Is the MENA Surfing to the Extremes?
Digital and Social Media, Echo Chambers/Filter Bubbles, and Attitude Extremity

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Research suggests that people are motivated to avoid information that challenges their predispositions. They seek out attitude-consistent information, leading to more extreme attitudes. While research suggests that the Internet facilitates this selective exposure more easily than traditional media, there is little evidence that it contributes to *issue attitude* extremity, and even less outside the Western context. We seek to fill that gap using survey data from the Arab Barometer. Our results indicate that digital information consumption consistently predicts issue attitude extremity, but some part of that relationship is mediated by political attentiveness. These results have tangible implications for understanding the complex relationship between public opinion and governance in societies with limited or absent democratic structures.

Keywords: digital communication, social media, political communication, attitude extremity, Middle East and Northern Africa, polarization

Much of the popular discussion in the general media regarding the impact of the Internet began in the early 2010s amidst the Arab Spring uprisings. This series of antigovernment protests, uprisings, and armed rebellions spread across many of the countries included under the Middle East and Northern Africa (MENA) umbrella. These mainstream discussions around the Arab Spring came after the Iranian protests following the reelection of then-president Mahmoud Ahmadinejad in June 2009. In the case of the Iranian protests, the allegations of electoral irregularities, along with charges of fraud, were familiar from past elections (Howard, 2011). However, the media environment was different from that during

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Ahmadinejad's initial election in 2005. While previous Iranian elections had been undertaken in a society with a state media that was tightly controlled, 2009 had a new variable, with the Internet and social media providing alternative options for information transmission and opposition organization (Wagner & Gainous, 2013).

Digital technologies present a new opportunity structure for political communication. Scholars have been measuring and debating whether these new forms of communication will encourage democracy (Allison, 2002), lead to greater amounts of participation (see Boulianne, 2009, for a review), or even encourage and support more dissident behaviors by providing a forum for disgruntled citizens to share information and plan to counter dominant national actors (Valenzuela, 2013). Indeed, digital communication in more closed or autocratic nations is often a more open and less regulated forum for political exchange, allowing more opposition communication or even protest activity (Lutscher et al., 2019). This is especially true in states that lack the resources or ability to effectively monitor and limit digital media (Howard, 2011). Using the case of the MENA, where digital media may provide a very different new forum, we consider whether the rise of digital platforms and the resulting changes in how information is obtained and understood changes the underlying understanding and alters the nature of the political sphere.

While there is research showing selective exposure, through outlets such as cable news, stimulates partisan extremity (Davis & Dunaway, 2016), there is a dearth of work showing that digital consumption itself is directly related to issue attitude extremity. We test whether simply consuming digital media is altering the balance of information individuals bring to bear when forming an opinion, and as a result, creating a more polarized and hostile political environment. More simply, does the medium alone matter? We seek to address that issue using survey data from the Arab Barometer (2017). Our results indicate that digital information consumption consistently predicts attitude extremity. That said, we also find that political attentiveness mediates some of this relationship. Digital media consumption may stimulate political attentiveness or engagement, and through this attentiveness attitudes become more extreme.

Internet Filters and Selection

The Internet has fundamentally altered the opportunities to consume information. Using different applications, including social media platforms, and considering the algorithmic nature of the Internet today, people can avoid the discomfort caused by having their preferred flow of information juxtaposed against ideas, facts, or beliefs that are inconsistent with their own opinions. People are motivated reasoners, and they seek to avoid exposure to information that challenges their predispositions and to seek out networks with information consistent with their preexisting beliefs (Arceneaux & Johnson, 2013; Sears & Freedman, 1967). Essentially, the result is a gravitation toward more attitude-consistent news (Garrett, 2009; Garrett, Carnahan, & Lynch, 2013; Iyengar & Hahn, 2009; Levendusky, 2013; Stroud, 2008).

This shift in the flow of information goes beyond individual political actors and changes the fundamental aspects of communication strategies of the political system. The construction of attitudes is

altered if there is a change in the flow of reaffirming information. People are motivated to selectively expose themselves to agreeable content online because it reinforces their predispositions and avoids the discomfort of exposure to information that challenges core beliefs. Digital information consumption can make it easier for selective exposure and therefore may cause attitude extremity as people may only consume information filtered by preference. People end up in filter bubbles because they selectively expose themselves to certain information, often without a conscious intent to do so. Technology and social media promote this type of selective exposure even more than partisan media through algorithms and organizational platforms that aid in the creation of a limited information bubble.

