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ABSTRACT

In a high-choice media environment, there are fears that individuals will select media and content that reinforce their existing beliefs and lead to segregation based on interest and/or partisanship. This could lead to partisan echo chambers among those who are politically interested and could contribute to a growing gap in knowledge between those who are politically interested and those who are not. However, the high-choice environment also allows individuals, including those who are politically interested, to consume a wide variety of media, which could lead them to more diverse content and perspectives. This study examines the relationship between political interest as well as media diversity and being caught in an echo chamber (measured by five different variables). Using a nationally representative survey of adult internet users in the United Kingdom ($N = 2000$), we find that those who are interested in politics and those with diverse media diets tend to avoid echo chambers. This work challenges the impact of echo chambers and tempers fears of partisan segregation since only a small segment of the population are likely to find themselves in an echo chamber. We argue that single media studies and studies which use narrow definitions and measurements of being in an echo chamber are flawed because they do not test the theory in the realistic context of a multiple media environment.

Introduction

The idea of an 'echo chamber' in politics is a metaphorical way to describe a situation where only certain ideas, information and beliefs are shared (Jamieson & Cappella, 2008; Sunstein, 2009). People inside this setting will only encounter things they already agree with. Without free movement of ideas and information people inside the echo chamber will believe that this is all there is. Under these circumstances, anyone who disagrees is misinformed at best and willfully ignorant at worst. Through opportunities to select information and communities which support existing beliefs as well as through algorithmic personalization, some worry that the Internet may make it easier for citizens to find themselves in an echo chamber. Some fear that segregation by interest or opinion

will exacerbate the gap between those who are informed about politics and those who are not, increase political polarization which will reinforce political divides, and threaten democracies by limiting political information and discussions (Ksiazek, Malthouse, & Webster, 2010; Prior, 2007; Sunstein, 2009).

The Internet creates a high-choice media environment where individuals may access news and political information from a diverse array of media and sources (Van Aelst et al., 2017).[1]

Since people can select their information sources, the Internet may foster an environment where echo chambers are more common and dangerous. Unlike in low-choice environments, today individuals may access news and political information from social media, search, online, and offline versions of newspapers, television broadcasts, radio, and so on. Thus, there are two possible outcomes from a diverse media environment. Individuals may be exposed to information and perspectives which are also diverse or they may select varied media in a way that produces the echo chamber effect. To date, evidence has been conflicting. Examinations of selective exposure have shown that individuals do tend to expose themselves to information and ideas they agree with more often (Iyengar & Hahn, 2009; Lawrence, Sides, & Farrell, 2010) but they do not tend to avoid information and ideas which are conflicting (Garrett, 2009). Even among partisans in the US, the media diet of Republicans and Democrats is in fact quite similar (Weeks, Ksiazek, & Holbert, 2016). While some have found evidence of echo chambers on Twitter (Barberá, Jost, Nagler, Tucker, & Bonneau, 2015; Conover et al., 2011; Himelboim, McCreery, & Smith, 2013), others have shown that the trend does not persist on Facebook (Bakshy, Messing, & Adamic, 2015; Goel, Mason, & Watts, 2010).

Beyond conflicting evidence, there are two key methodological issues with how echo chamber work has been conducted. First, many studies are single platform and this severely limits their generalizability. Even if Twitter is polarized (e.g., Conover et al. 2011), it is only one part of a much larger media environment. Individuals tend to use multiple media to access news and political information (Ahlers, 2006; Dutton, Reisdorf, Dubois, & Blank, 2017; Newman, Fletcher, Kalogeropoulos, Levy, & Kleis Nielsen, 2017) and the characteristics of Twitter or any other single medium may not give us useful information about how political information flows across offline media or other online media. It is important to consider the entire range of media individuals use in this high-choice media environment.

Second, measurement of echo chambers has been inconsistent and insufficient for the complex ways individuals can actually use the assortment of media they have access to. Measuring exposure to conflicting ideas on a single platform or medium does not account for the ways in which individuals collect information across the entire media environment. For example, someone might learn about an issue on Facebook which they fact-check using search. We argue that to understand whether a person is in an echo chamber, it is important to consider how they interact with their entire media environment. Incorporating more than one measure also helps respond to the known problem that individuals tend to overestimate how often they see conflicting views in their political information-seeking practices (Prior, 2009).

In order to understand echo chamber effects in a high-choice media environment, we draw on a nationally representative survey of adults in the UK. We examine self-reported political interest and diversity of media across many different channels of political

information. The following section reviews past work related to selective exposure and echo chambers before reviewing our key independent variables: media diversity and political interest, and dependent variables: acts individuals take which prevent/avoid being caught in echo chambers. We then review our survey methodology. Next, we analyse the effect of political interest and media diversity on echo chambers using multiple regression analysis. We conclude with a discussion of the importance of considering the entire media environment when assessing the news and political information-seeking practices of individuals.

