Major concerns have been raised over the impact of fake news, echo chambers and filter bubbles. But how pervasive are these problems? What proportion of internet users are susceptible to such sources of disinformation? Based on a seven nation comparative survey of internet users, we have identified those most likely to be vulnerable to the different but related risks of fake news, echo chambers and filter bubbles. Counter to widespread expectations, we find only a small proportion of internet users are likely to be at risk in these countries.

In seeking to identify those internet users who are vulnerable, statistical tendencies conform with general expectations of older users with less education and lower incomes being among those most susceptible. However, there is also evidence suggesting that some individuals in nearly all demographic groups can be among the vulnerable and fall through the cracks. Finding the vulnerable to be limited in scale, but scattered across major demographic categories, we argue against an aggressive awareness campaign targeting the most vulnerable, in favour of nudging all internet users to be aware of vulnerabilities and how to avoid them.

**INTRODUCTION**

Concerns continue to mount over potential threats to democratic structures and processes from disinformation circulated via the internet and social media. The major threats include the dissemination of fake news, the potential for personalised news and social media feeds to create filter bubbles, and the tendency for users to network with like-minded individuals in ways that trap them in virtual echo chambers. Each threat could distort what people know about politics and therefore undermine the choices they make as citizens and voters. Many efforts by internet service providers, social media platforms and the press are underway to address these threats. However, what should be done needs to be calibrated to the scale and distribution of these problems.

Research to date has focused on the production of fake news, the potential for individuals to network themselves into an echo chamber. However, most of this research is based on studies of platforms, and has a deterministic logic: expecting technical features such as search algorithms to have strong and predictable effects. Relatively little research has focused on the ways internet users actually use search and social media. Are they fooled by fake news? Are they trapped in a filter bubble? Do they inadvertently or purposively lock themselves in a political echo chamber online? Our own research focused on how internet users in seven nations get political information through search and social media to address these issues from a more user-versus techno-centric perspective.

The findings suggest that there is a moral panic developing over fake news, echo chambers and filter bubbles that could lead to disproportionate responses to genuine problems. For example, the vast majority of internet users use multiple sources of news across different online platforms as well as offline, reducing the likelihood they are trapped in a filter bubble. They recognise wrong information, and often check questionable information on social media by using search, reducing the likelihood they are fooled by fake news. And it is rare that they cull their social media sites to eliminate people who have different political views, and so see a greater diversity of viewpoints on social media than suggested by notions of an echo chamber.

However, individuals vary in their vulnerability to disinformation, such as their reliance on multiple sources of information about politics. That realisation led us to ask more about the proportion of the internet-using public that is highly vulnerable to disinformation, and whether it can be identified in ways that these issues could be addressed through targeted awareness campaigns or training programmes.

**RISING THREATS OF FAKE NEWS, ECHO CHAMBERS, AND FILTER BUBBLES?**

Efforts to stop the distribution of fake news gained worldwide attention following the 2016 US elections and allegations of Russian interference in elections...
in Angola, Armenia, Colombia, Ecuador, France, the Gambia, Germany, Indonesia, Italy, Kenya, Rwanda, South Korea, and Turkey – so not just the UK and the US. Clear evidence of the production of fake news, for example, has led governmental bodies and private industry to step up initiatives to understand the problem and stop its spread. For example, the UK recently announced the creation of a dedicated national security communications unit to combat disinformation by state actors and other malevolent users.

Technology companies are also taking steps to mitigate fake news, and foreign interference, in an effort to protect future elections. For example, Facebook announced news feed changes designed to present users with more “high-quality” news while pushing lower quality or questionable news to the bottom of user feeds. Facebook also announced the creation of a documentation process to require advertisers to verify who they are and where they are based. Google, Facebook and Twitter have floated a range of ideas to combat the spread of fake news, including compiling lists of fake news sites, flagging certain stories as having been disputed as fake, using plug-ins and apps to detect fake news, and even taking down known fake news providers. However, some argue, that such efforts to stop or slow the spread of fake news are in vain and demonstrate a fundamental misunderstanding of the issue.

Fake news is just one element in a larger debate about the possible dangers of repeated exposure to low-quality or selectively homogenous information sources – disinformation. For example, because search engines, news aggregators and social networks are increasingly personalising content, they might also be putting individual users in their personal, political “filter bubbles”.

Filter bubbles are viewed as an unintended outcome of algorithms designed to personalise search. Such algorithms are useful in pushing information that is personalised to the reader, reflecting content that is likely to reflect individual interests. However, critics have argued that one possible consequence of the personalisation of search is trapping users in searches that simply reinforce the user’s political beliefs and opinions. The worry is that algorithm-driven filter bubbles are undermining democratic choice by biasing or limiting the public’s sources of political information.

Another concern among scholars is the notion of echo chambers. Like filter bubbles, echo chambers arguably restrict access to alternative viewpoints and information sources. While filter bubbles are a function of search algorithms, echo chambers are associated primarily with social media. More specifically, echo chambers result not only from personalisation of content through social media algorithms, but also by users culling their social networks in ways that lead to a network of politically like-minded users, who confirm, rather than challenge, pre-existing beliefs and opinion.

