Digital information diversity and political engagement: The impact of website characteristics on browsing behavior and voting participation

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Abstract. Digital information is a new source of political information for citizens. News websites differ in the diversity of news content that they deliver, and such difference may have varied impacts on political behavior. This study explores the impact of news website characteristics on users' news browsing behaviors, and in turn on voting participation. Using datasets on Internet browsing and U.S. presidential elections, the study finds indications that both the popularity and apparent bias of websites have an impact on the browsing behaviors of users. Non-biased websites have more user visits and longer user visits than biased websites, which positively correlate with users' voting behaviors. Also, the longer users navigate news websites and the more users visit the news website, the higher the apparent political participation. The paper concludes with the implications of the research for political systems and news content providers.

Keywords: Web-based interaction, digital information, website popularity, digital divide, political engagement, website characteristics

Key points for practitioners

- News websites differ in the diversity of news content that they deliver, and such difference may have a varied impact on one's political behavior.
- This study identifies several website characteristics that correlate with browsing behavior and apparent political engagement behavior.
- This study is relevant for content creators as well as politicians and political campaigns because it highlights the importance of balanced and diverse information as compared to biased information in terms of political participation.

1. Introduction

Recently there has been a major rise in the number of websites with political information with two-thirds of US adults reporting that they got some part of their political information online (Dylko et al., 2017). Such access to a vast amount of diverse digital information enhances the potential for a politically informed citizen (Nelson et al., 2017). Nevertheless, such access might not necessarily imply that citizens

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will choose to be exposed to alternative political viewpoints (Sunstein, 2004). Some scholars caution that the more choices an individual has when seeking political news, the more likely the individual will exclude options with which he or she disagrees (Lee et al., 2018; Stroud, 2010). Consequently, digital information may be promoting a polarized society (Sunstein, 2004). It remains an area of debate among scholars whether or not digital information promotes or hinders political participation (Boxell et al., 2017; Van Deursen & Helsper, 2018).

The possible link between Internet use and political participation has been frequently examined lately. A meta-analysis of this research stream found that the relationship between digital political information and civic engagement is weak and inconclusive in terms of direction and significance (Boulianne, 2009). While some scholars suggest that the digital news potentially strengthens political engagement (Kim, 2017; Stroud, 2010), others suggest that the digital news is more complicated than initially predicted and may cause people to abandon their political thought (Mitchelstein & Boczkowski, 2010; Nie & Erbring, 2000). The findings thus far seem to suggest that different types of Internet use and digital news relate to differential impacts on civic engagements (Purdy, 2017). Given that the relationship between digital news and civic engagement remains unclear with theories predicting opposing views, it is essential to investigate the factors that have been overlooked to understand the nature of the relationship better.

Various types of demographic characteristics, political standpoints, and Internet use have widely been investigated (Boxell et al., 2017; Jasny, 2017; Lee et al., 2018). However, one crucial factor that hasn't been investigated is the characteristics of the news websites that are delivering political information and the political attitude of digital users. A website has a variety of characteristics (e.g., content quality and diversity, ease of navigation, usability, popularity, security, etc.) that must be improved to meet consumer satisfaction which directly affects behavioral intentions (Abrar et al., 2017). Appropriate design characteristics are required to make websites effective (Seckler et al., 2015; Tarafdar & Zhang, 2005). Therefore, studying website characteristics and their influence on behavior formulates an important aspect of framing strategies for website design. By examining the type of digital news that is consumed and the attitude of the user, this study aims to better understand the nature of the relationship between digital information and civic engagement.

Information plays a crucial role in preparing the citizens to vote, and it is valuable for citizens to be exposed to both sides of the story (Levendusky, 2011). Traditional media usually presents news that offers different sides of an issue, making their news diversity pretty high (D'Alessio & Allen, 2000). Contrary to the Internet, users have more control over their information environment. How well a news website content can attract a reader is now more crucial than ever given the zero-switching cost online. While some websites on the Internet deliver biased content, others deliver more neutral (Faris et al., 2017). The diversity of news on the Internet is very different from traditional media (Redden & Witschge, 2010). Online news organizations play a major role in reporting not only verified news but also fake news, thus ruining the digital news environment (Berghel, 2017). News organizations that report unsupported facts or 'fake news' often do so in ways that bias the reader towards thinking that the facts are real (Berghel, 2017). The spread of such biased online news reporting reaches its peak nearing elections (Faris et al., 2017) . For instance, the coverage of the US 2016 presidential elections was especially biased to the extent that experts blamed this biasedness to the loss of political turnout (Mihailidis & Viotty, 2017). Understanding how the biasness of a digital news site influences voting behavior is a vital issue that needs to be addressed and has substantial implications that can be immediately applied to political campaigns and content providers.

