Social Media Use and Polarization In Ontario: 2018 Case Study

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1 Introduction

2 Social Media And Polarization

2.1 What is Polarization

In the literature on polarization there has been much debate on the relationship between ideology and partisanship. Scholars studying polarization, particularly in the United States, have contrasting views on the nature of modern political polarization. Some 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 parties 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 opposing partisans being similar when it comes to policy issue they increasingly dislike and distrust members of the opposing party (Iyengar et al., 2019; Mason, 2018a). These divergences in understandings of political polarization have led studies on polarization to differentiate between what is called called issues based polarization (Mason, 2018a) and affective identity

based polarization (Mason, 2018b) in their analyses of the causes and consequences of political polarization.

2.1.1 Ideological Polarization

Ideological polarization refers to the idea that the elites and the public are ideologically divided and supporters of opposing parties have significantly different views on key policy issues. There is clear evidence that the elite in the United States is polarized and that these ideological divisions have important consequences for American politics. However, there has been far fewer studies examining elite polarization in Canada. One of the most consequential studies on elite level ideological polarization in Canada found that the emergence of the Reform and the Canadian Alliance in the 1990s transformed Canada's brokerage parties into ideological parties (Cochrane, 2015). These parties then began polarizing along a left/right political division similar to the party systems in other industrialized Western democracies. 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 (Merkley et al., 2020). Therefore, there is evidence that Canada's political elite is not as ideologically polarized as the American political elite which politicized the COVID-19 pandemic and undermined health experts for partisan gains (Gadarian et al., 2021).

Evidence of ideological polarization in the mass public is even less clear in both Canada and the United States. Mass ideological polarization generally refers to one of two ideas. First, that supporters of opposing parties or camps have distinct political beliefs, which is also referred to as policy polarization. Second, that partisans are increasingly supportive of left or right-wing ideology and place themselves on the left or right of the political spectrum. 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.

Policy based polarization is used to describe the growing differences in the beliefs systems

of the electorate since the 1970s in the United States and the 1990s in other Western democracies (Dalton, 2021). Studies have provided evidence that Americans are increasingly divided on various emotionally charged issues including abortion, gay marriage and religion. Similar studies in Canada have demonstrated that since 2019 Canadians have become more ideologically polarized (Merkley, 2022) and partisan sorting has been increasing in Canada since 1992 (Kevins & Soroka, 2018). One of the policy issues over which Canada's are the most polarized is climate change with supporters of the Conservative Party of Canada being less likely to believe in the existence of climate change in 2012 (Lachapelle et al., 2012). However, other studies have shown that policy polarization and partisan sorting only exists in certain regions of Canada. For example, McLay & Ramos (2021) found that Atlantic Canada is not experiencing the same levels of ideological polarization as the rest of Canada.

2.1.2 Affective Polarization

However, despite some evidence demonstrating the existence of ideological issue based polarization existing within the electorate the idea that the public is ideologically polarized has long been questioned in the literature on public opinion and voting behaviour. One of the first studies on political belief systems in the United States found that Americans do not have clear coherent ideologies (Converse, 1964). However, despite Americans not being committed ideologues, they have increasingly begun to dislike each other on partisan lines. This paradox of polarization has led those who study polarization to separate the concept into ideological polarization, mostly present at the elite level, and the more pervasive phenomenon known as affective polarization.

Affective polarization refers to the level of dislike and distrust that individuals have for out partisans (Iyengar et al., 2019). Affective polarization is often studied in the U.S. context and cited as one of the main issues in modern American politics. However, it 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 using 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 not to the same extent as the U.S. In contrast, Gidron et al. (2020) found that levels of affective polarization have decreased in Canada since 1995. This study used the Comparative Study of Electoral Systems (CSES) and measured level of affective polarization as difference between an individual's rating of their in-party and their average rating of all out-parties. Finally, 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.

One of the most comprehensive studies that focuses on affective polarization in Canada examines trends in the dispersion of like scores across time (Johnston, 2023). This study uses the standard deviations of feeling thermometers to conclude that feelings towards all of Canada's political parties have become more 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. 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.