Background

The internet and echo chambers

Echo chambers occur when people with the same interests or views interact primarily within their group. They seek and share information that both conforms to the norms of their group and tends to reinforce existing beliefs (Jamieson & Cappella, 2008; Sunstein, 2009). That social psychology has long shown this tendency to associate with like-minded others is common cross-culturally. However, there is new fear that the current media system is helping people enter echo chambers more easily than ever before.

Psychological and social psychological research in the 1950s found that people tend to avoid dissonance and gravitate towards agreement (Festinger, 1957). It is related to concepts such as groupthink (Janis, 1982) and selective exposure theory (Klapper, 1960). On social media, there are related theories about homophily; the tendency to form social ties with similar others (McPherson, Smith-Lovin, & Cook, 2001).

There are two main ways that the Internet and related technologies might support the development of echo chambers: allowing individuals to make choices that reinforce existing preferences and algorithmic filter bubbles. The filter bubble argument suggests algorithmic filtering which personalizes content presented on social media and, through use of search engines, could exacerbate the tendency for people to select media and content which reinforce their existing preferences (Pariser, 2011). We are primarily concerned with the choices individuals make in their news and political information-seeking practices in this study rather than the impact of algorithmic filtering.

Reinforcing existing preferences

In communication and media studies, fragmentation and polarization are key features of audiences which are relevant for discussions of how individuals might reinforce their existing preferences (Webster, 2005). 'Fragmentation describes a process by which the mass audience, which was once concentrated on three or four viewing options, becomes more widely distributed' (Webster, 2005, p. 367). Polarization occurs when audiences diverge and are segmented based on an issue or interest (Sunstein, 2002). In a high-choice media environment, individuals can select media and content from a wide range of options, which means audiences are fragmented and potentially polarized based on preferences which drive individuals' choices (Prior, 2007; Sunstein, 2002; Webster, 2005). More recently, the term echo chamber has become a popular description of this basic mechanism.

There are two concerns about segmentation when it comes to political information and news. The first is a divide between those who are informed and those who are not

informed about politics. The second is political polarization among those who exhibit at least minimal political interest or awareness. Since democratic political systems require people talk to each other to work out compromises and/or to become informed, the emergence of an echo chamber could have serious negative consequences.

Research into fragmentation, polarization, and echo chambers has surfaced conflicting results. While audiences are fragmented, most individuals continue to rely on at least some more general sources of news and political information such as non-partisan newspapers (online and offline) or television broadcasts (Newman et al., 2017; Weeks et al., 2016). Furthermore, when selecting media, individuals may choose to access information that confirms their beliefs more frequently but they are less likely to actively avoid information that contradicts their views (Garrett, 2009).

Similarly, though there is evidence of polarization in some media, such as partisan news websites, blogs, and some social media (Conover et al., 2011; Lawrence et al., 2010), these are not the only or even the main sources of news and political information the general public report relying on (Newman et al., 2017). Even considering social media, which show the clearest evidence of echo chambers, most individuals are in fact exposed to a variety of views and sources of political information (Messing & Westwood, 2014). That said, Bakshy et al. consider the case of Facebook and show that while individuals may be exposed to heterogonous information they are more likely to click on stories which are in line with their existing views than those which are in opposition (2015).

One reason past work reports conflicting results is that much echo chamber research has been focused on only a limited number of social media platforms, often Twitter. Single-platform studies are problematic because political information and news is rarely sought from a single platform in a high-choice media environment. There is also experimental evidence that people put more effort into thinking about information that comes from multiple sources instead of just one source. People appear to believe that information from multiple sources is more likely to be reliable, and thus worth more serious consideration, than is information that comes from only one source (Harkins & Petty, 1987).

To date, evidence-based studies of echo chambers have mostly been based on studies of political polarization in social media, especially Twitter (e.g., Adamic & Glance, 2005; Himelboim et al., 2013). A typical paper is Conover et al. (2011), which applies network methods to data from the US to show that Democrats' and Republicans' Twitter networks are mostly separate.

However, Twitter itself is used by a relatively small proportion of the population, about one-quarter of the UK, which is younger, wealthier, and better-educated than Britain as a whole (Blank, 2017). It is an influential segment, but it is not representative of the British population or British voters. Furthermore, social media is consistently the least trusted medium in cross-national studies (e.g., Dutton et al., 2017).