The Internet has also altered information exposure patterns; it's a platform that allows users to select or avoid content, thus providing broad opportunity to find like-minded political news and opportunities for

selective exposure (Arceneaux & Johnson, 2013; Bennett & Iyengar, 2008). This selective exposure is even more likely when the user strongly identifies with a particular political party (Arceneaux & Johnson, 2013; Garrett & Stroud, 2014; Skovsgaard et al., 2016; Stroud, 2011). Understanding citizens' partisan attitude on digital news and its impact on voting behavior will bring further insight into the impact of the Internet on political participation and has direct implications for digital news content providers, search engines and digital advertisers.

On an average day, approximately 84% of the US population uses the Internet in some way, and one-third of these online users went online for political news (ITU, 2014). Given the large numbers of people who report accessing political information online and the increase in online news biasedness, questions remain about the effects of digital news on political participation. The purpose of this paper is to empirically test the impact of website characteristics, citizens' partisan attitude, and user browsing behavior on voting participation. In particular, the current study answers two main questions: (1) what is the impact of website characteristics and partisan attitude on browsing behavior? And (2) what is the impact of browsing behavior on voting participation? This study will help academics better understand the relationship between digital content and civic engagement by examining factors that have been missed. The study will enable online news platforms and political campaigns to value and better understand the effectiveness of website characteristics and will identify the types of website characteristics that impact browsing behavior, and ultimately, political participation. Furthermore, the study will allow political campaigns and online news platforms to better understand the browsing behavior of partisan citizens and its impact on their political participation.

2. Theoretical background and hypotheses

Political campaigns depend highly on news content delivery and user engagement, even more so now than ever with the advent of Web 2.0 (Xenos et al., 2017). What characteristics of online news sites prompt more engagement and more inclination to participate politically is an important issue that needs to be addressed and is a vital issue that affects society (Clark, 2017).

As information availability and choices increase, content and website preferences become a key to understanding political knowledge and participation (Prior, 2007). Studies have investigated the use of certain types of websites (party websites vs. non-party websites) (Porten-Chée, 2013; Schweitzer, 2011), functions of websites (Lilleker et al., 2011), the communication aspect of a website (Hampton, 2011; Hsieh & Li, 2014; Klofstad, 2010) and their impact on voting. In the news consumption process, users need to use the website platform to obtain information and make judgments based on their existing experience (Hsieh & Yang, 2019). Therefore, the characteristics of the news website play an important role in consumer behavior and decision (Brun et al., 2017). Website characteristics refer to the content design of the website in terms of content, visualization and social popularity (Karimov et al., 2011). Several marketing studies (Brun et al., 2017; Chung & Shin, 2010; Yoo & Donthu, 2001) have evidenced the importance of certain website characteristics for enhancing service quality, customer experience, and online relations. However, to date, no study has analyzed whether website characteristics impact political participation. This study explores the impact of news website characteristics on users' news browsing behaviors, and in turn on voting participation.

Studies investigating the impact of Internet use and political participation assume that access to large and diverse political information may help civic participation (Boulianne, 2009). A meta-analysis of this research (Boulianne, 2009) has demonstrated that Internet use has a conditional positive but small effect on political participation. The 39 studies included in the meta-analysis generated results that contradict

the assumption that Internet use enhances political participation. Another field essay investigating Internet use and political participation concludes that while the debate of the impact of the Internet is still open, Internet use produces changes in attitudes that are favorable to political participation (Anduiza et al., 2009). The debate is especially inconclusive when it comes to whether the Internet increases or reduces participatory inequalities and this relationship is highly reliant on the information provided by websites (Anduiza et al., 2009), age of participants (Boulianne & Theocharis, 2018), type of digital technology used (Ohme, 2020), and the type of political context (Boulianne, 2019).

Furthermore, the literature on digital information effects on political engagement lacks a clear theoretical framework (Knobloch-Westerwick & Johnson, 2014), with an uncertainty of the roles and casual direction of variables (Boulianne, 2009). For example, not all users benefit equally from digital information (Blank & Lutz, 2018). Demographic characteristics are found to have a differential impact on Internet use and online participation (Hargittai & Dobransky, 2017; Van Deursen & Helsper, 2018). Such differentiation highlights the need to further investigate the many variables that may influence users differently. The current literature also fails to consider the critical role of the characteristics of the online website that is delivering the content in influencing participation.

The Internet has also altered the exposure of news. The Internet allows users to select or avoid content in great detail, thus allowing users to seek like-minded political news (Bennett & Iyengar, 2008). This selective exposure is even more probable when people strongly identify with a particular political party (Stroud, 2011). While some scholars have argued that the Internet promotes selective exposure to like-minded political news (Arceneaux & Johnson, 2013; Bennett & Iyengar, 2008; Iyengar & Hahn, 2009; Levendusky, 2013; Nie et al., 2010; Skovsgaard et al., 2016), other scholars suggest that online users may not be prone to avoiding attitude-discrepant information since diverse information brings in more information utility (Garrett, 2009; Knobloch-Westerwick & Johnson, 2014; Knobloch-Westerwick & Kleinman, 2012). One study even argues that the Internet increases gaps in knowledge and turnout between people who prefer news and people who prefer entertainment (Prior, 2007).