While these perspectives assume that features of the underlying technology, such as filter bubbles and social networking, unfold in particular ways, there are social psychological perspectives that lead to similar expectations. For example, theories of selective exposure postulate that people seek exposure to content they believe supports their pre-exposure attitude toward the issue or favourite candidate and avoid exposure to campaign communications that disagree with their predisposition. Others call this a “confirmatory bias” in content selection.

Despite anecdotal and empirical studies that document the propagation of fake news, for example, questions about the level of influence of disinformation campaigns remain unclear. And despite the intuitive appeal of deterministic and social psychological perspectives on filter bubbles and echo chambers, relatively little evidence exists on the degree that internet users are vulnerable to these problems. Consequently, questions about the proportion of people who are vulnerable to false or deceptive information are often not even asked. Relatedly, the profiles, or descriptive characteristics of those that are most vulnerable to information manipulation are unclear.

Before appropriate solutions can be judged, it would be valuable to have an empirical
our understanding of the extent of the problem and the characteristics of those most impacted. Documenting the existence of fake news does not translate into an understanding of the proportion of users exposed and vulnerable to this problem. Our research has sought to calibrate the extent of these problems by identifying the proportion of people across seven countries who are most vulnerable to fake news, echo chambers and filter bubbles.

OUR METHOD

Our user-oriented study was based on an online survey of stratified random samples of internet users in seven nations, six (France, Germany, Italy, Poland, Spain and the UK) in the European Union (EU), and the United States (US). The survey was complemented by a limited use of trace data on internet search to bring in more information about the relative importance internet users placed on political information relative to other purposes, such as entertainment. In each nation, responses were received from about 2,000 adult individuals, yielding a total sample size of about 14,000.

Participants were asked questions about offline activities, social networks, and online activities including search and social media use. The survey included questions about search habits and media use related to political information and a number of items to obtain demographic characteristics, including age, gender, children in the home, education, income, and job status. The questionnaire was tailored to our research questions, but built on existing survey research, such as the Oxford Internet Survey (OxIS), Pew Internet and American Life Project, YouGov surveys for the Reuters Institute, and Canada’s Young Voters Survey.

IDENTIFYING THE HIGHLY VULNERABLE

Our early analyses of cross-national patterns of access to information about politics led to an increasing focus on individual variations in the vulnerability of different internet users, which appeared far more significant than cross-national variations. Our findings highlighted the degree that internet users rely on multiple sources of information about politics, not just search or any single platform, making it far less likely that a person is trapped in a bubble on a single platform. These were among an array of findings that illuminated how the information practices of users was likely to mitigate the degree that internet users rely on multiple sources of information about politics, not just search or any single platform, yielding a total sample size of about 14,000.

In short, internet users see a diversity of viewpoints from a diversity of sources, which they can check in a variety of ways. If they are in an echo chamber, it is not because they fail to be exposed to multiple sources and viewpoints.

However, there are individual variations. Particularly, internet users who said they were interested in politics tended to consult a greater diversity of information sources on and offline. This makes it far less likely that they are subject to filter bubbles or echo chambers. Moreover, those interested in politics are more likely to use search to double-check problematic political information.

The importance of search skill can be illustrated in the prevalence of search engines for access to information about any topic, but also political information. For example, nearly two-thirds of users in six of the seven nations use a search engine “greater than once a day”. Germany is the exception where only half of respondents reported using the internet more than once a day, but another 29% said they search “daily”.

Empirically, we found through multivariate analyses that interest in politics and the ability to search the internet are key to understanding who is accessing information in ways that are less susceptible to being fooled by fake news stories, or trapped in filter bubbles or echo chambers. Our analyses led us to the conclusion that those most vulnerable to disinformation are among those individuals who are not interested in politics and report very low internet and search skills.

By controlling for one’s orientation to information, captured best by internet and search skills, and one’s orientation to politics, captured most simply by interest in politics, it is possible to explain a major proportion of the variance in the information habits of internet users. Those interested in politics and skilled in search are more likely to consult diverse sources and check their sources, independent of their demographic characteristics.

However, from this perspective, demographic variables such as income, education, age, gender, life-stage or work status and household make-up could help explain who is most vulnerable to information problems like filter bubbles or believing fake news by helping us to identify those least likely to be interested in politics and have the lowest skills in search.
Based on this framework, we were able to identify those most vulnerable to disinformation, which are those least interested in politics and least skilled in search. We then examined the demographic characteristics of those classified as highly vulnerable to fake news, filter bubbles or echo chambers in each country surveyed. These factors included age, income, education, gender, marital status, life-stage or employment status, and children at home.

The classification of those who are highly vulnerable was operationalised as the group of individuals who indicate low interest in politics and low search ability. Those who answer “not at all interested” and rate their own ability to use a search engine as “bad, poor or fair” are classified as highly vulnerable. Those who report being “somewhat interested, interested, or very interested” in politics, and say they have “excellent” ability to use a search engine are classified as least vulnerable. The percentage of those most vulnerable (not interested in politics and unskilled in search) is quite low in all countries, ranging from less than 1% of users in the US to less than 5% (3.72%) in Italy. Clearly, from our user-focused perspective, very few individual internet users are very vulnerable to disinformation.