2.2 The relationship between social media usage and polarization

It is often considered a forgone conclusion that social media usage is linked to increased levels of affective and policy polarization. Proponents of this idea argue that social media platforms create "echo chambers" or "filter bubbles" where users will only encounter ideas and policies that they already agree with (Terren et al., 2021). Since the internet is a high

choice media environment individuals can either choose to be exposed to diverse information or select media that reinforce their pre-existing opinions (Dubois & Blank, 2018). On social media echo chambers occur because users shown ideologically agreeable materials as a result of these platforms' algorithms that show users content based on their past behaviour (Raynauld & Grennberg 2014). However, the empirical evidence supporting the existence of eco-chambers on social media has been mixed. Most studies in the United States find that Republicans and Democrats have similar media diets, both online and offline. Additionally, studies have found that there is some evidence that echo chambers exist on Twitter (now known as X) but not on Facebook. Notably, Terren et al. Terren et al. (2021) found that studies that used digital trace evidence found more evidence of echo-chambers and polarization than studies that used self-reported data. For example, 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 exposed to cross cutting content. They also find that individual choices, not algorithms, are what determine if an individual engages with opposing viewpoints. Using self reported social media usage, Dubois & 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.

The evidence linking the presences of echo chambers to increased polarization is also 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 (SOURCE). 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 affective polarization among Republicans but not Democrats. Additionally, Boxell et al. (2017) observe that the individuals who are the most polarized are those who are the least likely to use social media. Specifically, they found that adults over 75 are becoming polarized at a faster rate than those under 40, 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.

The evidence that social media usage leads to increased polarization in Canada is even more limited. There is evidence that affective polarization has been increasing in Canada (Johnston, 2019). Additionally, there are mixed conclusions with regards to policy polarization in Canada. One study that measured polarization using preferences towards re distributive policies found that Canada experienced a surge in partisan sorting between 1992 and 2015 (Kevins & Soroka, 2018). However, another study that measured polarization using distribution based measures only found evidence of ideological polarization increasing after the 2019 Canadian election (Merkley, 2022). Furthermore, none of these studies investigate the factors that have contributed to the rise of both affective and ideological polarization in Canada.

2.3 Polarization and Online News Consumption

In contrast to the contested relationship between polarization and social media usage their is clearer evidence that increased online news consumption is linked to increased polarization. Early studies of online news media found that partisan online sources engage in greater partisan filtering of content than traditional news wires (Baum & Groeling, 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 both the structure of news sites and the behaviour of online news consumers contributes to users only consuming news that reinforces their ideological priors. Specifically, they find that the online news environment allows users 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 & 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.

3 Ontario 2018 Summary

4 Data and Methods

4.1 The 2018 Ontario Post Election Study

- Sampling strategy
- Questions used to construct variables

4.2 Indenpedent 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. Individuals who 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 usage` variable measures how often respondents use social media. Respondents who stated that used social media asked "How often do you use social media?" are could respondent with options from "several times a year" to "several times a day." We coded individuals who said do not use social media as "never" using social media, those who responded that they us 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. We further recode the social media usage variable for our distributional analyses due to sample size restrictions. For these analyses individuals who use social media once a month or less are coded as rarely using social media and those who use social media more than once a month are coded as using social media often.

4.3 Polarization Varaibles

4.3.1 Affective polarization

We observe affective polarization using two commonly used measured to measure affective polarization in multiple party systems. The first first measure, developed by Wagner (2021), creates an individual affective polarization score for each respondent based on the *spread* party like scores for each of Ontario's four major political parties. 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). For formally the Weighted Affective Polarization (WAP) equation measured spread for parties j and voters i:

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

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 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 on 12 policy issues. All the measures were re-coded so that 0 indicates the most left-wing position and 1 indicates the most right-wing position. Table # displays the factor loading from an exploratory analysis which indicates that these items represent three latent constructs. The first construct measures attitudes towards redistribution, the second loading measures attitudes towards business and the third measures Ontario specific policy issues. The items were then combined in an additive index to create an ideological distribution that includes all 11 items. In this 0 represents being the most left-wing on all issues and 11 represents being the most right-wing on all issues.