Ultimately, there is little agreement about the extent to which echo chambers form, whether they persist across media, and what their democratic impact is.

Media diets in a high-choice environment

In the current media environment, individuals may access political information through a wide variety of channels such as via television, radio, social media, search, online news

sites, and face-to-face communication to name a few (Van Aelst et al., 2017). They may choose to combine these media or use them singularly. These media are diverse and at times overlapping.

Importantly, individuals consume news and political information in a patterned way. Individuals tend to develop *media habits* which are repeated media consumption behaviours (LaRose, 2010) and *news or political information media repertoires*, which is the collection of media an individual uses to access news and political information regularly (Heeter, 1985; Wolfsfeld, Yarchi, & Samuel-Azran, 2016). Research has convincingly argued that, given multiple media to choose from individuals tend to habitually make use of a smaller subset of media available (Heeter, 1985; Wolfsfeld et al., 2016). These repertoires differ in terms of how many media are included, which media, and how those media might be combined. We call the regular, daily set of media individuals use their media diet.

Individuals tend to use multiple media to access news and political information (Dutton et al., 2017; Newman et al., 2017). For example, just 2% of individuals in the US rely only on social media for news (Newman et al., 2017). Furthermore, social media, search engines, and news aggregators are becoming increasingly popular as a way to access news cross-nationally, with 65% of the cross-national sample in the Reuters Digital News (2017) survey reporting a preference for accessing news brands indirectly. That said, going directly to a news source such as the BBC remains more common in the UK (Newman et al., 2017).

Notably, not all media are used in the same way or provide the same type of political information. For example, Nikolov et al. show that social media provide a narrower array of political content than search engines (2015). Indeed, a news consumer has no control over what a television news programme displays in contrast to their own Twitter feed which they can curate at a granular level. Similarly, newspapers are often broad in topical scope while personalized and niche content is more readily available via various social media sites and online news aggregators.

The media individuals select is often related to their political engagement and their partisan preferences. Stroud shows that the media individuals choose to incorporate into their media diets can be predicted by their partisan pre-dispositions (2008). Similarly, in a survey of Americans, television and magazine news consumption were found to be strongly related to increased civic participation while Internet-based news consumption was not (Ksiazek et al., 2010). Although Ksiazek et al. (2010) treat the Internet as a single monolithic medium, others have since attempted to tease out differences across Internet-enabled media. Scholars have commonly compared social to traditional media, acknowledging that traditional media may be accessed via websites. Social media, search engines, and online newspapers each play a potentially varied and important role. A core problem with this line of research is that most studies select only one or a few media to focus on and so the comparative utility or effects of use of media in a diverse media environment are unclear.

Relatedly, some media are valued and/or trusted more than others. For example, interviews with Canadians who actively discuss politics on Twitter showed that these individuals rely on mainstream news media and face-to-face conversations with friends when seeking information about a political issue they think is important instead of posts on Twitter and Facebook, despite themselves contributing posts online (Dubois, 2015).

Cross-national surveys also suggest people tend to trust social media less than other sources for news (Dutton et al., 2017; Newman et al., 2017).

By examining the media diets of citizens, we can gain a better understanding of how the many media in a high-choice media environment are integrated into daily life. We use the diversity of media as a main independent variable. In fact, educational media literacy campaigns often suggest that relying on more than one medium is an important way individuals can avoid echo chambers. This mechanism has been implied in much work on media literacy yet has not been clearly tested. We do this as we consider how different media are used in conjunction with one another, such as fact-checking, in order to establish a more nuanced set of measures for identifying when individuals are caught in an echo chamber or not. These and other variables are described below.

Media diversity

Media repertoires can differ in terms of how many media are included, which media, and how those media might be combined. Media diversity, a key independent variable in this study, is concerned with the number of media in a person's' repertoire. The greater the number of media a citizen uses the more the opportunity to be exposed to differing political opinions and news. Citizens could exist within a cross-platform echo chamber; however, this is unlikely for several reasons.

First, even individuals who have strong partisan affiliation report using both general news sites (which are largely non-partisan and include a variety of issues) and niche news sites (which may be partisan or focused on specific issues) – Republicans and Democrats have media diets which are quite similar (Weeks et al., 2016). Second, it is possible to be incidentally exposed to political information and news whether you are interested in it or not (Wojcieszak & Mutz, 2009). Third, not all media are used in the same way and for the same content, which means that as media diversity increases, there is also an increase in the diversity of content. While one might receive primarily left-leaning political content on Twitter, they may be incidentally exposed to a right-leaning perspective from a family member on Facebook or they might hear a debate between representatives from various perspectives on a television news broadcast.

