A3. Survey analysis: news consumption habits and media plurality outcomes

A3.1 In this annex we provide an analysis of the relationship between how people access news and several outcomes that are related to individuals' effective participation in a well-functioning democracy. In particular we distinguished between people who access news using traditional media, social media, search engines, news aggregators, and friends and other news sources. We then looked at the relationship between news consumption and four outcomes: knowledge of news,[1] political polarisation, trust, and participation in the 2019 general election as a proxy for democratic participation.[2] In doing so we took into account the demographic and socio-economic characteristics of the respondents.

A3.2 We found that compared to people who use traditional media most often for news, those who use social media most often displayed lower levels of knowledge about news and important issues, higher levels of political polarisation[3], lower levels of trust in media and state institutions, and were less likely to have voted in 2019. These results withstood controlling for demographic characteristics and we found similar results using a range of alternative measures of news consumption.

A3.3 When we compared people who use traditional media most often for news, with those who use search engines most often, there were no significant differences in polarisation. When we used our main measure of news consumption, we found that people who used search engines most often displayed lower levels of knowledge about news and important issues, lower levels of trust in media, and were less likely to have voted in 2019. However, when we ran the analysis using other measures of news consumption there was no significant difference. Those who use news aggregators most often for news did not show any significant differences in outcomes compared to those who use traditional media most often.

A3.4 These are not necessarily causal relationships. The results could be driven by social media, for example, increasing polarisation among its users, or they could be driven by more polarised individuals choosing to use social media more than traditional media.

Data

A3.5 The data referenced below was drawn from two surveys:

[1] Our measure of news knowledge relates to whether people can distinguish between true and false statements relating to news and important issues.
[2] We acknowledge that democratic participation can take many other forms.
[3] There are some exceptions. Social media users do not display any more polarisation than traditional media users with regard to Brexit. See Data section for more details.

a) A representative survey of UK adults aged 16-75+ conducted online using Ipsos proprietary iSay panel.

b) A survey of UK adult members of Ipsos Iris, Ipsos' passive measurement panel.

A3.6 A total of **2,557** interviews were conducted: **1,483** iSay panel interviews and **1,074** iris panel interviews with fieldwork completed between 29th July – 16th August 2022. Quotas were set by age, gender, region, education and social grade.

News consumption

A3.7 The purpose of this research was to find out whether there is a relationship between where people get their news from and a series of outcomes that are related to media plurality and its aim of a well-functioning democracy.

A3.8 Our main measure of news consumption was the news source that a respondent claimed to use most often for news (*source used most*). Survey participants were asked where they tend to go for news most often. They could choose only one option (e.g., television, newspapers, social media, etc.). We categorised the answer to this question into one of five general news source categories: Traditional media, social media, search engines, news aggregators, and other (including friends).

A3.9 We defined traditional media as news outlets which create news content, regardless of the technology used to access the content (print, radio, smart phone, etc). We classified television, radio, newspapers, and magazines as well as websites and apps belonging to news creators as 'traditional media'. We also classified online-only news creators such as the Huffington Post or BuzzFeed as traditional media.

A3.10 We classified social media services such as Facebook and Twitter and video sharing platforms (e.g., YouTube) as 'social media'. We also created separate categories for search engines (e.g., Google Search) and for news aggregators (e.g., Google News, Apple News, etc).

A3.11 To gauge the robustness of our findings to the way we measure news consumption, we considered a number of alternatives. We created these measures for all categories, but focus here on social media for ease of exposition:

- We created a binary variable that equals one if the respondent uses social media at all, or zero if the respondent does not use social media (*uses social media)*.
- Respondents were asked to identify and rank their three most important news sources. If all of those were social media, then we classified the respondent as using *exclusively social media*. If the most important source was social media, but another category was ranked 2nd or 3rd, then we classified social media as the *most important source*. Any other answer combination served as the baseline category.
- The survey tracked all the specific media sources which respondents reported to use for news. We counted the number of distinct media sources, and how many of them were social media, and constructed the share of news sources which are social media (*share of social media in sources*).

- We refined the previous measure by using information on the frequency of use of each media source. Respondents could select from a number of answer choices. The choices ranged from 'less than once a month' to 'more than 10 times a day'. Based on the answers we created the share of social media in total 'visits' to news media sources (*share of social media in visits*). Note that this measure is only based on frequency of access and does not record duration of the access.

Outcomes

A3.12 Ofcom has stated that the aim of media plurality is to support the maintenance of a well-functioning democratic society.

A3.13 We selected four groups of outcomes which capture an aspect of how effectively individuals may be participating in the democratic process. We looked at: an individual's level of knowledge about news and important issues (knowledge of news); their level of political polarisation; their levels of trust (in institutions, the media and in people); and whether an individual voted in the 2019 General Election (democratic participation).

A3.14 We discuss how we measured each of these indicators in turn below.

A3.15 *Knowledge of news* was measured by two news quizzes. Our choice of quiz format was informed by Angelucci and Prat (2021) who also investigate differences in news knowledge between different media users.[4] Each quiz presented the respondent with six statements concerning issues that are relevant to people's voting decisions. To design the quizzes, we referred to Ipsos' Issues Index, a survey conducted monthly that provides an overview of the key issues that currently concern citizens in Great Britain.[5] At the time we commissioned this research, the survey indicated that the topics of the economy, healthcare and climate change were seen as important topics by all demographic groups. We looked for newsworthy items on these topics, verified by an official source such as the ONS. We then used six of these newsworthy items as facts, and altered six other newsworthy items to create a set of plausible, false statements. Each item was only used once in the news quizzes, either in true or false form. Both news quizzes can be found at the end of this Annex.

A3.16 In each quiz, three of the statements were true and the remaining three were false. Respondents were given the statements and then had 90 seconds to select the three items they believed to be true. Respondents were given this tight time limit to prevent them from searching for the correct answers. To some extent this controlled for the quiz difficulty since respondents only needed to form a ranking of which statements are most likely to be true. They did not need to know with any certainty whether a statement is true or false.

[4] Angelucci, Charles and Prat, Andrea (2021), Is Journalistic Truth Dead? Measuring How Informed Voters Are About Political News.
[5] See here for the most recent Ipsos Issues Index.

A3.17 We aggregated the correctly identified true statements from the two news quizzes to give us a measure of news knowledge ranging from 0 (no statement was correctly identified) to 6 (all statements were correctly identified).[6]

A3.18 The survey was cog-tested, as part of questionnaire testing, among 8 people prior to launch, and the survey was initially soft-launched among 120 participants in order to ensure the quiz difficulty did not result in high levels of drop-out.