4.3.2.1 Bimodality Coefficent

First we use these distributions to calculate the bimodality coefficient (BC). The BC is calculated using the `bimodality_coefficient` function from the `mousetrap` package in `R` (Wulff et al., 2023), which employs the following formula:

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

where 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 typical considered bimodal when $BC \geq 0.55$. 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.

4.3.2.2 Distinctiveness Coefficent

We also use the distinctiveness coefficient first used to measure levels of polarization Lelkes (2016) and Levendusky & Pope (2011) which is typically referred to as the overlap coefficient (OVL). This measure compares the overlap of the ideological distributions of two groups using the following formula:

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

where $f(x)$ is the probability density function (PDF) of one ideological distribution and $g(x)$ is the PDF of another (Pastore & Calcagnì, 2019). We calculate the the OVL using the `overlap` function from the `overlapping` package in `R` (Pastore et al., 2022). 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) for those primarily receive news from legacy media, online media sources, 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 Social Media Usage and Affective Polarization

Table 1: Mean levels of affective polarization (WAP scores) for key variables of interest

Group	Mean	Standard Deviation	Minimum	Maximum	*N*
Ontarians	0.440	0.125	0	0.748	2552
Social Media Use					
Never	0.437	0.119	0	0.748	408
Less than once a week	0.438	0.122	0	0.652	53
About once a week	0.439	0.133	0	0.654	76
Several times a week	0.433	0.115	0	0.674	153
About once a day	0.437	0.122	0	0.706	390
Several times a day	0.447	0.129	0	0.748	956
Vote Choice 2018					
Liberal Party	0.458	0.104	0.150	0.748	260
Conservative Party	0.489	0.100	0	0.722	471
NDP	0.476	0.087	0.107	0.695	556
Green Party	0.383	0.126	0.085	0.748	86
Undecided	0.396	0.118	0	0.748	294
Primary Media Source					
Legacy	0.447	0.116	0	0.748	795
Mixed	0.440	0.132	0	0.748	1485
Online	0.427	0.114	0	0.748	185

Group	Mean	Standard Deviation	Minimum	Maximum	N
Social Media	0.404	0.131	0	0.617	87

First, we examine levels of affective polarization by `social media usage`, `primary media` source, and party affiliation. Table 1 displays the mean levels of affective polarization and standard deviations of the WAP scores for these groups. These results indicate that those who use social media several times a day have the highest WAP scores with those who use social media several times a week have the lowest WAP scores with a difference of 0.014 between the group with the highest and lowest scores. When examining vote choice in the 2018 Ontario election supporters of the Conservative Party had the highest WAP scores and supporters of the Green Party had the lowest levels of affective polarization. For vote choice there is 0.106 point difference between those with the highest average levels of affective polarization and those with the lowest levels. Finally, for primary media source those who only used legacy media to receive news about the 2018 Ontario election had the highest average affective polarization scores and those who only used Social Media had the lowest average levels of affective polarization with a 0.043 point difference between the two groups.

These results reveal a contradiction where 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. These preliminary results indicate that individuals who regularly use social media are more affectively polarized than those who do not, however those who received news about the 2018 election primarily from social media are less affectively polarized. We investigate this contradiction further in the following sections.

Next, we estimate the correlation between primary media source and social media usage and levels of affective polarization. Figure # presents the results from ordinary least squares

(OLS) regression models with WAP scores as the dependent variable and social media usage 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 in the change in the dependent variable correlated with a full change in the independent variable.

First we estimate a model with only `primary media` as an independent variable. In this model receiving election news from mixed sources, online sources, and social media are all correlated with a decrease in levels of affective polarization when compared to receiving election news from legacy media sources. Next, we estimate a series of models adding a additional control variables each time. The pattern observed in the first model is present in all the models presented in Figure # with the exception of model three which only includes political interest as a control variable. In this model receiving news from social media as opposed to legacy news sources is not significantly correlated with lower levels of affective polarization. We then re-estimate the same models that we estimated in **?@sec-pm_WAP** using social media usage as the primary independent variable (See Figure #). In these models using social media more than never is not significantly correlated with levels of affective polarization.