This leads us to propose our first hypothesis,

> **H1:** The more diverse media that individuals are exposed to, the less likely they are to be in an echo chamber

Political interest

Political interest is associated with higher than average news and political information consumption (Boulianne, 2011). Strömbäck et al. show that news polarization in Sweden is increasing over time and that political interest is a key driver for news consumption (2013). Others note that as news consumption increases so do the number of media an individual incorporates into their diets (Ksiazek et al., 2010; Yuan, 2011). As Prior argues, political 'junkies' are likely to consume a lot of information and therefore may encounter more perspectives and arguments (2007).

Importantly, individuals are less likely to avoid conflicting opinions and information when they see value in being exposed to those ideas (Knobloch-Westerwick & Kleinman,

2012; Valentino, Banks, Hutchings, & Davis, 2009). People who are politically interested often want to understand political situations in detail and understand alternative perspectives. For these people, there is value and relevance in avoiding echo chamber.

This leads us to our second hypothesis:

H2: The higher a person's level of political interest the less likely they are to be in an echo chamber

Interacting in the environment in ways that avoid echo chambers

In studies of echo chambers, the dependent variable is commonly conceptualized as whether or not people are exposed to contrasting views from their own.

This is problematic because people have a hard time recalling when they have been exposed to different ideas and so survey research is potentially flawed (Prior, 2009). Trace data approaches have emerged as a response to this self-report bias problem but are also limited because it is hard to measure the type of information and/or partisan leaning of content accessed across platforms (Wesler, Smith, Fisher, & Gleave, 2008). As such, single-platform studies are common. But, being presented with confirmatory opinions on one platform does not mean other platforms are not used by individuals to help them avoid being caught in an echo chamber. While our study is limited by self-report, we work to address these concerns. We consider the wide variety of media accessible to citizens. We also conceptualize our dependent variables in terms of not only what information people are exposed to but whether or not they take acts to avoid echo chambers. By using five proxy variables, we are able to offer multiple perspectives on whether a respondent is in an echo chamber. If they agree, we can have higher confidence in our findings.

The data

We use data from the Quello Search Project, a study of media use and politics collected in January 2017 in the United Kingdom. The 2000 cases are a random sample of the online population of Britain, including England, Scotland, Wales, and Northern Ireland. Poststratification weights are used to re-weight them to census proportions for age, gender, and region. The data collection was funded by Google, although Google has had no access to this paper prior to publication.

Variables and measurement

As control variables, we include six demographic variables: age, gender, marital status, education, income, and lifestage. As additional controls, we use a left-right political position variable and a self-report of skill using the Internet. Political interest is measured by an item asking 'How interested are you in politics?' Responses were measured on a 4-category Likert scale from 'No interest at all' to 'very interested'. Media diversity was measured with two variables. First, the questionnaire asked 'When looking for information about POLITICAL news, issues, or elected officials, how often do you go to … ' Responses were measured on a 5-category Likert scale from 'Never' to 'Very often'. This item was used for 12 media, 6 online and 6 offline. The 12 items were formed into a scale by

summing the responses, yielding a range from 0 to 48. We tried separating online and off-line media use, but they are highly correlated and they cause collinearity problems in the models reported below. Since we could not put them both in the same model, we only use the combined measure of total media diversity. Second, since social media are an important source of political news, particularly for certain groups, we measured it separately. Our measure of social media use is a count of the number of sites on which a respondent has a profile; so the variable ranges from 0 to 12. There is a relationship between political interest and media diversity but the Pearson product moment correlation is relatively small, about 0.43, and it does not cause collinearity problems.

We used five different dependent variables, each of which measures different aspects of an echo chamber. Each variable measures the extent to which people are exposed to different opinions, i.e., the extent to which respondents find themselves in an echo chamber. All are based on five-category Likert scales; so they measure the extent to which a respondent reports being in an echo chamber. For the first three items, the stub was 'When looking for news or political information, how often, if ever, do you … '. Each of the following four items follow that stub and are used as dependent variables. They are

(1) 'Read something you DISAGREE with?' (which we call 'Disagree');
(2) 'Check a news source that's different from what you normally read?' (which we call 'Different');
(3) 'Try to confirm political information you found by searching online for another source?' (which we call 'Confirm').
(4) 'Try to confirm political information by checking a major offline news medium?' (which we call 'Offline')

The fifth dependent variable, which we call 'Changed', is about opinion change:

(5) 'Thinking about recent searches you have done online using a search engine, how often have you discovered something that CHANGED your opinion on a political issue?'