Scholars are already observing higher rates of ideological polarization in the electorate (Webster & Abramowitz, 2017). Other scholars have found evidence that technology is helping to create information bubbles or echo chambers (Borah, Thorson, & Hwang, 2015; Colleoni, Rozza, & Arvidsson, 2014; Pariser, 2011; Sunstein, 2009). However, some evidence suggests that concerns about how the Internet creates echo chambers/filter bubbles may be mixed, premature, or overestimated (Bakshy, Messing, & Adamic, 2015; Barberá, Jost, Nagler, Tucker, & Bonneau, 2015; Dubois & Blank, 2018; Flaxman, Goel, & Rao, 2016; Garrett, 2009; Garrett & Stroud, 2014; Song, Cho, & Benefield, 2018). Digital media use, especially when used for nonpolitical engagement, can lead to incidental exposure to information that is outside one's political sphere. Indeed, researchers have found that incidentally exposed users use significantly more online news sources than nonusers (Fletcher & Nielsen, 2018). Recent work has found that many social media consumers across the political spectrum ultimately consume moderate media diets with a sizable part drawn from mainstream news websites and portals (Guess, 2021).

However, the societal and national contexts matter. While there is no bubble for many nonpolitical users, there is often a substantial amount of overlap in the ideological distributions of accounts followed by users who are strongly engaged in politics from both political parties (Eady, Nagler, Guess, Zilinsky, & Tucker, 2019). The bubble can be very real for people who are highly partisan and ideological, and this group may well be driving much of the traffic (Guess, Nyhan, Lyons, & Reier, 2018). The Internet and social media may not cause the echo chamber, but they provide the means to insulate when there already is a predisposition to do so. In a limited media environment, users will seek out contrary information that is not available in traditional outlets, with the result being a far more polarized content. This new hybrid environment (Chadwick, 2011), could be particularly polarizing in the MENA nations. In more closed states, the Internet may well be overpopulated with dissident information as the same knowledge is not available elsewhere. This would make the effect magnified in the MENA context.

To be clear, our goal is not to make an argument around the direct effects of selective exposure, but rather what digital information consumption produces in the MENA context. Instead of examining the degree to which the Internet facilitates selective exposure, we examine the potential consequences of this. We test the medium to see whether there is a relationship between online information gathering and policy attitude extremity. While we theorize that usage of digital media forces selective exposure, we recognize that other scholars have found alternative theories for increased political polarization. Lee, Shin, and Hong (2018) investigated the effects of social media use on political polarization using panel data collected in South Korea. While they did find that there were no direct effects, they also noted that

social media indirectly contributed to polarization through increased political engagement. In essence, those who actively used social networks were more politically active, and this activity led to ideological polarization (Lee et al., 2018). In this work, we focus on issue attitudes instead of ideology. Furthermore, we model the effect of the potential mediating relationship of engagement and political attentiveness to see if those play an influence in the MENA context.

State Media, the Internet, and the Modern MENA

While the relationship between partisan media consumption and attitude polarization has been studied in recent years (Prior, 2013; Stroud, 2010), traditional media was the primary focus of earlier research. Existing research on attitude formation and media focuses on the implications of state-sponsored media and other more traditional forms of media (Iyengar & Hahn, 2009; Levendusky, 2013; Prior, 2007). As the dominant source of information, traditional media consumption leads to stable public opinion because of limited information flows (Hastie & Park, 1986; Lodge & Taber, 2000; Zaller, 1992). The considerations people rely on to form opinions largely come from the media, and the absence of avenues for more extreme opinions limits the availability of these positions for general consumption. State media present in MENA countries limited opposition messaging (Wagner & Gainous, 2013).

The effect of choosing partisan mass media sources that confirm predispositions and existing biases is one of increased polarization (Davis & Dunaway, 2016; Levendusky, 2013). Consumers tend to accept information that is consistent with preexisting views already (Taber, Cann, & Kucsova, 2009; Taber & Lodge, 2006), but in the absence of competing information, the effect is amplified (Taber, Lodge, & Glathar, 2001; Zaller, 1992). Digital media often provides one-sided information, leading people to accept more polarized viewpoints. However, it is not just the mere exposure to one-sided information that leads to motivated reasoning but also the processing of the information that leads to the consumer becoming more extreme (Avnur, 2020). As views are repeatedly reinforced, the directional processing of the information becomes more extreme. (Avnur, 2020; Levendusky, 2013; Sunstein, 2009).

Although scholars have shown that selective exposure to traditional media, namely television news, stimulates attitude extremity (Arceneaux & Johnson, 2013; Levendusky, 2013), the application of this research in the digital universe raises new complexities. Existing research shows that multiple one-sided information flows are a common feature of the Internet. Furthermore, people who prefer one-sided information are more likely to gather political information via the Internet, and more likely to gather information from these one-sided sources (Gainous & Wagner, 2011, 2014). The likelihood of political participation increases in individuals who gathered more information from one-sided sources (Gainous & Wagner, 2011). While some scholars have suggested the small and already polarized nature of cable news audiences limits the ability of those channels to influence political attitudes (Arceneaux & Johnson, 2013), the Internet, with broad and growing consumption across demographics, presents an entirely new audience that is far more varied and is quickly growing in content and magnitude of consumption.