Given the contradictory results in understanding the relationship between digital news and civic engagement, and the two opposing theories information exposure on the Internet, the present investigation sheds light on the relationship between digital news and civic engagement. This study draws on the information utility theory (Knobloch-Westerwick & Kleinman, 2012) and the selective exposure theory (Festinger, 1962) to conceptualize the processes involved in digital news impact, and in particular, website characteristics, and partisan attitude on political participation.

The information utility theory refers to the degree to which information can help individuals in making decisions. Information has a utility to the extent that it provides individuals better knowledge and more effective means of acting towards a topic. The more valuable an individual perceives the information to be, the more likely the individual will engage and act on the information. This engagement is, regardless of whether or not it is consistent with one's pre-existing attitude (Knobloch-Westerwick & Kleinman, 2012). The increased utility of information promotes longer and more frequent exposure to information (Knobloch-Westerwick, 2008). The information utility view states that if the information is anticipated to benefit an individual, the individual will be less concerned with whether or not the information is consistent with one's beliefs, and will be more willing to consume diverse and different information (Purcell et al., 2010).

Selective exposure theory refers to the tendency of people to expose themselves to information in agreement with their pre-existing beliefs (Klapper, 1960). The theory assumes that partisan individuals tend to exclusively seek supportive information on their pre-existing attitude (Festinger, 1962). The Internet has greatly changed the information environment, and, in turn, increased selective exposure

(Bennett & Iyengar, 2008). Several empirical studies have tried to demonstrate media consumers' biased information selection (Barberá et al., 2015; Garrett, 2009; Knobloch-Westerwick & Johnson, 2014; Sunstein, 2004). Yet, other scholars believe that the Internet produces either no effect, or a decrease in selective exposure (Dvir-Gvirsman et al., 2016; Weeks et al., 2016). The rationale of these studies is based on the diversity of available information online along with the ability of the Internet to cross-geographical boundaries making counter-attitudinal information easy to access (Dvir-Gvirsman et al., 2016; Weeks et al., 2016).

The two conflicting theories facilitate in identifying the research model of this study. The information utility theory is used to assess the value of digital information on news websites, its impact on the browsing behavior of individuals, and in turn, voting participation. Selective exposure theory is used to examine the impact of partisan attitude on browsing behavior and in turn, voting participation.

2.1. Website news diversity and usage

One way to measure the information utility of a news website is to assess the content or the news diversity of the website. Balanced news provides a broad variety of information and thus enables citizens to act well-informed on political decisions (Haim et al., 2018). News diversity represents the means for an informed citizen and is considered a key dimension of news quality (Porto, 2007). Users can gain more knowledge in a more news diverse website; therefore; the information utility of a news diverse website is higher than a less news diverse website.

News diversity is composed of source diversity, content diversity, and viewpoint diversity (McDonald & Dimmick, 2003). The more viewpoints, sources, and content diversity the news website covers the higher the news diversity, thus the higher the news quality and, in turn, the higher the information utility of the website (Baden & Springer, 2017). Biased websites deliver few viewpoints, sources, and content diversities, and are less news diverse, thus deliver lower news quality and lower information utility.

News websites are all critically dependent on attracting consumers to their websites (Thorbjørnsen & Supphellen, 2004). The presence of a diversity of information offers citizens access to a range of ideas, expertise, and topics (Carpenter, 2010). This diversity of information increases the utility of consumers. The increased utility of information promotes more prolonged exposure to information (Knobloch-Westerwick, 2008) and overall time spent surfing for political information (Tsfati, 2010). Therefore, this study argues that when the news website is biased, the diversity of content is low, which consequently results in a low information utility. Thus, users will not spend as much time browsing the website. Furthermore, when the information utility is low, there is a low incentive for consumers to visit the website (Knobloch-Westerwick et al., 2015; Lu & Lee, 2019; Valentino et al., 2009). These expectations are framed in the following two hypotheses:

> H1a: Browsing duration is negatively associated with biased digital information.
> H1b: Frequency of access is negatively associated with biased digital information.

2.2. Website popularity and usage

Another means of measuring the information utility of a news site is by assessing the impact of the website on Internet users (Hsieh & Yang, 2019) such as the popularity of the website (De Vries et al., 2012). The popularity of a website is based on the frequency with which users have visited the website (Meric et al., 2002). Popular websites are websites that are more familiar and trustworthy (Yang, 2016). Popular websites are websites that have attracted a large customer base and thus deliver high

information utility as compared to less popular websites that have a lower customer base (Chi, 2018; Knobloch-Westerwick & Kleinman, 2012; Knobloch-Westerwick, 2008).