All dependent variables are coded so that *lower values* mean the respondent is *more likely* to be in an echo chamber. This coding implies that, in the regressions, negative coefficients of the independent variables mean a respondent is more likely to be in an echo chamber; positive coefficients mean they are less likely.

These variables complement each other in several ways. The variable Disagree measures how often respondents encounter contrary opinions or information. This is closest to the standard measures of being in an echo chamber used in previous works. It is a passive measure of coming across conflicting information without actively seeking it. The variable Different measures the extent to which respondents expose themselves to unfamiliar publications, possibly containing new or different information. The variables Confirm, Different, Changed, and Offline measure the extent to which respondents have taken action to actively remove themselves from an echo chamber. By using all five dependent variables, we have a much more comprehensive view of possible echo chambers than other research. This comprehensive view is directly responsive to the increasingly complex media habits and repertoires of individuals.

Results

Our five dependent variables have reasonable distributions (see Figure 1), largely symmetric and well-spread across the entire range of possible values. The symmetry is noteworthy because it indicates the portion of the population who are less likely to be in an echo chamber. The exact proportions vary across the five variables, but in general about the same proportion are on the right side of the centre as on the left side.

To address our main hypotheses, we used hierarchical regression models. First we entered all of our control variables. In the second step, we entered our three variables measuring political interest and media diversity. Table 1 contains standardized regression coefficients for the five regressions containing only control variables. The results are fairly consistent across all five dependent variables. Skills and political participation are always significant. Age is significant and (as expected) negative for three variables. Gender, marital status, life stage and right-left political orientation are each significant only once. Income and education are not significant. The R^2s range from 11% to 23%. We lose over 500 cases because of missing data. This is due mostly to the income and right-left politics variables, where there are a large number of people who did not respond (about 350 respondents). Because of the missing data, we remove income and right-left politics from the remaining regressions. Including them does not change substantive results or interpretations of the remaining regressions.
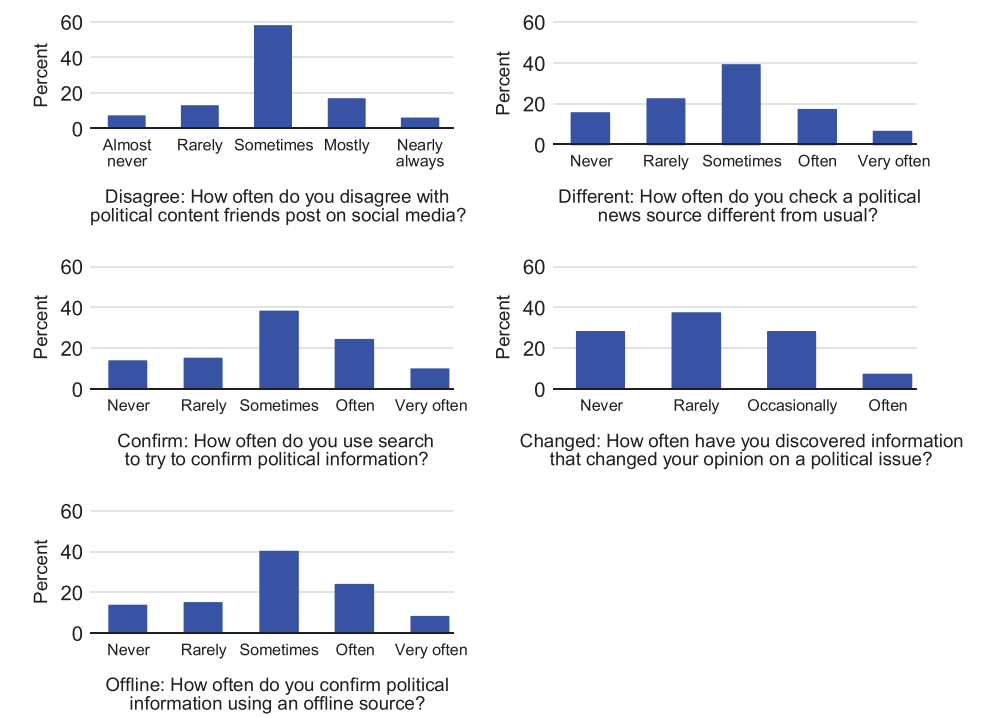

Figure 1. Distributions of dependent variables. Source: Quello Search Project, UK data, N = 2000.

Table 1. Control variables only.