A3.19 *Polarisation* was measured by the strength of feeling that respondents had towards people with opposing views. For each respondent we first identified their in-group and their out-group. We then constructed two measures of polarization. The first was based on the respondent's stated feelings towards people in the in-group and towards people in the out-group on a scale from 0 to 100. We took the difference between these two feeling thermometers. A highly polarised person would report 100 towards the in-group, and 0 towards the out-group resulting in a polarisation measure of 100. An unpolarised person would report the same feelings towards in-group and out-group, resulting in a polarisation measure of 0. The second measure was based on how strongly respondents agreed on a scale from 1 to 5 with the statement that it is hard to be friends with people belonging to their out-group.

A3.20 We defined in-groups and out-groups first with respect to the political party respondents identified with. Respondents were asked which political party they support or, if they do not support any, which party they felt a little closer to. This defined their in-group. The out-group was defined as the main opposition to that party. Respondents were also asked whether they identified as 'remainer' or as 'leaver' with respect to Brexit as a second axis to define in- and out-groups.

A3.21 Polarisation with respect to party affiliation is complicated by the fact that UK politics is not characterised by a two-party system. Moreover, the landscape of political parties differs considerably across the nations of the United Kingdom. We therefore followed two approaches. The first was to consider polarisation only for supporters of the Conservative or the Labour party. In- and out-group were thus identified. However, this excluded supporters of any other party from our sample and neglected the possibility that a supporter of the Conservative or Labour party might feel more strongly about a third party. We therefore also constructed polarisation measures based on the difference between a respondent's supported party, and the party for which they expressed the lowest feelings.[7]

A3.22 We standardized all polarisation measures to have zero mean and unit variance. This facilitates comparison between different polarisation measures.

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[6] Note that there is no perfect way to design a news quiz. We measure knowledge at one specific time, on a specific set of questions (which relate to issues that are important to voters). There may be unobservable factors that make certain people more likely to select the correct statements, that cannot be captured by our analysis. Results may also differ under a different set of questions.

[7] Aside from the respondent's selected party, they were only asked to rate selected parties in their nation. The selected parties that we included for each nation were: England – Conservative and Labour; Scotland – SNP, Conservative and Labour; Wales – Labour, Conservative and Plaid Cymru; NI – DUP, Sinn Féin and Alliance. This prevents us from artificially increasing our measure of polarisation if people have particularly strong feelings towards other parties.

A3.23 *Trust* was measured in the survey on a 10-point Likert scale ranging from 'Not at all trustworthy' to 'Completely trustworthy' and respondents were asked to state their trust in a number of institutions (e.g., the UK government, the NHS, the judiciary, etc.), in different media categories (traditional media, social media, search engine companies), and in people.[8] We distinguished between the following categories: people, state institutions, traditional media, social media, search engines, regulators, and national governments (of Scotland, Wales, and Northern Ireland). State institutions comprise the UK government, local government (councils), the NHS, the police, and judges.

A3.24 We added all the trust scores for the state institutions. We then standardised all our trust variables to have zero mean and unit variance. We thus obtained standardised trust scores for each of those seven categories.

A3.25 *Democratic participation* was measured by whether the respondent had voted in the last general election (in 2019). Respondents were excluded from the analysis if they reported that they did not remember or if they were not eligible to vote. We recognize that this is a narrow measure and that a broader set of questions including, for example, future voting intention and other aspects of democratic participation would yield a more comprehensive picture of democratic participation.

Demographic characteristics

A3.26 There are many factors other than news consumption that could influence the outcomes we are interested in. For example, young people might be more likely to obtain news from social media, and they might be less informed about news. In the absence of any controls for age we might observe a negative correlation between social media news use and knowledge of news that could to some extent be explained by age rather than social media use. We therefore include in our analysis a range of control variables that capture demographic and socio-economic characteristics of the respondents.

A3.27 We created variables that control for: sex, number of children in household, age, ethnicity, household size, employment status, education, region of residence, household income, religion, occupational status, disabilities, sexual orientation, marital status, date survey completed, and immigration status. We controlled for each characteristic with a categorical variable (e.g., 0, 1 or 2, 3 or more for number of children, etc.) and included these categories as binary variables in the regressions.

Methodology

A3.28 We first performed a variable selection exercise. We analysed which control variables perform well in explaining which media source category people use most often. In particular, we estimated a logistic Lasso regression on whether people use traditional media or an alternative source (including social media, search engines and news aggregators). A Lasso regression is a model commonly used for prediction and variable

[8] In contrast to the other trust questions, trust in people was measured on a 5-point Likert scale.

selection. The classical linear regression produces non-zero estimates for all variables in a model, whereas the Lasso will exclude some variables ('shrink' them to 0) if they do not improve the model's performance on testing data.[9] We retained all variables which had a non-zero coefficient for at least one of their associated categories after the Lasso regression.

A3.29 The results from the Lasso regression suggested that all variables except religion help explain the choice of source for news consumption. We thus proceeded using all our control variables except religion.[10]

A3.30 We explored the effect of news consumption sources on our outcomes of interest using linear regression. We estimated the linear regression model both with and without including the control variables described above. We used the linear regression model as our benchmark model due to some of its attractive properties. If the relationship that we are investigating is linear, then under some regularity assumptions the linear regression model is unbiased, and it has the lowest variance among all unbiased estimators. But even if the underlying relationship is non-linear the linear regression model provides the best linear approximation.

A3.31 For two of our outcome variables we know that the 'true' model cannot be linear: The news knowledge quiz can take on seven discrete values (from 0 to 6) and whether respondents voted in 2019 is wither yes or no. A binary dependent variable is frequently fit by a binary logit model. This can be extended to the ordered logit model if a dependent variable takes a finite number of values and if these values can be ranked – e.g., identifying 4 answers correctly is 'more' than identifying 3 answers correctly.

A3.32 To test the robustness of our benchmark results we estimated the voting outcome with a binary logit, and the news knowledge outcome with an ordered logit model.

Results

Knowledge of news

A3.33 Table 1 reports the results for knowledge of news. Each row displays the difference in knowledge of news between the corresponding news source category and those who use traditional media most often. Those who use social media as well as those who use search engines most often scored much lower on the news knowledge scale – someone using social media most often identified 0.41 fewer correct statements compared to someone who uses traditional media most often and someone using search engines most often identified 0.43 fewer correct statements (column 1).

A3.34 Once we controlled for the demographics of the users the size of the effects were reduced. But we still found a significant difference between those who use traditional media and

[9] We chose the penalty parameter λ by searching over a grid for the value of λ which minimizes a 10-fold cross validation function.