Empirical findings have shown that recommendations based on collective audience behavior considerably affect other users' news browsing behavior (e.g. Messing & Westwood, 2014; Sundar & Nass, 2001). Following others' choices can reduce one's chances of making the wrong decisions without much effort (Knobloch-Westerwick & Kleinman, 2012). Validation by several unknown other users also serves as a heuristic cue for a decision, by enriching the informational utility of the collectively recommended news website (Messing & Westwood, 2014). Online news users may assign more information utility to popular news sites because those news sites already passed many others' examination, which, in turn, awards public validation. Therefore this study argues that popular news websites have higher information utility. As such, higher information utility is expected to lead to higher browsing time and higher website visiting time (Knobloch-Westerwick et al., 2015; Tsfati, 2010; Valentino et al., 2009). Due to the higher information utility of popular websites, users will spend more browsing time and more visits as compared to less popular websites. These expectations are framed in the following two hypotheses:

> *H2a: Browsing duration is positively associated with popular news websites.*
> *H2b: Frequency of access is positively associated with popular news websites.*

When a website is both popular yet biased, the information utility attained from the popularity is then negatively impacted by the less diverse and lower news content quality of the biased information. The credibility of the news website is lost by the intention to persuade towards a particular biased viewpoint (Knobloch-Westerwick et al., 2015; Thorson, 2008; Tsfati, 2010). The information utility from the popularity of the website is diminished. Thus, its website usage, in terms of browsing duration and frequency of access, is predicted to negatively associate with popular biased news websites due to reduced information utility. These expectations are framed in the following two hypotheses:

> *H3a: Browsing duration is negatively associated with popular biased news websites.*s
> *H3b: Frequency of access is negatively associated with popular biased news websites.*

2.3. Political partisan attitude and website usage

Political partisan attitude has a substantial impact on political engagement (Druckman et al., 2018). The Internet facilitates information selection, which may lead to stronger partisan attitudes (Bennett & Iyengar, 2008; Porten-Chée, 2013). To avoid cognitive overload, Internet users expose themselves to small subsets of information among the wide selection of digital information available (Yang, 2016). Users with partisan attitudes will thus only expose themselves to information that is in agreement with their beliefs (Porten-Chée, 2013).

While people do not purposefully avoid online information they disagree with (Garrett et al., 2013), the Internet allows people to seek like-minded political news easily (Bennett & Iyengar, 2008). Such selective exposure is even more probable when an individual has a partisan attitude towards a particular political party (Stroud, 2011).

The vast amount of online information may expose users to counter-attitudinal information. Repeated exposure to counter-attitudinal information online may motivate politically partisan individuals to increasingly partake in selective exposure, by seeking to reaffirm their political attitude through like-minded information (Slater, 2015). Such reaffirmation is usually in the form of a "scan" such that an individual will not spend long since the information is already known and the purpose of the exposure is for reinforcement (Weeks et al., 2017). Thus, this study hypothesizes that while an individual with a partisan attitude will seek to reaffirm, the reaffirmation will not be time-consuming.
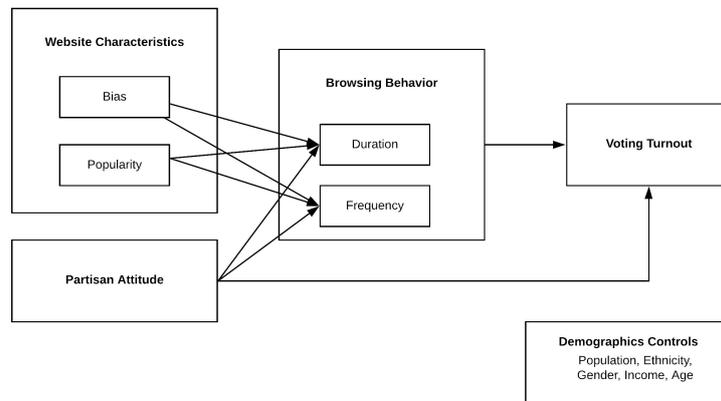
Fig. 1. Theoretical framework.

H4a: Browsing duration is negatively associated with partisan attitude.
H4b: Frequency of access is positively associated with partisan attitude.

2.4. Digital information use and political engagement

Recent studies suggest that citizens are using the Internet to follow news and engage in online political activities (Boulianne, 2016; Yamamoto et al., 2015). Studies have argued that the Internet will have positive impacts on civic and political engagement (Boulianne, 2016; Polat, 2005). The Internet reduces the costs of accessing political information, in terms of time and effort, and offers more accessible ways to engage in political life than traditional media. The Internet also has the potential to mobilize politically inactive citizens (Weber et al., 2003). Increased access to information online reduces knowledge deficiencies, which are the main reason for political disengagement (Boulianne, 2009). This vast increase in access to information online allows citizens that are like-minded to engage and enhance their knowledge (Boulianne, 2009). In sum, the Internet revives civic life by increasing access to political information, enabling political discussion, and facilitating public, social engagements.