Overall, these tests revealed very small percentages of those that would be highly vulnerable and this is the case for nearly all demographic characteristics (see table). There are weak relationships, even if statistically significant in cases, between demographic factors and vulnerability. Specifically, while statistically significant, income, age and education are not clear predictors of vulnerability. Someone in any income, age or education bracket could be among the vulnerable to information problems. Other indicators such as gender and having children in the home are statistically significant in some instances, but demonstrate even weaker relationships, while life-stage or employment status rarely explain any level of vulnerability.

Income is the strongest predictor of vulnerability – those with higher incomes are less likely to be vulnerable to information problems. It was the only factor that demonstrated a statistically significant association with vulnerability across all seven countries when all other demographic characteristics are controlled. However, the relationship between income and vulnerability remained weak across all seven countries. Using standardised coefficients across countries and variables, the strongest relationship is in France and the weakest in the US.

And when cross-tabs are used to identify the percentage of the most vulnerable based on income brackets we see anomalies for some countries. For example, in Poland the highest income category appears most vulnerable, with 7.69% of this income bracket being the most vulnerable. Similarly, in the UK, the highest income category is more vulnerable (2.78%) than all other income brackets. But income is a clear example of people falling through the cracks. However, this same pattern of weak relationships, with some people vulnerable across categories, is true for all of our demographic categories.

Regression models for each country were calculated to determine the variance that can be attributed to demographic factors. Overall, even in combination, vulnerability cannot be easily predicted or explained by demographics. The amount of variance that can be explained by demographic variables ranged from about 4% in Germany to 9.8% in the UK. Income and education are the strongest predictors of vulnerability, followed by interest in politics and then internet and search skills.
education were the best predictors; however, cross-tabs illuminated the fact that anyone can fall through the cracks at every level of income and education.

WHAT CAN BE DONE?

Based on our analysis, vulnerability to disinformation may be far more limited than implied by deterministic models of filter bubbles, echo chambers and fake news. Most people access multiple sources of information about politics and exhibit a number of other good information practices, such as checking the authenticity of questionable information. Those who have poor information practices, such as limiting themselves to fewer sources of information about politics, are those with little or no interest in politics and poor skills in the use of the internet and search.

The good news is that it is not a large proportion of the internet population, at least in the seven high-income countries we surveyed. The bad news is that it is difficult to predict those who are vulnerable – who have no interest in politics and lack skills in use of the internet and search. While there are some statistically significant relationships with some demographic characteristics, such as income and age, these are weak relationships. So the least well to do and oldest internet users might be somewhat more vulnerable, but some young users with high incomes can also be vulnerable.

Given these statistical patterns, there is not a strong basis for a targeted awareness campaign, or training programme, given that such a negligible percentage of most categories of users appear vulnerable. That said, our findings demonstrate that there is some potential for a few internet users in any category to sometimes, albeit rarely, be vulnerable. The conjunction of these two insights leads to an approach that is more “libertarian paternalist” and social psychological than focused on policy or regulation – the potential for “nudging” all users to follow information practices that, in the words of Richard Thaler and Cass Sunstein, will “make their lives better”. In this case, it means less vulnerable to fake news, filter bubbles and echo chambers.

Given the limited size of the populations at risk, the characteristics shaping risk, and the demographic spread of the vulnerable, the principle conclusion of this analysis is that developing aggressive initiatives aimed at pushing regulation of content and internet service providers are misplaced and inappropriate. Even targeted digital media literacy programmes might miss the mark given the small size and spread of the target population. Instead, the evidence is suggestive of the potential value of social interventions aimed at nudging and reminding all users to employ helpful practices, such as using multiple sources, search engines, and checking questionable news and facts (see box – and we find nudge theory associated with Richard Thaler’s 2017 Nobel Prize to be compelling in this case). In addition, it is critical to encourage people to be interested in politics, and have some ability to use the internet and search as a means to mitigate the problems associated with disinformation.

Our findings do not deny the existence of fake news, filter bubbles and echo chambers. They are real problems, but they are not deterministic processes that inevitably envelop all internet users. In fact, there is likely to be a great deal of variation among users, with most exhibiting information practices that will mitigate many of these problems most of the time. This is why a regulatory approach by government or industry is likely to be disproportionate, unless focused on campaigns to encourage good information practices by all users.

That said, the fact that internet users are exposed to multiple sources of information and have a variety of practices that are likely to expose them to a diversity of information, does not mean that they will be open minded. Individuals can create their own echo chambers, but the cause is not the internet, search or social media, it is the mindset and confirmatory biases of individuals who choose to ignore countervailing information. Internet users, just like academics, journalists, scientists and politicians, often choose to ignore information that does not follow and reinforce their viewpoints.

However, this is not because they are unaware of or not exposed to countervailing information. Blaming the news, the internet or social media for our selective perception of the facts is likely to lead to inappropriate and misplaced remedies. What can be done is to work hard to encourage all news, information and internet service providers to nudge their readers, listeners, viewers and users to follow good information practices, such as those suggested in this article.

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