chamber, perhaps that is not the case. Perhaps, even at low levels of interest, social media platforms and online news outlets facilitate the consumption of more news that is ideologically proximate, leading to greater polarization,

8 References

9 Appendix

Table 9OLS regressions of weighted affective polarization on primary source of news consumption plus controls.

	model1	model2	model3	model4	model5	model6	model7	model8	model9	model10	model11	model12
(Intercept)	−0.03	−0.81***	−0.15**	−0.07	−0.83***	−0.80***	−0.71***	−0.72***	−0.83***	−0.87***	−0.59***	−0.54***
	(0.04)	(0.08)	(0.05)	(0.05)	(0.08)	(0.08)	(0.09)	(0.09)	(0.08)	(0.09)	(0.11)	(0.15)
ScoreMixed	0.09+	0.05	0.03	0.09	0.03	0.05	−0.02	0.03	0.03	0.02	−0.03	−0.15
	(0.06)	(0.05)	(0.06)	(0.06)	(0.06)	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.16)
ScoreOnline	−0.16+	−0.20*	−0.15	−0.16+	−0.20*	−0.23*	−0.28**	−0.22*	−0.19*	−0.23*	−0.28**	−0.05
	(0.10)	(0.09)	(0.10)	(0.10)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.10)	(0.29)
ScoreSocial_Media	−0.22	−0.09	−0.16	−0.20	−0.07	−0.11	−0.16	−0.13	−0.10	−0.12	−0.23	−0.35
	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.33)
Interest		1.21***			1.15***	1.28***	1.28***	1.29***	1.26***	1.24***	1.36***	1.29***
		(0.10)			(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.12)	(0.12)	(0.18)
Media Diversity			0.06***		0.03*		0.04**	0.04**	0.04**	0.04**	0.04**	0.03**
			(0.01)		(0.01)		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Political knowledge				0.13		−0.16*	−0.16*	−0.18*	−0.17*	−0.19*	−0.10	−0.11
				(0.08)		(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Age							−0.31**				−0.40**	−0.41**
							(0.12)				(0.12)	(0.12)
Income								−0.04**			−0.04**	−0.04**
								(0.01)			(0.01)	(0.01)
Degree									−0.12*		−0.10+	−0.09+
									(0.05)		(0.06)	(0.06)
Female										0.08	0.07	0.07
										(0.05)	(0.05)	(0.05)
ScoreMixed:Interest												0.18
												(0.23)
ScoreOnline:Interest												−0.33
												(0.41)
ScoreSocial_Media:Interest												0.19
												(0.54)
Num.Obs.	1481	1477	1481	1466	1477	1462	1442	1425	1442	1427	1395	1395
R2	0.008	0.090	0.023	0.010	0.094	0.094	0.103	0.109	0.104	0.099	0.117	0.118

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 10OLS regressions of weighted affective polarization on social media usage plus controls

	model1	model2	model3	model4	model5	model6	model7	model8	model9	model10	model11	model12
(Intercept)	−0.06	−0.88***	−0.21***	−0.15*	−0.90***	−0.89***	−0.85***	−0.79***	−0.92***	−0.94***	−0.71***	−1.08***
	(0.06)	(0.09)	(0.06)	(0.07)	(0.09)	(0.09)	(0.10)	(0.10)	(0.09)	(0.10)	(0.12)	(0.18)
ScoreLess than once a week	0.00	−0.01	−0.04	0.01	−0.03	0.01	0.00	−0.03	0.01	0.00	−0.03	−0.19
	(0.17)	(0.16)	(0.17)	(0.17)	(0.16)	(0.16)	(0.16)	(0.17)	(0.16)	(0.16)	(0.17)	(0.60)
ScoreAbout once a week	−0.13	−0.13	−0.17	−0.12	−0.15	−0.12	−0.14	−0.17	−0.14	−0.10	−0.13	−0.11
	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.52)
ScoreSeveral times a week	−0.07	−0.09	−0.09	−0.06	−0.10	−0.08	−0.07	−0.11	−0.08	−0.09	−0.11	−0.07
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.33)
ScoreAbout once a day	0.02	0.02	0.01	0.03	0.01	0.03	0.02	0.01	0.03	0.02	0.00	0.79**
	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.24)
ScoreSeveral times a day	0.14*	0.16*	0.13+	0.18*	0.15*	0.17*	0.13+	0.15*	0.16*	0.15*	0.09	0.56**
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.19)
Interest		1.22***			1.15***	1.27***	1.23***	1.26***	1.25***	1.21***	1.31***	1.86***
		(0.10)			(0.11)	(0.11)	(0.12)	(0.11)	(0.11)	(0.12)	(0.12)	(0.23)
Media Diversity			0.07***		0.03**		0.04**	0.04**	0.04**	0.04**	0.04**	0.04**
			(0.01)		(0.01)		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Political knowledge				0.19*		−0.10	−0.13	−0.13	−0.12	−0.14+	−0.07	−0.07
				(0.08)		(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Age							−0.16				−0.26*	−0.25*
							(0.12)				(0.13)	(0.13)
Income								−0.04***			−0.04**	−0.03**
								(0.01)			(0.01)	(0.01)
Degree									−0.12*		−0.10+	−0.11+
									(0.05)		(0.06)	(0.06)
Female										0.05	0.05	0.05
										(0.05)	(0.05)	(0.05)
ScoreLess than once a week:Interest												0.23
												(0.85)
ScoreAbout once a week:Interest												−0.03
												(0.73)
ScoreSeveral times a week:Interest												−0.07
												(0.46)
ScoreAbout once a day:Interest												−1.17***
												(0.35)
ScoreSeveral times a day:Interest												−0.70**
												(0.27)
Num.Obs.	1479	1475	1479	1464	1475	1460	1440	1423	1440	1425	1393	1393
R2	0.007	0.092	0.027	0.012	0.097	0.094	0.101	0.111	0.107	0.099	0.113	0.123

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Appendix 2

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