[10] We repeated variable selection using an elastic net instead of Lasso. An elastic net can improve on Lasso performance in the presence of highly correlated data. This also resulted in the exclusion of religion as a variable.

those who use social media or search engines most often (column 2). The results were unchanged when we used an ordered logit model (columns 3 and 4).

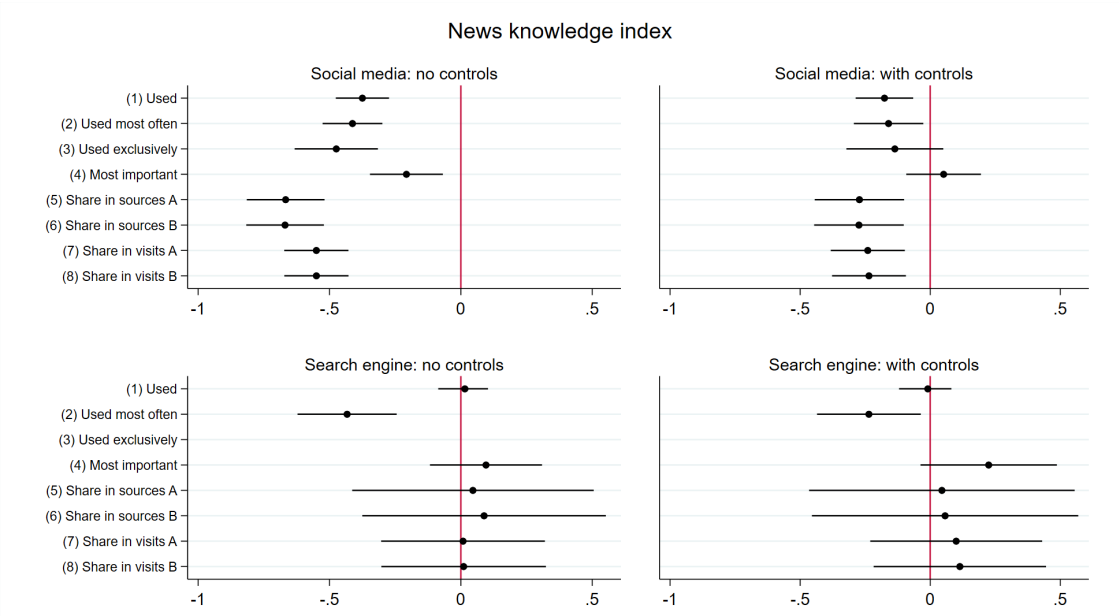
Table 1: News sources and outcomes, news knowledge

	Linear regression		**Ordered Logistic regression**	
	(1)	(2)	(3)	(4)
Social media	-0.41***	-0.16**	-0.42***	-0.18***
	(0.06)	(0.07)	(0.06)	(0.07)
Search engine	-0.43***	-0.24**	-0.43***	-0.24**
	(0.10)	(0.10)	(0.09)	(0.10)
News aggregator	-0.18**	-0.09	-0.18**	-0.09
	(0.08)	(0.09)	(0.08)	(0.09)
Friends / Other	-0.52***	-0.27**	-0.50***	-0.24*
	(0.11)	(0.13)	(0.11)	(0.13)
Includes controls	No	Yes	No	Yes
Observations	2410	2016	2410	2016
R-squared	0.032	0.174		

*Note: The dependent variable is a count of correctly identified factual news statements ranging from 0 to 6. See Data section for more details and a description of the control variables. Standard errors in parentheses. Stars denote significance levels: * 10%, ** 5%, *** 1%.*

A3.35 Figure 1 shows the results for the full set of different measures of news consumption that we defined in paragraph A3.11. The figure displays the point estimate along with the 95% confidence intervals for using social media (top set of results) or search engines (bottom set of results). All estimates are obtained using linear regression. The finding that social media users score lower on the news quiz appears robust as it is significant for nearly all of the different consumption measures used (with controls). For search engine users only one of the measures (*used most often*) shows a statistically significant correlation.

Figure 1: News knowledge by social media and search engine use.



Note: The figure shows the estimated difference in knowledge of news and important issues by the type of media used. The sub-figures on the left (right) are estimates from linear regression models excluding (including) control variables. The upper (lower) part reports estimates for social media (search engine) use. Circles are point estimates. The bars cover the 95% confidence interval around the point estimates. No estimates are reported for those who exclusively use search engines due to no or too few cases in this category.

Polarisation

A3.36 Table 2 shows the results of our analysis without controls. When we defined people's in- and out-groups according to the political parties they identify with, people who use social media most often were more polarised compared to people who use traditional media most often. When we identified in- and out-groups by Brexit the picture was more mixed, people that use social media more often were more likely to say it was difficult to be friends with someone holding the opposite view on Brexit, but there was no difference using the feeling thermometer.

A3.37 People that use news aggregators were more polarized with respect to party affiliation when we measured polarization by the "difficult to be friends with" variable and not when we used the feeling thermometer.

Table 2: News sources and polarisation, no control variables

	Main source of news			
	Social Media	Search Engine	News aggregator	Friends/Other
Polarisation (in standard deviations) compared to traditional media				

Difficult friends with (Conservative/Labour)	0.584***	0.173	0.395***	0.343*
	(0.099)	(0.140)	(0.131)	(0.191)
Feeling thermometer (Conservative/Labour)	0.266***	-0.030	-0.019	0.202
	(0.099)	(0.159)	(0.127)	(0.263)
Difficult friends with (all parties)	0.457***	0.143	0.267**	0.335**
	(0.071)	(0.124)	(0.109)	(0.131)
Feeling thermometer (all parties)	0.156**	-0.108	-0.122	0.340**
	(0.077)	(0.132)	(0.117)	(0.170)
Difficult friends with (Brexit)	0.380***	0.188	0.188*	0.310**
	(0.072)	(0.130)	(0.105)	(0.131)
Feeling thermometer (Brexit)	0.008	0.176	-0.073	0.011
	(0.071)	(0.131)	(0.112)	(0.131)

*Note: The dependent variable is a standardised measure of polarisation. See Data section for details on the polarisation variables. Standard errors in parentheses. Stars denote significance levels: * 10%, ** 5%, *** 1%.*

A3.38 Table 3 shows the results with controls. These results show that people who use social media most often display higher levels of polarisation when it comes to party affiliation compared to those who use traditional media most often. There are no statistically significant differences between people who use search engines or news aggregators when compared to people that use traditional media most often. There are also no differences between groups for polarisation as measured on the Brexit axis.