In terms of the control variables in all the models political interest is correlated with a 1.50 to 1.67 standard deviation increase in levels of affective polarization. We investigate the relationship between political interest and levels of affective polarization further in section … Additionally, and contrary to to theoretical expectations when controlling for an individual's primary media source age is negatively related to levels of affective polarization, in that older individuals are less affectively polarized. In order to investigate this phenomenon further we estimate an OLS regression model that includes age as a polynomial term and can be expressed as follows:

$$Y_i = \beta_0 + \beta_1(Age) + \beta_2(Age)^2 + \beta_3(Interest) + \boldsymbol{\beta M} + \varepsilon$$

Where Y_i is and individual's level of affective polarization and $\boldsymbol{\beta M}$ is matrix of coefficients for the primary media source variables. Figure Figure 1 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 affectivetly polarized until they reach 65 when they start becoming more affectively polarized.

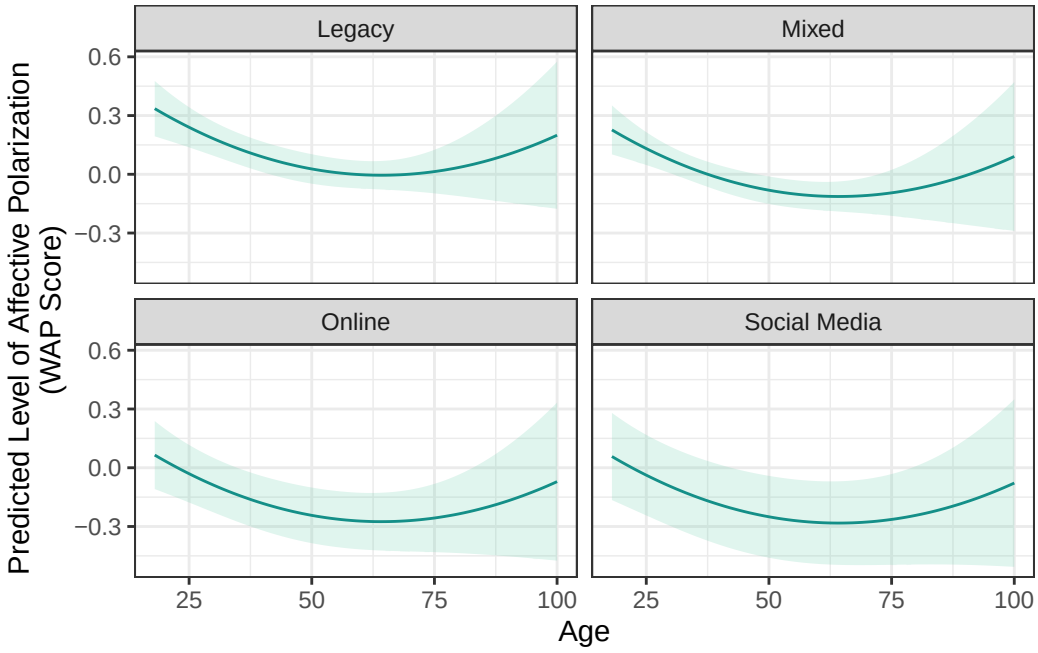

Figure 1: Predicted Levels of Affective Polarization by Age

5.2 Social Media Usage and Policy Polarization

To investigate the relationship between social media usage and policy polarization we first calculate the mean policy positions of individuals by primary media source, social media usage, and vote choice in the 2018 election.

We then investigated the relationship between social media usage and policy polarization.

First, we calculated bimodality coefficients for individual's who received news about the 2018 Ontario election exclusively from social media, online media sources, legacy media sources and a mix of media sources (See Figure 2). These results indicate that individuals who received news about the 2018 election from online news sources have the most bimodal distribution of policy positions ($BC = 0.36$) and individuals who received news exclusively from legacy media sources have the least bimodal distributions ($BC = 0.29$). However, none of these distributions surpass the threshold of 0.55 to be considered bimodal. These results indicate that individuals who receive news about elections from online media have the highest levels of policy polarization and those who receive news from legacy media sources have the lowest level of policy polarization.