Therefore, the longer and the more often a user browses the Internet, in particular, online news sites, the more the user will have access to political information, discussion, and engagement.

H5: Browsing behavior is positively associated with voting participation.

Testing those relationships requires one to control for several confounding variables. The relationship between age and news exposure has been well-established and is positive (Delli Carpini, 2000; Hamilton, 2004; Prior, 2007). An exception to this phenomenon is the Internet, where news consumers tend to be younger (Norris, 2000). Also, few studies show positive correlations between income, education, and news consumption (Baldwin et al., 1992; Norris, 2000). Age, income, and education are positively associated with news engagement (Ksiazek et al., 2010) . Such news consumption demographics might be linked to political engagement and therefore may produce a spurious relationship. Thus, we include these demographic controls in our model, as shown in Fig. 1.

3. Research methodology

Table 1 exhibits the research variables, description, and source of the measuring data. The two website characteristics variables are the popularity index of the website (SITE_POPULARITY), and biasness of

Table 1
Summary of variables

Variable	Description	Source
SITE_POPULARITY	Website characteristic. Average popularity of the news site based on the inverse of Alexa country (US) rankings. Alexa rank is calculated using a proprietary methodology that combines a site's estimated traffic and visitor engagement over the past three months. The data were collected monthly from January to November 2016, and the average ranking per month was calculated.	Alexa.com
SITE_CONTENTBIAS	Website characteristic. Content bias of a news site based on a scale of 1–7. The higher the score, the more biased the content of the news site.	Survey
DURATION	Browsing behavior. Average number of minutes spent on a news site in a particular county.	ComScore
FREQUENCY	Browsing behavior. Total number of visits to a news site in a particular county.	ComScore
PARTISAN_ATTITUDE	Absolute value of ANES feelings thermometer. Such that the higher the score the more the user in a particular county identifies with a political party.	ANES
VOTING_TURNOUT	Voting turnout in a particular county. Log transformed.	CPS
POP	Population of the county. Log transformed.	CPS
BLACK	Percentage of black population in the county.	CPS
MALE	Percentage of male population in the county.	CPS
INCOME	Average income of a resident of the county.	CPS
AGE	Average age of a resident of the county.	CPS

the content on the website (SITE_CONTENTBIAS). SITE_POPULARITY measures the popularity of the website in the US relative to other websites visited in the US, measured in the number of visitors in a particular period. SITE_CONTENTBIAS measures the biasedness of the content of the news website. The biasedness of the content of a website was measured using a survey conducted for this study.

The two browsing behavior variables are the average duration spent at a website in minutes (DURA-TION), and the average total number of visits to the website (NUM_VISITS). PARTISAN_ATTITUDE measures the differential attitude of partisan individuals. VOTING_TURNOUT is the voter turnout in a county- the main dependent variable.

Lastly, the control variables include the demographic characteristics of the population in a county (POP), race as a percent of the black population (BLACK), gender as a percent of the male population (MALE), income (INCOME) and age (AGE). Education level was omitted due to its high correlation with INCOME.

3.1. The data set

To test the research hypothesis, we compiled a data set, including 2170 observations for the 2016 US Elections from January 2016 to November 2016. The unit of analysis of each observation is the average individual in a county in the USA. The investigated 2170 counties make up 71% of the total counties in the USA. The data set was compiled from two main data sets: (1) ComScore dataset and (2) US Census and Current Population Survey (CPS) dataset.

The data on browsing behavior were compiled from 2016 Internet browsing data from ComScore to examine the browsing behavior of US Internet users for the 2016 US Elections. ComScore monitors all website browsing activities of users. The ComScore dataset was reduced to analyze only news website browsing behavior. The data set includes approximately 100,000 individual users from January 2016 up to Election Day (November 8, 2016) and 200 news websites. From this data set, the individual browsing

Table 2
Descriptive statistics

Variable	Obs	Mean	Stdev	Min	Max
VOTING_TURNOUT	2170	0.68	14.06	0.21	0.86
PARTISAN_ATTITUDE	2170	23 .5	34.70	0.00	100.00
DURATION	2170	3.96	1.04	1.20	8.41
FREQUENCY	2170	1.95	3.21	1.00	13.00
SITE_CONTENTBIAS	200	3.45	2.41	1.00	7.00
SITE_POPULARITY	200	0.04	0.01	0.01	1.00
POP	2170	15.47	0.80	13.05	17.42
BLACK	2170	0.14	0.17	0.00	0.93
MALE	2170	0.44	0.10	0.00	0.91
INCOME	2170	0.60	0.14	0.00	1.00
AGE	2170	36.30	4.58	20.43	57.00

data were aggregated to provide an indication of news browsing for each county.[1]

We collected the website content bias data through a survey that was adopted from Pew Studies survey items. For each of the 200 news sites used in the ComScore browsing data, a panel of 30 raters was asked to spend a few minutes on each site and assess the extent to which the news source is biased using a 7-point scale (1 = not biased at all, 7 = very biased). Since the ratings might vary across the assessors, the ratings were normalized. For each news site, there were two raters, and various Cohens Kappa measures for inter-rater reliability were higher than 0.40, which is moderate and statistically significant (Landis & Koch, 1977).