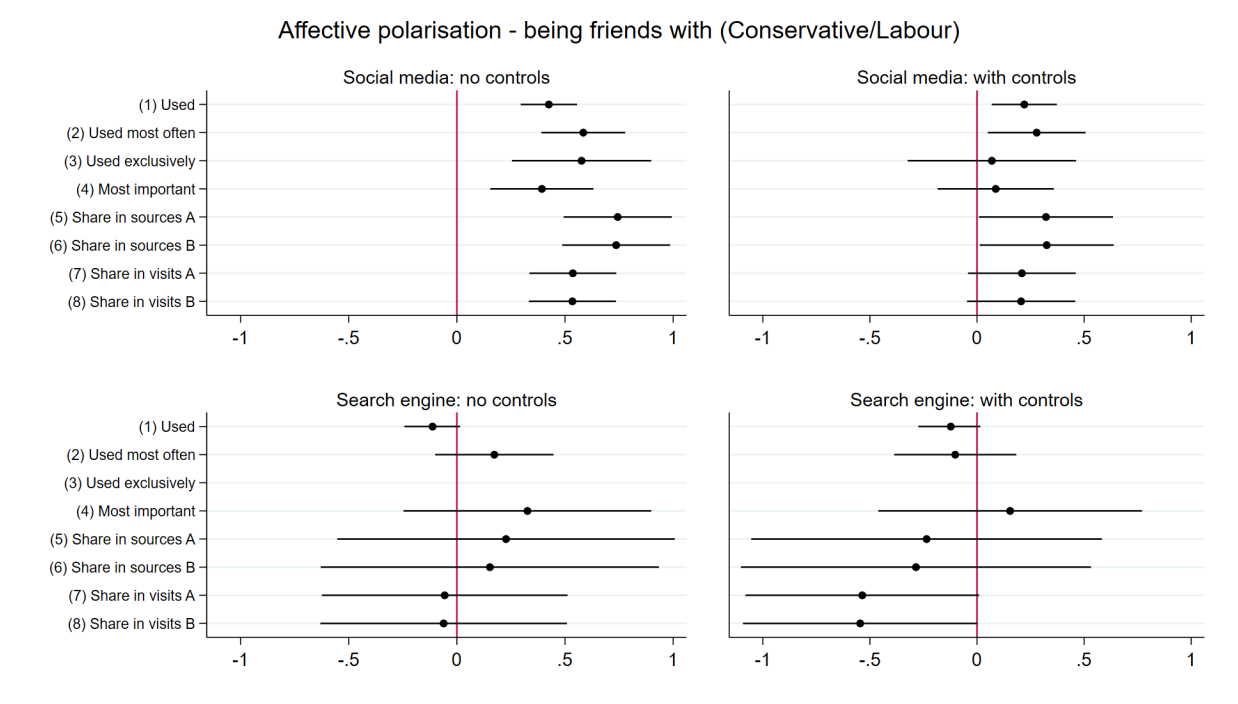
Table 3: News sources and polarization, with control variables

	Main source of news			
	Social Media	Search Engine	News aggregator	Friends/Other
Polarisation (in standard deviations) compared to traditional media				
Difficult friends with (Conservative/Labour)	0.279**	-0.102	0.264*	-0.099
	(0.116)	(0.145)	(0.140)	(0.218)
Feeling thermometer (Conservative/Labour)	0.297**	-0.142	0.154	0.203
	(0.126)	(0.170)	(0.139)	(0.311)
Difficult friends with (all parties)	0.200**	-0.004	0.176	0.121
	(0.083)	(0.130)	(0.123)	(0.157)
Feeling thermometer (all parties)	0.174**	-0.067	0.008	0.370*
	(0.087)	(0.138)	(0.119)	(0.194)
Difficult friends with (Brexit)	0.156*	-0.021	0.095	0.072
	(0.087)	(0.147)	(0.120)	(0.153)
Feeling thermometer (Brexit)	0.059	0.207	-0.065	-0.074
	(0.082)	(0.144)	(0.124)	(0.164)

*Note: The dependent variable is a standardized measure of polarisation. See Data section for details on the polarisation and control variables. Standard errors in parentheses. Stars denote significance levels: * 10%, ** 5%, *** 1%.*

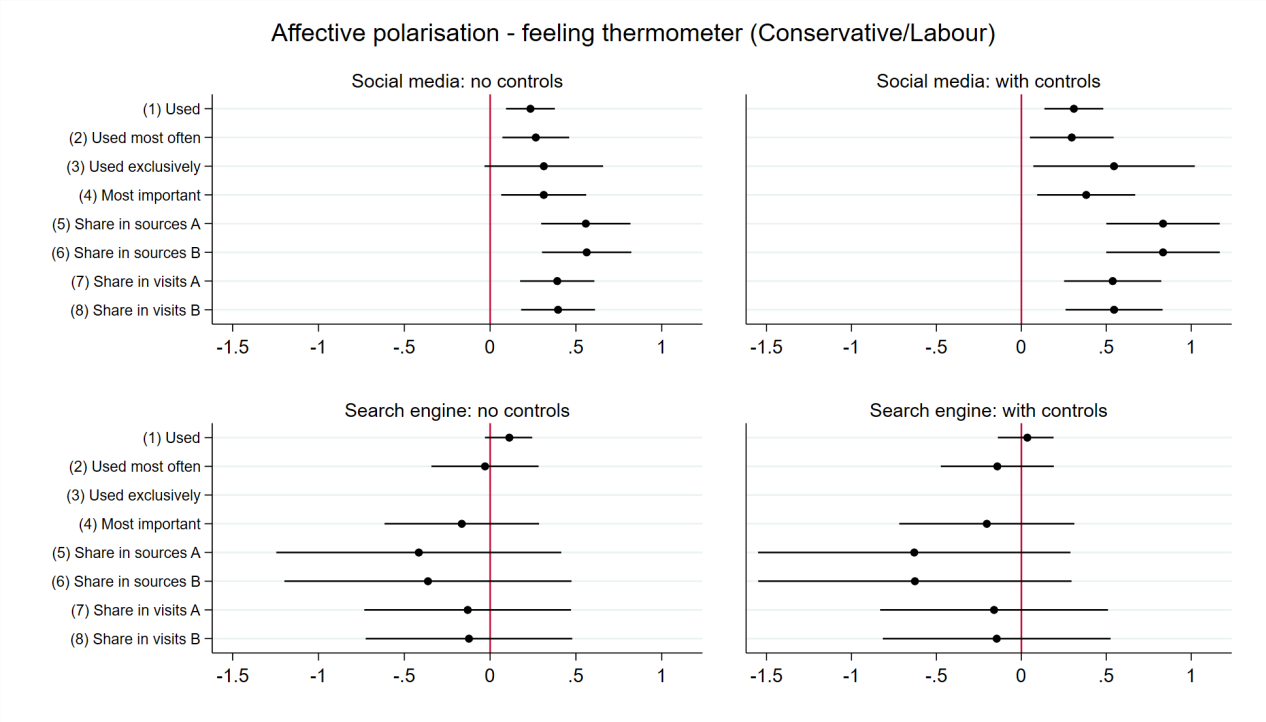
A3.39 Figures 2 to 5 below show the results for the full range of news media consumption measures we defined. They show that people who use social media are more polarised, using the feeling thermometer measure, across a wide range of different measures of social media use. We saw a similar result when we used the 'difficult to be friends with' measure although the results were insignificant on some of the measures of news consumption.