	Disagree	Different	Confirm	Change	Offline
Age	−0.02	−0.14***	−0.20***	−0.20***	−0.07
Gender	0.06*	−0.02	0.03	−0.04	0.04
Marital status					
Married	−0.02	0.01	0.01	0.03	−0.02
Living w partner	−0.02	−0.01	−0.01	−0.03	−0.05
Divorce/separated	0.03	−0.02	−0.04	−0.06*	−0.07*
Widowed	−0.02	−0.02	0.00	0.00	−0.05
Lifestage					
Employed	0.14	0.15*	0.1	0.03	0.15*
Retired	0.14	0.07	0.08	0.01	0.14*
Unemployed	0.09	0.04	0.04	0.00	0.10*
Education level	0.00	−0.01	0.03	−0.01	0.04
Income	0.05	0.00	−0.03	0.00	0.00
Right-left politics	0.04	0.06*	0.03	0.04	0.05
Skills	0.13***	0.19***	0.22***	0.14***	0.19***
Political participation	0.27***	0.29***	0.26***	0.25***	0.24***
N	1454	1448	1458	1434	1461
Adjusted R^2	0.11	0.23	0.22	0.19	0.14

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$; OLS regressions presenting standardized beta coefficients; Omitted categories are single and student.

Table 2 adds the variables measuring media diversity and political interest. These new variables change the results considerably. First, the R^2s generally double in size, increasing by between 12 and 22 percentage points. Second, both skills and political participation become less significant and weaker. They are not significant at all in the Change regression. Age also becomes weaker and it is no longer significant in the Different regression.

The media diversity variables have strong effects. They are always significant. Media diversity is particularly noteworthy because it has by far the strongest effects. It is between two and six times stronger than the second strongest variable in the model. Since the

Table 2. Adding political interest and media diversity.

	Disagree	Different	Confirm	Change	Offline
Age	0.04	−0.03	−0.09*	−0.09*	0.04
Gender	0.04	−0.02	0.02	−0.02	0.04
Marital status					
Married	−0.02	0.01	0.01	0.01	−0.02
Living w partner	−0.02	−0.01	0.01	−0.02	−0.02
Divorce/separated	0.01	−0.01	−0.02	−0.05*	−0.05
Widowed	−0.01	−0.01	0.01	−0.01	−0.04
Lifestage					
Employed	0.02	0.01	−0.05	−0.07	−0.02
Retired	0.03	−0.05	−0.06	−0.08	−0.02
Unemployed	0.03	0.02	−0.02	−0.05	0.03
Education level	0.02	0.01	0.03	0.01	0.05*
Skills	0.05*	0.08***	0.10***	0.03	0.07***
Political participation	0.09**	0.07**	0.05*	0.04	0.01
Political interest	0.15***	0.05*	0.10***	0.04	0.13***
Media diversity	0.31***	0.50***	0.41***	0.44***	0.47***
Social media diversity	0.08**	0.07**	0.11***	0.08**	0.08**
N	1793	1797	1801	1752	1806
Adjusted R^2	0.23	0.44	0.40	0.34	0.36

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$; OLS regressions presenting standardized beta coefficients; Omitted categories are single and student.

media diversity variables are always positive, respondents who have more diverse media habits are less likely to be in an echo chamber. This confirms hypothesis 1.

Political interest is significant for four of the five dependent variables; only for Change it is not significant. It is stronger than social media diversity in the Disagree, Confirm, and Offline models. Since it is positive, respondents who are more interested in politics are less likely to be in an echo chamber. This confirms hypothesis 2.

These results raise two possibilities. First, that respondents with no political interest are in an echo chamber. We examine this possibility using the regressions in Table 3. The results in this table are based only on the respondents who said they had 'No interest at all' in politics, $N = 243$. With so few cases, the results are not very stable, but they follow the same broad pattern that we have seen in prior regressions. Social media diversity is no longer significant but media diversity remains positive, significant, and strong; so even respondents with no political interest are less likely to be in an echo chamber when they have diverse media habits. Because of this strong variable, the R^2s remain high.

The second question is whether these relationships continue to hold for respondents at the ends of the political spectrum. In other words, it may be that these relationships hold for people who are in the political middle, but that respondents who are on the extreme left or the extreme right of the political spectrum are more likely to be in an echo chamber. We repeated these regressions separately (1) for respondents who said they were fairly or very right wing ($N = 273$) and (2) for respondents who said they were fairly or very left wing ($N = 393$). We do not show these two tables of regression results because they duplicate the results in Tables 1–3. On both ends of the political spectrum, political interest, media diversity and social media diversity remain strong, generally significant and positive. Media diversity is always significant and always the strongest coefficient in all models. In short, hypothesis 1 and hypothesis 2 continue to be confirmed no matter how we slice the data.

Table 3. Respondents with 'no interest at all' in politics.