The data on site popularity in the USA were collected using the "Traffic Rank in Country" measure, available on Alexa.com website. The rank of a particular website in a country is calculated using the average daily visitors and pageviews of the website by users from that country over a month. The site with the highest number of visitors and pageviews is ranked number one in that particular country.

The partisan attitude data was collected from the American National Election Studies (ANES). The survey provides a set of "feeling thermometer" questions on party identification to rate a respondent's feeling towards a political party on a scale from 0 to 100 for dislike to like. The difference score of two parties allows us to create an index ranging from -100 to $+100$ as a proxy for partisan attitude. For instance, a high negative or positive value indicates a strong preference for one party, whereas a small or zero value indicates a neutral preference.

Lastly, voting and demographic data for each county were obtained from the US Census and Current Population Survey (CPS). The CPS data provides voting turnout as a percentage of the number of total registered voters at the county level. The demographic information at the country level includes education, income, age, gender, and race.

4. Analysis and results

Table 2 shows descriptive statistics of the variables in the model. On average, the voting turnout per county is 68%. The feelings thermometer shows that the sample has a partisan attitude of 23.5 from 100, which shows a low average of partisan attitude in the sample. As for browsing behavior, the sample has an average of 3.96 minutes spent per site and an average of 1.95 visits per site. For website characteristics,

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[1]The ComScore data each subject's profile information includes zip code, which we used to identify county information to match a subject's demographic information to county data from US Census.

Table 3
Pairwise correlation of variables

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) VOTING_TURNOUT	1										
(2) PARTISAN_ATTITUDE	0.27	1									
(3) DURATION	0.25	0.06	1								
(4) FREQUENCY	0.24	0.09	0.23	1							
(5) SITE_CONTENTBIAS	−0.21	0.11	−0.24	−0.23	1						
(6) SITE_POPULARITY	0.17	0.07	0.19	0.17	0.15	1					
(7) POP	0.18	0.11	0.16	0.06	0.14	0.16	1				
(8) BLACK	−0.08	0.17	−0.11	−0.04	−0.03	0.08	0.14	1			
(9) MALE	0.15	0.10	0.17	0.01	0.12	0.11	0.07	−0.07	1		
(10) INCOME	0.12	−0.16	0.19	0.02	0.16	0.12	0.02	0.05	−0.01	1	
(11) AGE	0.15	0.00	0.22	0.06	0.05	0.08	−0.02	0.05	0.21	−0.09	1

*Note: All correlations more than 0.1 is significant at 0.001 level.

the average content bias is 3.45 out of 7, showing a neutral amount of bias; and an average country popularity rank of 25, which is a relatively high popularity average for a country. Lastly, the average demographic characteristics of the population in a county are black (14%), males (44%), and age (36.30 years old).

Table 3 displays the pairwise correlations between the variables. The browsing behavior variables have positive and significant correlations with the voting turnout (0.27 and 0.25, respectively). Website characteristics have a lower correlation with voting turnout than browsing behavior. While content bias is negatively correlated to voting turnout, popularity is positively correlated to voting turnout.

4.1. Estimation approach

The empirical model specifies browsing behaviour and voting turnout as dependent variables. Formal specification of our general model is as follows:

Browsing Behavior Model:

$$(BB\_Duration_i, BB\_NumberofWebsiteVisits_i) = \beta_0 + \beta_1 WebsiteCharacteristics_i$$
$$+\beta_2 PartisanAttitude_i + \beta_3 Demographics_i + \varepsilon_i, \tag{1}$$

Voting Turnout Model:

$$(Voting_i) = \beta_0 + \beta_1 BB\_HAT_i + \beta_2 PartisanAttitude_i + \beta_3 Demographics_i + \varepsilon_i, \tag{2}$$

To examine the research hypothesis, we use seemingly unrelated regression (SUR) models to estimate the β coefficients of the key parameters and employ robust standard errors. ε are disturbances associated with each observation. SUR models are used because they can address multiple dependent variables, and lead to efficient parameter estimates as compared to ordinary least squares (OLS) estimators. Our model is a two-stage model where browsing behavior variables are dependent variables in stage 1 and are independent variables in stage 2. The voting participation model uses predicted values of browsing behavior (i.e., Duration, Number of Website Visits) from the first stage model (BB_HAT).