Figure 2: Polarisation (friends) between Conservative and Labour party supporters by social media and search engine use



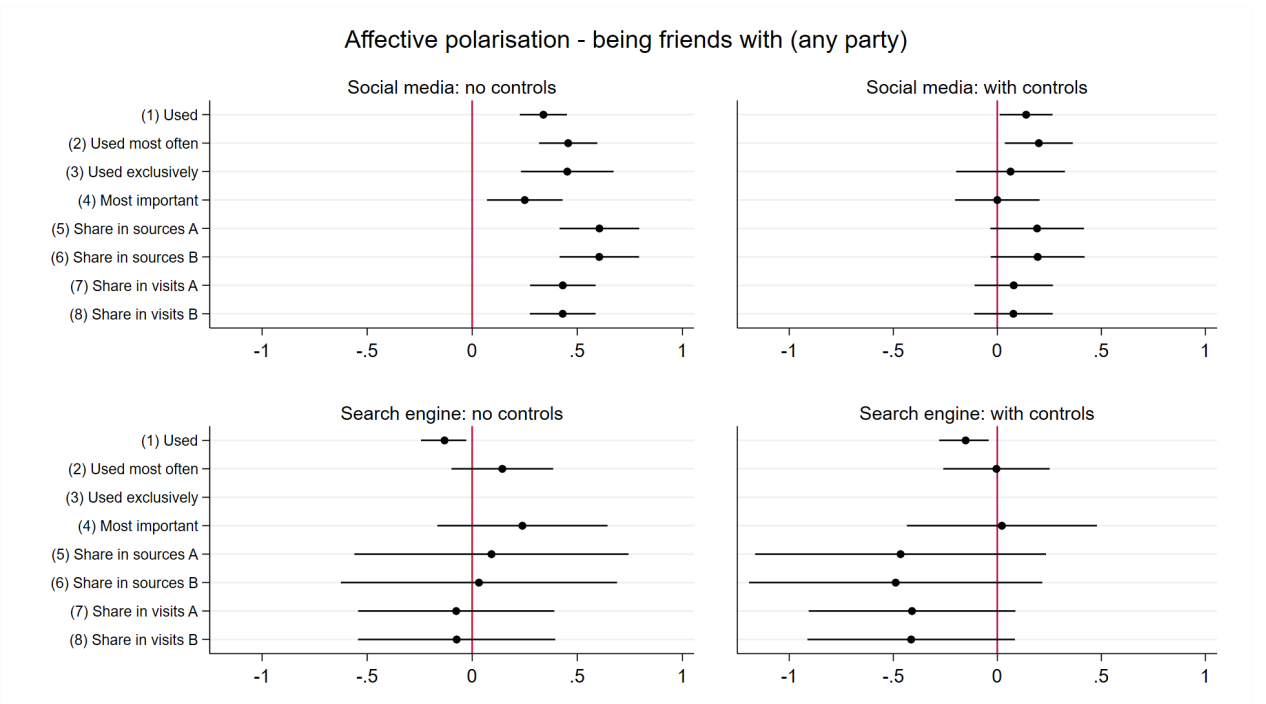
Note: The figure shows the estimated difference in polarisation (in standard deviations) based on respondents' agreement with the statement that it is hard to be friends with someone in the out-group (Conservative/Labour supporter) by the type of media used. See note to figure 1 for further details.

Figure 3: Polarisation (feeling) between Conservative and Labour party supporters by social media and search engine use



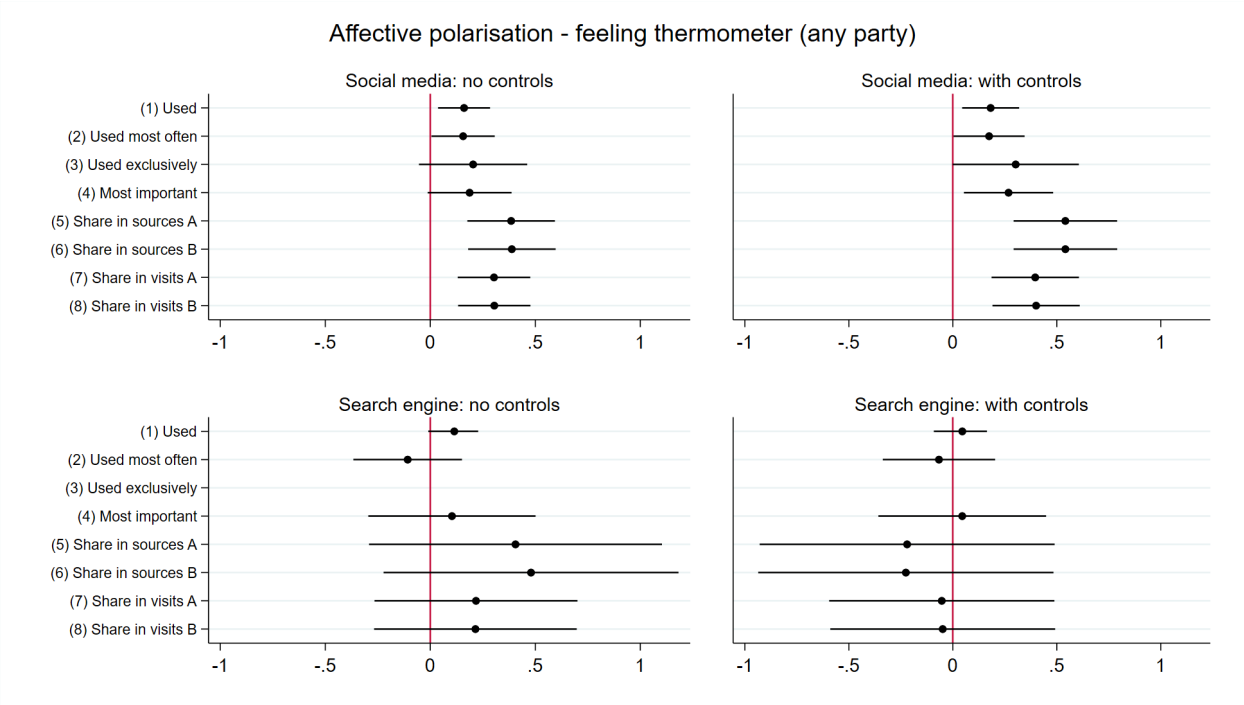
Note: The figure shows the estimated difference in polarisation (in standard deviations) based on respondents' feelings towards the in-group compared to their feelings towards the out-group by the type of media used. In and out-group are based on supporting the Conservative or the Labour party. See note to figure 1 for further details.