	Disagree	Different	Confirm	Change	Offline
Age	−0.11	−0.27**	−0.21*	−0.19*	−0.15
Gender	−0.01	−0.07	−0.03	−0.10	−0.06
Marital status					
Married	0.04	−0.03	0.02	0.20*	−0/05
Living w partner	0.06	−0.05	0.03	0.15	0.07
Divorce/separated	−0.09	−0.01	−0.02	0.00	−0.05
Widowed	0.09	0.03	0.11	0.06	0.10
Lifestage					
Employed	0.15	0.21	0.24	−0.08	0.25
Retired	0.26	0.17	0.09	0.04	0.12
Unemployed	0.11	0.18	0.24	−0.11	0.22
Education level	0.09	0.09	0.08	0.02	0.05
Skills	−0.02	−0.02	−0.09	0.07	−0.78
Political participation	0.16*	0.12	0.12	0.00	0.10
Media diversity	0.37***	0.49***	0.42***	0.41***	0.51***
Social media diversity	0.03	0.01	0.09	0.09	−0.02
N	197	203	202	186	203
Adjusted R^2	0.29	0.45	0.42	0.35	0.40

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$; OLS regressions presenting standardized beta coefficients; Omitted categories are single and student.

Discussion

The main point that comes out of these regressions is that, regardless of how we measure the presence of an echo chamber, greater interest in politics and more media diversity reduces the likelihood of being in an echo chamber. These results are strong and consistent and this confirms both hypotheses.

It is evident that media diets and choices matter when it comes to assessing the threat of potential echo chambers. Supporting our first hypothesis, we have shown that the number of media an individual chooses to incorporate into their habits is related to their likelihood of becoming caught in an echo chamber. Having a diverse media diet is a step towards exposure to diverse information and perspectives. Individuals may expose themselves to these viewpoints in a range of ways, from passively encountering information they disagree with, to actively checking multiple sources or using other media to verify information. In each case, we have found that media diversity predicts acts which help the individual avoid an echo chamber. Supporting our second hypothesis, we have shown that greater interest in politics also reduces the likelihood of being caught in an echo chamber.

Whatever may be happening on any single social media platform, when we look at the entire media environment, there is little apparent echo chamber. People regularly encounter things that they disagree with. People check multiple sources. People try to confirm information using search. Possibly most important, people discover things that change their political opinions. Looking at the entire multi-media environment, we find little evidence of an echo chamber. This applies even to people who are not interested in politics. Thus, the possibility of being in an echo chamber seems overstated. Of course, there are a small number of individuals with both very low interest in politics and low media diversity for whom being stuck in an echo chamber is more likely. We discuss this segment of the population below but we first review theoretical and methodological implications of our findings.

Echo chamber theory in a high-choice media environment

Past work on echo chambers, selective exposure to news and political information, and political polarization narrowly define and measure likelihood of being in an echo chamber. These studies focus on exposure to different ideas whether it be through a self-report survey or through analysis of trace data from a social media platform such as Twitter. In line with this work, we have included exposure to different ideas as a dependent variable but we push beyond this narrow conceptualization and operationalization of the term.

A high-choice media environment does not simply mean that individuals develop strategies to deal with the many media options available, though of course they do so as they develop their news and political information repertoires (Webster & Ksiazek, 2012). People also develop strategies for making use of different media, often in complementary ways (e.g., checking a story using a different media). Consequently, focusing only on whether or not someone is exposed to differing views is a flawed approach because it does not consider the nuanced and possibly strategic use of multiple media in a high-choice environment. Exposure to different ideas is one proxy for likelihood of being caught in an echo chamber but so too are acts individuals take which can, intentionally or

otherwise, help them avoid echo chambers. We consider the acts individuals can take to avoid echo chambers as they choose which media to use and how to use them in a high-choice media environment. We use these acts as a proxy for likelihood of being caught in an echo chamber. This is because news and political information seeking are a complex set of communication practices which should be studied across platforms (Garrett et al., 2012) and a simple measure of exposure, particularly when few or even one media source is considered or recalled, cannot capture the notion of an echo chamber.

Future work on echo chambers should consider the various types of choices individuals can make in this high-choice media environment, including the diversity of media they make use of and the consequences of that diverse use in terms of how and when different media are combined. Future studies might draw on the idea of dual-screening (Vaccari, Chadwick, & O'Loughlin, 2015), individuals' fact-checking practices, and other ways in which individuals use media in complementary ways as they seek out news and political information.

Measuring echo chambers in a high-choice environment

Most individuals make use of multiple media in their news and political information-seeking practices, which means that single-platform studies are insufficient for assessing the threats of echo chambers in the context of a high-choice media environment. The risk of echo chambers is that they divide society into groups of people who are informed and people who are not and/or across partisan lines. This societal threat can only be assessed if the multiple media individuals often rely on are considered together.