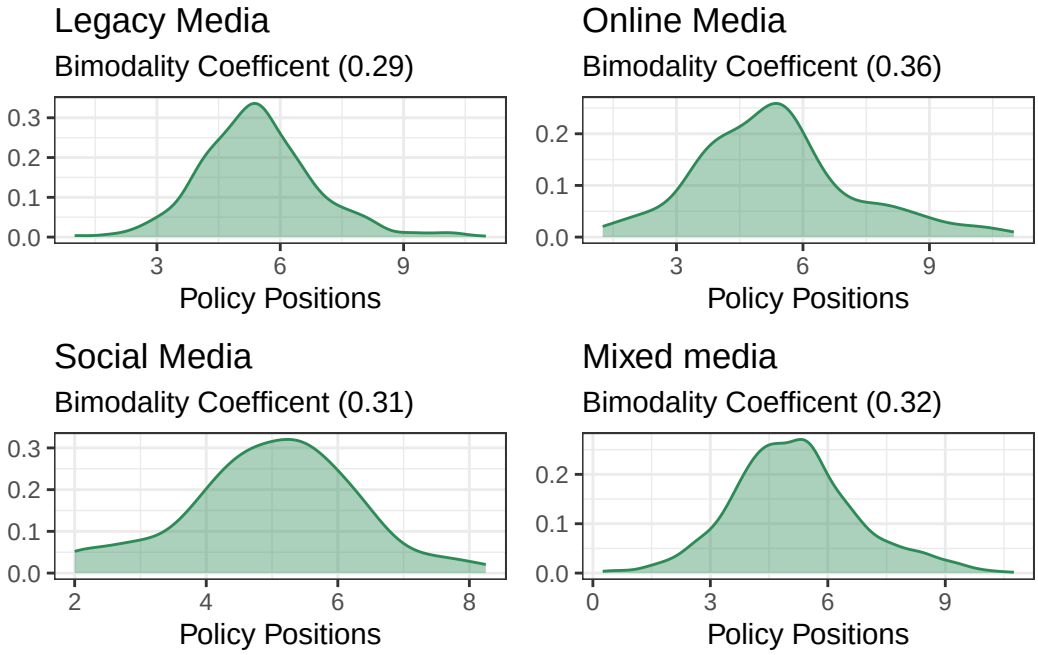

Figure 2: Bimodality Coefficents and Policy Position Distributions by Primary Media Source

Second, bimodility coefficients were calculated for the policy position distributions of individuals who use social media often and those who social media rarely (See Figure 3). These results indicate that that the policy position distribution individuals who rarely use

social media has a BC of 0.33 and the BC for those who use social media often is 0.29. Similar to the previous results those who use social media often are have lower levels of policy polarization than those who use social media rarely.