Figure 4: Polarisation (friends) with respect to any party by social media and search engine use



Note: The figure shows the estimated difference in polarisation (in standard deviations) based on respondents' agreement with the statement that it is hard to be friends with someone in the out-group (most disliked party) by the type of media used. See note to figure 1 for further details.

Figure 5: Polarisation (feeling) with respect to any party by social media and search engine use.



Note: The figure shows the estimated difference in polarisation (in standard deviations) based on respondents' feelings towards the in-group compared to their feelings towards the out-group by the type of media used. In and out-group are based on the supported and the least liked party. See note to figure 1 for further details.

Trust

A3.40 Table 4 summarises the results excluding controls. Those who use social media or search engines have significantly lower levels of trust in state institutions compared to those who use traditional media most often. Those who use search engines most often also have significantly lower levels of trust in the media. Low trust is also pronounced among those whose most used news source are friends or other sources. Not surprisingly, people who use social media most often put much more trust in social media (0.410 standard deviations higher than those who use traditional media most).

Table 4: News sources and trust, no control variables

		Main source of news			
		Social Media	Search Engine	News aggregator	Friends/Other
Trust (in standard deviations) compared to traditional media					
	people	-0.041	-0.149	-0.128	0.174

	(0.063)	(0.105)	(0.097)	(0.106)
state institutions	-0.148**	-0.368***	-0.083	-0.480***
	(0.067)	(0.120)	(0.090)	(0.122)
media (not social)	-0.121*	-0.306***	-0.080	-0.238**
	(0.065)	(0.113)	(0.093)	(0.113)
social media	0.410***	0.203*	0.130	0.042
	(0.065)	(0.109)	(0.088)	(0.107)
search engines	0.157**	-0.026	-0.025	-0.207**
	(0.062)	(0.106)	(0.088)	(0.103)
regulators	-0.045	-0.176	-0.122	-0.075
	(0.062)	(0.114)	(0.089)	(0.106)
national governments	-0.114	-0.190	0.006	-0.145
	(0.121)	(0.291)	(0.194)	(0.194)

*Note: The dependent variable is a standardized measure of trust in the institution given by the row name. State institutions are a) the UK government, b) local government, c) the NHS, d) the police, and e) judges. The national governments are the devolved governments of Scotland, Wales, and Northern Ireland. See Data section for more details. Standard errors in parentheses. Stars denote significance levels: * 10%, ** 5%, *** 1%.*

A3.41 Controlling for demographics (table 5) results in stronger estimates of distrust among those who use social media most often. Those who use search engines most often have lower trust in the non-social media.

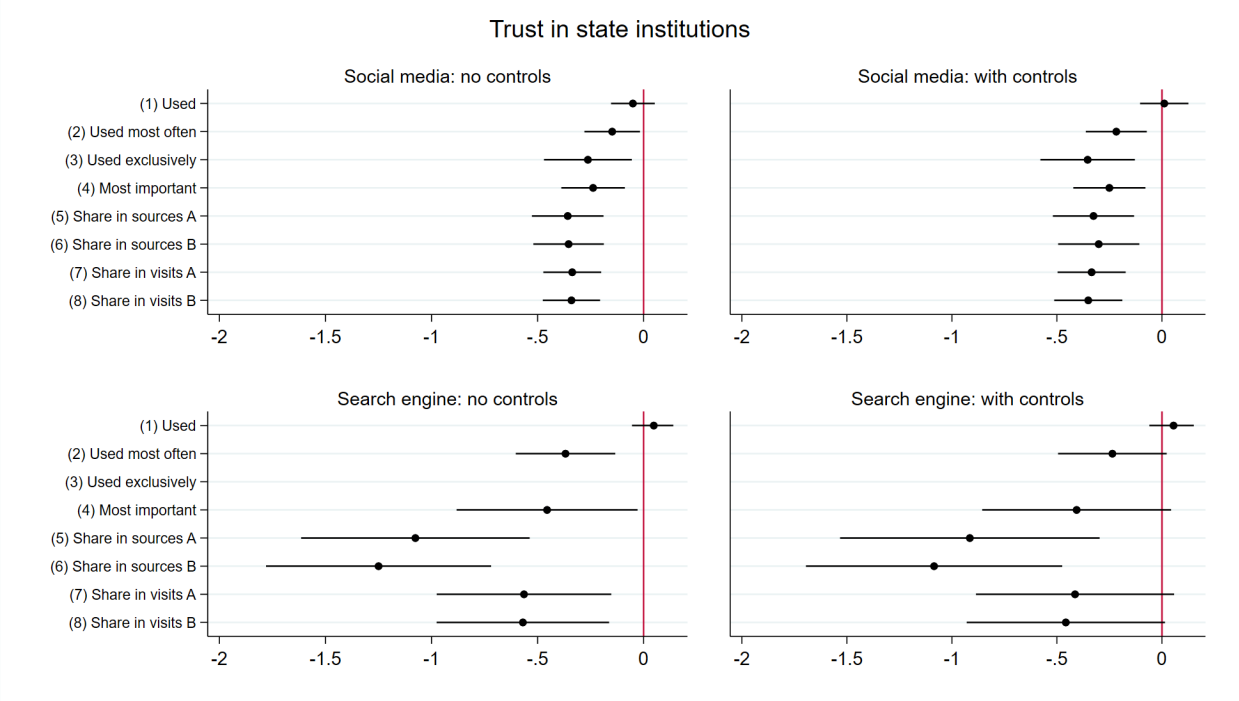
Table 5: News sources and trust, with control variables

	Main source of news			
	Social Media	Search Engine	News aggregator	Friends/Other
Trust (in standard deviations) compared to traditional media				
people	-0.022	-0.084	-0.087	0.335***
	(0.076)	(0.123)	(0.110)	(0.119)
state institutions	-0.217***	-0.236*	-0.076	-0.414***
	(0.074)	(0.132)	(0.097)	(0.144)
media (not social)	-0.252***	-0.259**	-0.063	-0.213*
	(0.073)	(0.124)	(0.101)	(0.128)
social media	0.192***	0.131	0.069	-0.096
	(0.072)	(0.125)	(0.091)	(0.117)
search engines	0.015	0.004	-0.035	-0.263**
	(0.074)	(0.116)	(0.099)	(0.112)
regulators	-0.115	-0.090	-0.074	-0.075
	(0.072)	(0.134)	(0.096)	(0.126)
national governments	-0.096	-0.338	-0.346*	-0.114
	(0.143)	(0.320)	(0.198)	(0.242)