Table 4 provides the main results of our hypothesis testing, which shows that all hypotheses are supported at both stages of the model. The first stage model explains around 30%–31% of the variance in the dependent variable; while in the second stage voting turnout model, the model explains 23% of the variance in the dependent variable.

Table 4
Key estimation results and support for hypotheses

Variables	Browsing behavior (1)		Voting turnout (2)
	DURATION	FREQUENCY	LN_VOTING
BB_HAT (DURATION, FREQUENCY)			2.847*** (0.03) *H5 Supported*
SITE_CONTENTBIAS	−2.878*** (0.28) *H1a Supported*	−1.861*** (0.17) *H1b Supported*	
SITE_POPULARITY	1.964*** (0.11) *H2a Supported*	1.729*** (0.10) *H2b Supported*	
SITE_CONTENTBIAS *SITE_POPULARITY	−1.517*** (0.08) *H3a Supported*	−1.083*** (0.05) *H3b Supported*	
PARTISAN_ATTITUDE	−0.108*** (0.02) *H4a Supported*	0.176*** (0.03) *H4b Supported*	1.274*** (0.04)
POP	0.028 (0.04)	0.075 (0.05)	1.153*** (0.03)
MALE	0.049 (0.05)	0.085 (0.12)	0.762*** (0.09)
INCOME	0.743*** (0.10)	0.993*** (0.05)	2.724*** (0.10)
BLACK	−0.031 (0.10)	−0.012 (0.08)	−0.002 (0.11)
AGE	0.257 (0.34)	0.314 (0.31)	1.113 (0.96)
R-squared	0.31	0.30	0.23
Observations	2170	2170	2170

Note: Robust standard errors in parentheses. Wald test was used to compare coefficients across two equations. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

From the first stage model, biased news sites (SITE_CONTENTBIAS) has negative and significant coefficient on both duration and number of visits to the website ($\beta = -2.878$, $p < 0.01$; $\beta = -1.861$, $p < 0.01$, respectively). For a one-unit increase in SITE_CONTENTBIAS of a news site, the duration is reduced by 2.878 minutes, and the number of visits to the website is reduced by 1.861 visits. These results support the acceptance of Hypotheses 1a and 1b. Furthermore, site popularity (SITE_POPULARITY) is significantly and positively associated with duration and number of visits to the websites ($\beta = 1.964$, $p < 0.01$; $\beta = 1.729$, $p < 0.01$ respectively). A one-unit increase in SITE_POPULARITY of a website will result in a 1.964 minutes increase in the time spent on the website and a 1.729 increase in the number of visits to the website. These results support the acceptance of Hypothesis 2a and 2b. In addition, the interaction of SITE_POPULARITY and SITE_CONTENTBIAS is significantly and negatively associated with both the duration and number of website visits ($\beta = -1.517$, $p < 0.01$; $\beta = -1.083$, $p < 0.01$, respectively). These results support the acceptance of hypotheses 3a and 3b.

Moreover, partisan attitude (PARTISAN_ATT) is significantly associated with the browsing behavior variables. In particular, partisan attitude is negatively associated with duration, and positively associated with the number of website visits ($\beta = -0.108$, $p < 0.01$; $\beta = 0.176$, $p < 0.01$, respectively). For a one-unit increase in PARTISAN_ATT of an individual, the duration is reduced by 0.108 minutes and the number of visits to the website is increased by 0.176 visits. These results support the acceptance of hypotheses 4a and 4b.

From the second stage model, BB_HAT is significantly and positively associated with the voting turnout ($\beta = 2.847$, $p < 0.01$). A one-unit increase in browsing behavior would lead to a 2.847% increase in voter turnout. This result supports the acceptance of hypothesis 5. Partisan attitude is also significantly and positively associated with the voting turnout, which is in line with previous studies (Fieldhouse & Cutts, 2016; Smidt, 2017). For demographic controls, while only income is significant at the first stage, income, population, and males are significant at the second stage, again these findings are in line with previous studies (Huff & Tingley, 2015; Leighley & Nagler, 2013).

5. Discussion

This study investigates how website characteristics and partisan attitudes impact browsing behavior and in turn, voting behavior. It adopts a research model and tests hypotheses derived from the theories of information utility and selective exposure. These findings provide interesting insights.

The first set of findings indicate the importance of website characteristics for browsing behavior in terms of content biasedness and website popularity. Biased news websites experience lower visiting times and fewer number of visits than the less biased news websites. On the other hand, popular websites experience higher visiting times and a higher number of visits than the less popular websites. As such, users associate credibility with news sites that are popular with other users. Furthermore, the study finds that popular biased websites experience lower visiting times, and a lower number of visits than the less popular websites do. This result implies that online users find websites, which are popular with other users to be credible. However, the credibility of a website tends to suffer as its content becomes more biased. This finding confirms the importance of providing diverse news content as a means for enhancing the usability of digital news. This finding also supports the proposition relating to the popularity of an information source to its credibility and utility (Waddell, 2018).