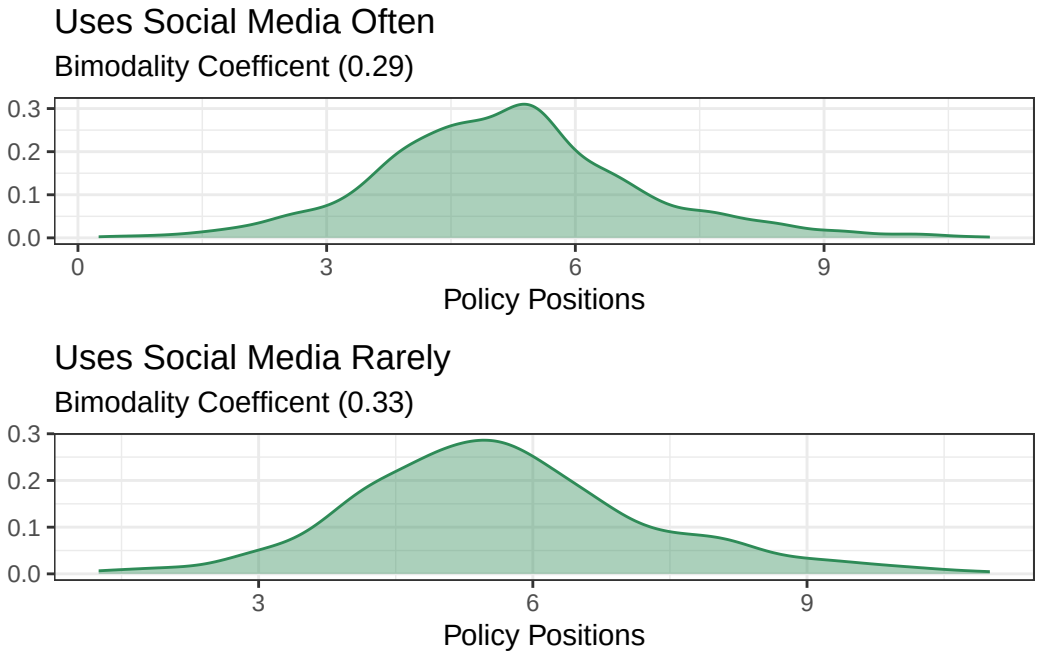

Figure 3: Bimodality Coefficents and Policy Position Distributions by Social Media Usage

In order to, further investigate this relationship we estimate the overlap coefficients for the policy position distributions of right and left-wing individuals who use exclusively receive news from social media, online news sources, legacy news sources, and a mix of news sources. For these analyses a larger overlap coefficient indicates that the distributions overlap more and that the policy distributions for left and right-wing individuals are less polarized. The plots presented in Figure 4 indicate that individuals who primarily use online media are the most polarized ($OVL = 0.59$) and those who primarily use social media were the least polarized ($OVL = 0.74$).

Finally, we calculated the overlap coefficient for individuals who use social media often and those who use social media rarely. The results presented in Figure 5 contradict the results from

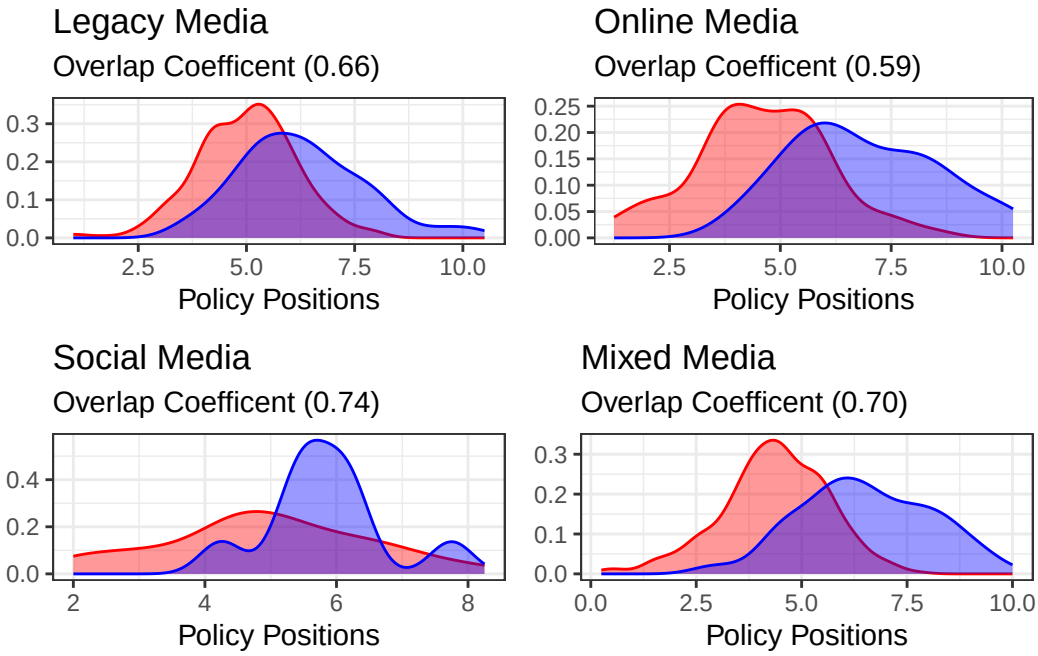

Figure 4: Overlap Coefficents by Primary Media Source

the bimodality coefficients. These results indicate that individuals who rarely use social media are less polarized ($OVL = 0.70$) than individuals who use social media often ($OVL = 0.53$).