*Note: The dependent variable is a standardized measure of trust in the institution given by the row name. State institutions are a) the UK government, b) local government, c) the NHS, d) the police, and e) judges. The national governments are the devolved governments of Scotland, Wales, and Northern Ireland. All regressions control for the variables described in the Data section. Standard errors in parentheses. Stars denote significance levels: * 10%, ** 5%, *** 1%.*

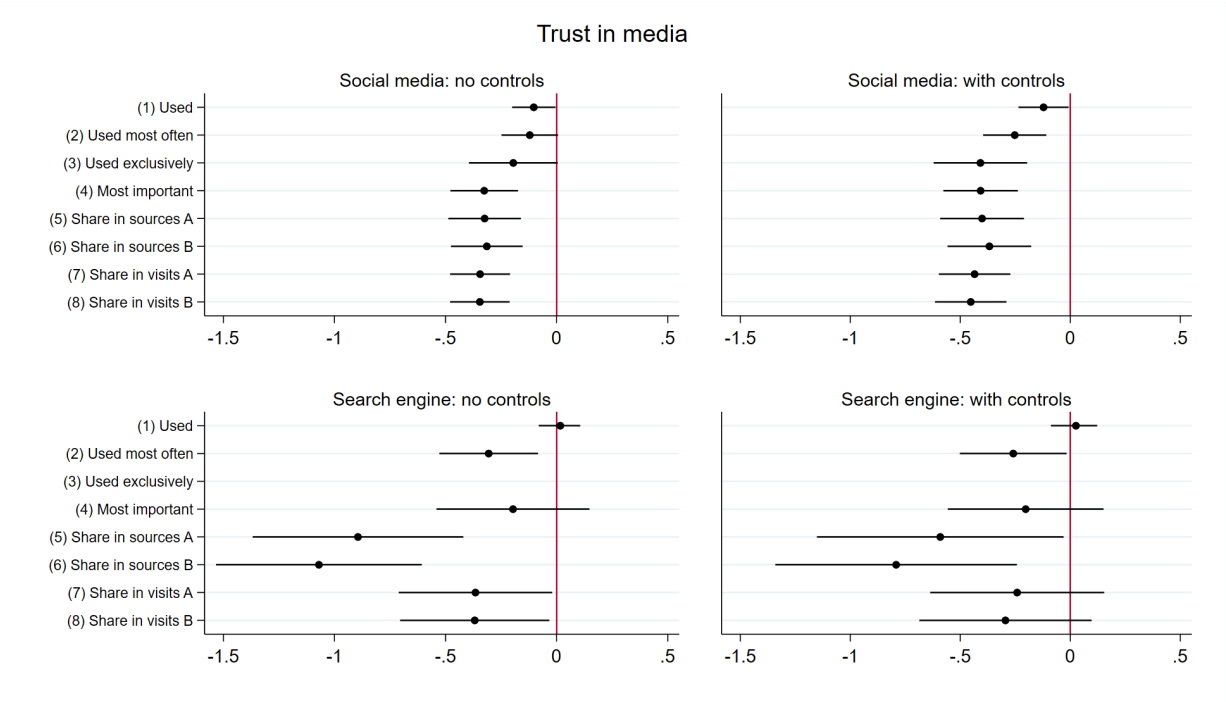
A3.42 Figures 6 and 7 show the results for the full range of different news consumption measures we defined. They show that people who use social media have lower trust in state institutions and news media and that these results are robust to using a wide range of different news consumption measures.

Figure 6: Trust in state institutions by social media and search engine use.



Note: The figure shows the estimated difference in trust in state institutions (in standard deviations) by the type of media used. State institutions are a) the UK government, b) local government (councils), c) the NHS, d) the police, and e) judges. See note to figure 1 for further details.

Figure 7: Trust in media (not social) by social media and search engine use



Note: The figure shows the estimated difference in trust in media institutions (in standard deviations, not including social media) by the type of media used. See note to figure 1 for further details.

Democratic participation (voting)

A3.43 Table 6 summarises our results for voting behaviour. The coefficients in the model show how the likelihood of having voted in the 2019 election varies by type of media used most often compared to those individuals who use traditional sources of news most often. 88.1% percent of people who use traditional media most often voted, while only 73.6% of people who use social media most often did so – a gap of 14.5 percentage points. This is the coefficient reported in column 1. People who use search engines most often were 18.2 percentage points less likely to have voted, those who use news aggregators were 7 and those who mainly use friends and other sources for news were 6.6 percentage points less likely to have voted.

Table 6: News sources and outcomes, voted in last general election

	Linear regression		Logistic regression	
	(1)	(2)	(3)	(4)
Social media	-14.4***	-8.0**	-14.4***	-6.6**
	(2.9)	(3.1)	(2.9)	(2.6)
Search engine	-18.2***	-10.4**	-18.2***	-9.0**
	(5.1)	(5.3)	(5.1)	(4.5)
News aggregator	-7.0*	-1.4	-7.0*	-0.5
	(3.7)	(3.9)	(3.7)	(3.7)
Friends / Other	-6.6	0.1	-6.6	-0.3