The second set of findings indicate that individuals with partisan attitudes differ in their news browsing behavior. Users with higher partisan attitudes visit a news website more often but spend less time in each visit than users with lower partisan attitudes. This finding demonstrates that although partisans continuously re-affirm their beliefs by frequently viewing digital news, they do not spend much time re-affirming the information content. The study further finds that partisan attitude is positively associated with the voting turnout. These findings confirm propositions linking partisans to seeking out more information to affirm political beliefs and to higher voting turnout (Weeks et al., 2017).

The study further finds that browsing behavior has a positive and significant impact on voting turnout. Individuals who exhibit higher browsing behavior have a higher tendency to vote than their counterparts who exhibit lower browsing behavior. This significant and interesting finding highlights the predominantly emerging role of digital information in political decision-making and asserts the critical impact of the Internet on civic participation (Boulianne, 2009; Halpern et al., 2017).

6. Implications

The findings of this study provide several theoretical and practical implications. This study contributes to the information utility literature by proposing and testing a model of voting turnout via website characteristics and browsing behavior. Framing website characteristics and browsing behavior as information utility to voting turnout are very useful with the elevated use of the Internet for political information. This study demonstrates that different information utilities lead to different browsing behavior outcomes,

which, in turn, potentially influence civic participation. This study is one of the first studies to use information utility in terms of website characteristics and browsing behavior to estimate voting turnout. The study also furthers selective exposure theory and describes how partisans browse news websites on the Internet and its impact on voting turnout.

The findings of this study provide immediate practical implications especially in contexts where voting is not voluntary. The study highlights the importance of news content providers and the role of website creators in terms of voting behavior. News content providers will attract more users when the information content provided is more diverse and balanced rather than biased. By making diverse news more accessible online, political information allows people to become more politically knowledgeable and can promote their civic participation (Porto, 2007). Political marketing campaigns and democratic advocates should try to collaborate with news content providers that are diverse and not biased. This will allow more users to browse their information, gain political knowledge and, in turn, participate in the political arena. Such a marketing campaign is usually targeted at biased news websites. However, this finding suggests that targeting more balanced news websites would be a better strategy. Political organizations should be aware that providing very biased content would attract partisans for only short periods to affirm their biased information, and not seek in-depth information. Therefore, political organizations' websites should focus on providing not only more diverse and balanced news to users but also on engaging them to access the information content further.

6.1. Limitations and future studies

The results of this study should be interpreted in light of its limitations. While this study finds a correlation between voters and the sites that they visit, the study is conducted on a temporal basis within a bigger cycle of mutually influencing variables. Political information and engagement will keep influencing each other therefore future studies should explore political information and engagement in a longer timeframe.

Another limitation of this study is that it uses "county" as a proxy for digital information because information on the voting turnout of the users browsing the news websites was not available in the analyzed secondary data sets. Although it would have been ideal to have particular users' voting turnout, we used voting turnout at the county level since counties are similar in demographics (Huff & Tingley, 2015). Future studies can examine the voting turnout of the same users that browsed digital information.

Furthermore, we did not control for news that users could have attained from offline sources. Yet some offline sources could have had an impact on users' voting behavior. Also, this study only investigated two website characteristics: popularity and news bias. Other website characteristics, such as navigating site features and patterns of interactions among the users within a particular website, may have an impact on both the information utility gained and the voting turnout. Future studies may, therefore, investigate and compare the impact of online and offline news sources on voter turnout as well as explore the possible impact of other website characteristics on browsing behavior and voting turnout.

7. Conclusion

Web 2.0 and digital information has dramatically altered the way individuals gather and behave towards political information and ultimately, political participation. Understanding the impact of digital information on political participation is crucial to the effectiveness of political campaigns. This study explores an understudied factor of digital information, the impact of website characteristics, and partisan

attitude on browsing behavior and voting turnout. The current study adopts a research model derived from theories of information utility and selective exposure. The results highlight the importance of a balanced news website as compared to a biased one, not only for voting turnout but also for attracting users to the news website itself. Users find popular websites to be credible. This credibility, however, suffers when the website content is biased. While partisans visit websites more frequently than others do, they do not expose themselves as much to information and have shorter website visits. The results provide useful insights to researchers, news content providers, and political organizations. To broaden our understanding of digital news consumption behavior and its influence on political engagement, researchers may identify and explore other factors influencing browsing behavior and political participation. Research results should guide Web news designers' efforts to build news sites and provide informative content that positively influences users' browsing behaviors and enable them to be politically engaged.

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