It seems likely that networks on Twitter are polarized, as Conover et al.'s results show (2011), and networks on other social media may be equally polarized. But social media are only part of the environment, and they are the least trusted part. Political information can be sourced through many media channels, including political websites, websites of offline magazines and newspapers, offline print media, and above all television. Twitter may be a place where individuals talk to people with the same political opinions. But a study of Twitter says little about the political information one is exposed to when they watch CNN or BBC news, or visit the Economist website or the *Washington Post*. These are places where individuals may be exposed to a wider variety of information and political views. This suggests that future research could profitably focus on the complex ways that people interact with all forms of online and offline media.

Those who are likely caught in an echo chamber

Our results suggest that people who are both not politically interested and who do not use diverse media are more likely to be in an echo chamber. They are less likely check multiple sources or to discover things that change their minds. This is an argument that an echo chamber exists, but for a subset of the population. While it is concerning that some individuals are likely to be caught in an echo chamber, it is worth noting that this segment of the population is quite small. In our data of 148 respondents, about 8%, have media diversity scores of 10 or less (out of a possible maximum of 48) and also say they are not interested in politics.

Furthermore, though this 8% of the population may be more likely to be caught in an echo chamber, they may also benefit from friends and family who have more diverse media diets and who are interested in politics. Katz and Lazarsfeld famously identified the opinion leader who is found in every social stratum and who is an above-average consumer of news media (1955). The opinion leader shares political information and opinions with their everyday associates who are normally less interested in politics and who normally consume less news. Their opinion is one that people who are less interested in politics may listen to and heed. Though we cannot test this idea in the present study, this could be a way that people who are less interested in politics escape an echo chamber. Notably, there is an outstanding research question as to what opinion leaders choose to share, with whom, and in what contexts.

Finally, this evidence that an echo chamber may exist for a portion of the population does suggest that increased media literacy can help people learn to avoid echo chambers. Within media literacy campaigns it is common to suggest that individuals should not rely solely on social media. These claims are correct; people with greater media diversity do better at avoiding echo chambers. This presents an opportunity for future work to examine the kinds of media choices that are most effective, which can in turn inform policy and educational campaigns. This work would serve efforts at increasing media literacy and shed light on ways we might combat echo chambers that exist for the relatively small proportion of individuals who are neither interested in politics nor use a diversity of sources currently.

Broader implications

This study has two broader implications. First, the definition and measurement of being in an echo chamber has so far been overly narrow. This narrowness is a potential challenge for other examinations of political communication theories. Second, single medium studies are not useful to generalize to the broader media environment. Both relate to the fact that, despite touting the potential of the Internet to expand media and communication possibilities, researchers often overlook this complexity when it comes to understanding the political communication practices of individuals and the implications of those practices.

Indeed, even the conceptualization of an echo chamber is rooted in an assessment of an Internet-enabled, high-choice media environment, which affords individuals the opportunity to choose among a variety of media in order to serve their own needs and preferences. Yet, empirical work has too often used overly narrow definitions of being caught in an echo chamber, which do not actually encompass the choices individuals can make. We need to consider factors such as what and how many media people choose, how they choose to use them, and whether this use is overlapping and complimentary. The likelihood of being caught in an echo chamber should be assessed by more than a single-self report of exposure to different ideas or trace data from a single platform. Instead, we need to take a multi-perspective approach which considers the ways individuals actually use media in this high-choice environment.

Similarly, studies of a single medium, especially popular studies of a single social network site, are of limited value. Consider that in our data, young respondents (aged 18–34) say they have accounts on an average of five social media. Studying one of those five social

networking sites, no matter how large the dataset, remains a single case study. Though valuable for other purposes, they do not help us understand the other four social media, nor does it help us understand how they consume other online and offline media. The value of studies of a single medium is waning. Unless we have a special theoretical justification, we should stop doing them.

As researchers, we sometimes do not act as if we believe that the Internet and related technologies have expanded communication possibilities in a meaningful way. If we believed it we would study individuals and their choices in this environment in all its multiple media glory.

Note

1. We choose to use the term 'media environment' to represent the collection of media available and their interactions. This is essentially the setting in which individuals make choices about their media use. Others use the terms 'media ecosystem' or 'media ecology', which emphasize the interrelated nature and importance of interactions among media in a system. For our purposes, we see these terms as roughly interchangeable with 'media environment.' Each term aims to capture the environment which individuals find themselves in, we select one for consistency.

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