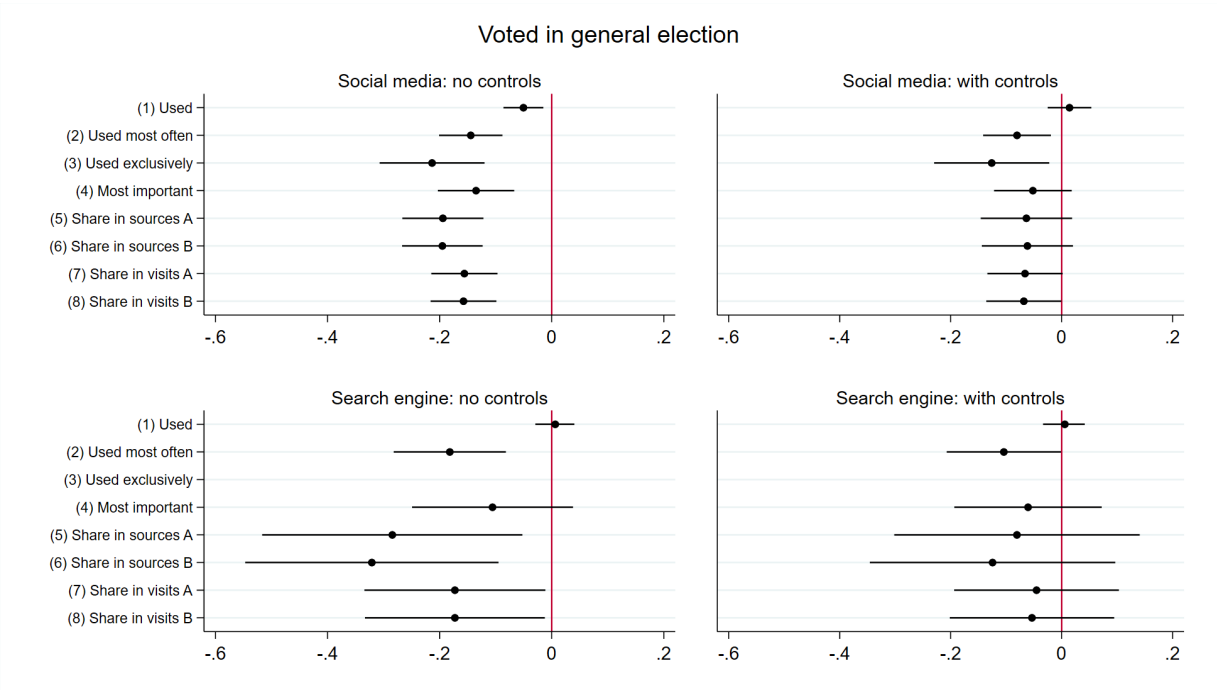
	(4.7)	(5.4)	(4.7)	(4.1)
Includes controls	No	Yes	No	Yes
Observations	2157	1830	2157	1823
R-squared	0.026	0.163		

*Note: The dependent variable is whether the respondent voted in the last general election (1 if yes, 0 if no). The coefficients are the probability of voting in the last general election compared to someone who uses traditional media most often (participation among this group was 88.1%). See Data section for a description of the control variables. Standard errors in parentheses. Stars denote significance levels: * 10%, ** 5%, *** 1%.*

A3.44 Once we added control variables to the regression the results were dampened. Controlling for the demographics of the respondents we found that people that use social media or search engines most often for news were respectively 8 and 10.4 percentage points less likely to have voted in the 2019 general election (column 2) when compared to an individual with the same demographics that uses traditional news sources most often. The results for the other news source categories were not statistically significant once we controlled for demographics. We obtained very similar results when we used logistic regression.

A3.45 Figure 8 displays the robustness of the results to different ways of measuring social media and search engine usage described in the data section. Respondents who use social media most often had a lower participation rate in the general election than respondents who use traditional media most often. We also found a significant result for using social media exclusively, but we did not find significant results for the remaining measures. Results for search engine use were not significant for alternative measures.

Figure 8. Probability of voting in last election by social media and search engine use.



Note: The figure shows the estimated difference in the probability of voting by the type of media used. See note to figure 1 for further details.

Discussion and limitations

A3.46 Our analysis has established that there are important differences in media plurality outcomes between people who rely on different types of news media. We found that users who use social media most often are less likely to correctly identify important news information, feel more antipathy towards people who hold different political views, and are less trusting of democratic institutions and the news media compared to consumers who use traditional media most often. This finding is robust to controlling for a variety of factors which might influence both the type of media uses as well as the outcomes and is consistent across a wide range of different measures of news consumption.

A3.47 We did not find such a consistent pattern with respect to people that use search engines and aggregators, when compared to people that use traditional news sources.

A3.48 This analysis does not permit a causal interpretation. It is possible that use of social media causes the differences in outcomes that we observe, but it is also possible that people with higher levels of polarisation, or lower levels of trust to begin with, for example, choose to obtain their news from social media. Our analytical approach, which controls for user characteristics, helps to reduce the likelihood of this latter interpretation, but it cannot eliminate it altogether, due to the possibility of unobserved characteristics that we are unable to control for.

A3.49 We are also mindful of the inherent limitations of survey data: people might not understand or misinterpret a question; they might display recall or reporting biases; and there might be differences across individuals in interpreting statements like 'strongly agree' or 'strongly disagree'. These risks are somewhat reduced in our case. We measure media use based on questions which are less prone to these errors, e.g., stating the source most used, or the three most important ones.

A3.50 Our measures of media use are by necessity incomplete. In particular, our quantification of news consumption is subject to two important caveats: first, people might inaccurately report what their news sources are and how often they access them and second, the data does not record how much time respondents spend on each news source.

A3.51 We are also aware that any approach to measuring outcomes may exclude some factors of interest. For example: our measures of democratic participation and knowledge of news may exclude some relevant considerations: a person who did not vote in the general election might be a very active member in their community, and a person who performed poorly on the news quizzes might be very well informed on issues which were not covered by the quizzes. A high or low score on the news quizzes could also be indicative of the difficulty of the quiz – though the average of 4.1 in the news knowledge index reassures us that the quizzes were neither too easy nor too difficult. Finally, both our trust and polarisation measures are necessarily relative – we can only infer that someone is more or

less polarised compared to a benchmark such as the sample average or the average among traditional media users.

Annex: News quiz true and false statements[11]

Quiz 1

The following list of statements contains three true statements and three false statements. Please select the three statements you think are true.

Don't worry if you're not sure, please choose which statements you think are true based on what you know about the subject.

1. The UK is set to ban the sale of all new diesel and petrol cars in 2030 [True]
2. Around 80% of the UK's total economic output is created by the services sector (e.g. retail, accommodation, finance) [True]
3. The earth's average surface temperature has increased by about 1 degree Celsius since 1900 [True]
4. In 2021, about a third of the UK's GDP (gross domestic product) was attributed to healthcare [False]
5. The cost of living rose by 1% from May 2021 to May 2022 [False]
6. UK average house prices have not increased over the past year [False]

Quiz 2

The following list of statements contains three true statements and three false statements. Please select the three statements you think are true.

Don't worry if you're not sure, please choose which statements you think are true based on what you know about the subject.

1. In May 2022, the UK government announced a universal energy bill discount of £400 [True]
2. The UK has committed to reducing its greenhouse gas emissions to net zero by 2050 [True]
3. In the UK, the majority of households own (with or without a mortgage) the home they live in [True]
4. The national living wage for those aged 23 and over is £7.50 per hour [False]
5. The current unemployment rate is 10% [False]
6. By the end of 2021, less than half of adults in the UK had at least one dose of COVID-19 vaccination [False]

[11] Note that the order of these quizzes and statements was randomised for each respondent; and that these true and false statements were accurate at the time of the survey (July-August 2022).