Overall, the results presented in this section provide mixed results on the relationship between social media usage and both affective and policy polarization. In terms of policy polarization the results in section blank indicate that individuals who use social media or online news sources as their primary news source are less affectively polarized. Furthermore, these results indicate that whether an individual regularly uses social media is not significantly related to their level of affective polarization. The results from the bimodality coefficients and the overlap coefficients for individuals' primary media source lead to similar conclusions. Specifically, they indicate that using social media is correlated with less policy polarization. However, the overlap coefficients for level of social media usage indicate that individuals who use social media more often have higher levels of policy polarization. Therefore, in order to better understand these results seemingly contradictory results in this section the next section

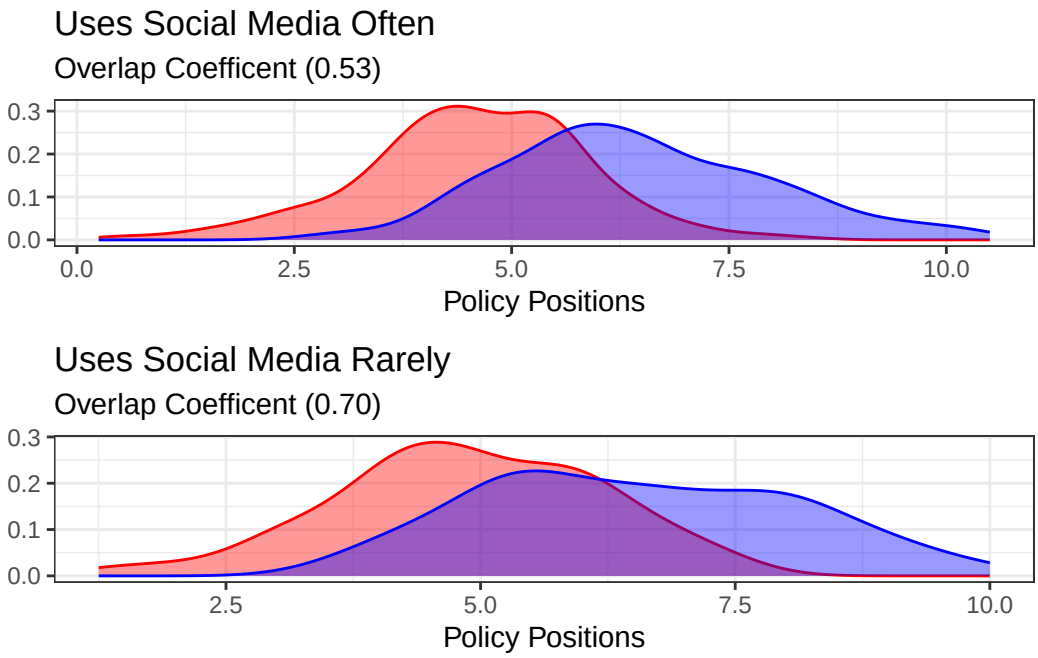

Figure 5: Overlap Coefficents by Social Media Usage

further investigates the relationship between political interest, social media usage and levels of affective polarization.

5.3 The Moderating Role of Political Interest on the Relationship between Social Media Usage and Affective Polarization

In order to further test the relationship between media usage and levels of affective polarization we test the relationship between political interest, social media usage, and affective polarization. First, we estimate two OLS models with political interest as the dependent variable and primary media and social use as the independent variables. Then, we estimate the interaction between of primary media source and political interest (`Primary Media X Interest`).

6 Discussion

7 Conclusion

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