The features and scope of the Internet create an entirely new paradigm. Whether through human or machine aggregation, the polarization effect of the Internet is amplified by this method of

information simplification. The gathering of one-sided information comes with little to no effort from the consumer. The structure and norms of the Internet make self-selection of information inherent (Bimber & Davis, 2003). Readily available and well-designed search portals make online selective exposure merely a by-product rather than an act of cognition. Online applications can magnify this effect, in part, through the networks that people join and construct themselves or through online platforms that use algorithms designed to encourage users to frequent certain portals by providing agreeable content. Consumers have an arsenal of tools available to them to further self-select information. Search portals and online platforms allow users to reject and even remove information and sources that they do not prefer or wish to perceive (DeVito, 2016a).

The contrary is true as well, allowing users to select and denote preferences for information and which sources they like. Using the ability to self-select who and what to follow is a common feature of social media that further allows consumers to create a cognitively harmonious online experience (Bakshy et al., 2015; Jungherr, 2016). Armed with these tools, consumers have an unprecedented level of control, allowing them to define their consumption of information online. This level of control is not available to them in traditional media, specifically cable news.

However, research exists to suggest that the Internet is not a polarizing force. Some scholars have contended that networks can be constructed along nonpolitical and social lines that lead to more information sharing, and that social media and other similar platforms are creating exposure to and engagement with greater cross-cutting political information (Garrett & Stroud, 2014). Even with this considered, there is sufficient evidence surrounding Internet discourse that supports the approach that people are using motivated reasoning that specifically involves seeking attitude-consistent information (Gainous & Wagner, 2016). For example, the research focusing largely on chat rooms and general online discussion forums has suggested that the Internet provides echo chambers, where like-minded people are exposed to one-sided arguments that reinforce their initial predispositions (Borah et al., 2015; Sunstein, 2002; Wojcieszak & Mutz, 2009). Political leaders, politicians, and parties are often trusted sources that draw people toward harmonious information flows in mediums such as the ones listed above (Slothuus & de Vreese, 2010). Even if and when dissonant information makes it through the flow and to the consumers, it tends to be largely avoided by them altogether (Bakshy et al., 2015).

Thus, we theorize two basic successive principles: (1) the Internet allows people to choose their content and network of association, and (2) the Internet, through information-grouping platforms, serves as a *selective* political news/information aggregator. Unlike traditional news media, which limit people's ability to choose the content and flow of information, the Internet inherently allows people the choice of what information to consume and to define the news universe in which they chose to reside. The Internet thus provides people with multiple sources of political news in a central location, all of which cater to their views. While this happens across Internet platforms, this phenomenon is most commonly associated with social media, which, as selective aggregators, essentially provide individuals with one side of the information flow—the side that conforms to their predispositions (DeVito, 2016b).

More and more often, social media platforms enable people to sort their feeds and the flow of information based on their selected and algorithmic preferences. This allows people to avoid cognitively

dissonant information from appearing in their network, with little to no effort. In a 2016 article, DeVito emphasizes that social media tend to be homophilic and ideologically clustered (DeVito, 2016a; Gaines & Mondak, 2009; Kushin & Kitchener, 2009). A platform such as Facebook, whose news feed algorithm is weighted toward algorithmically identified values, has polarizing personalization baked into its design (DeVito, 2016b). The algorithm quite efficiently picks up on the information and people one prefers and shows that to them most frequently.

Social media are far from being the only tool that allows for self-aggregating information selection. From search engines to news-aggregating applications and everything in between, each is intended to adjust content to meet users' expectations. Substantial one-sided information is visible across online platforms. People's attitudes are made up of the mix of considerations that they have, and these considerations are also a mix of both long-term memory such as values, party identification, and personal experiences, and short-term memory consisting of recent experiences such as new stories and conversations with others about a topic (Hastie & Park, 1986; Lodge & Taber, 2000). The Internet provides the perfect environment for people to construct and shape their attitudes through flows of reaffirming, preferred information. People's predispositions aid in the consumption of one-sided information, and when added to existing information, crystallization of the bias occurs (Gainous & Wagner, 2016).

In a politically open nation like the United States, the Internet may create efficiencies in various types of political activity. In a nation with strict conventional political controls, the degree to which the Internet can alter political activity may be higher as it presents one of the few alternatives to the otherwise tightly controlled political processes (Wagner & Gainous, 2013). Within the context of the MENA, and in states lacking Western political freedoms, the Internet can become the most significant means to circumvent state control. The Internet should facilitate the development of opposition ideas and ideology by lowering the barriers to communication and organization while increasing the visibility of opposition movements and protests (McAdam, Tarrow, & Tilly, 2001; Tarrow, 2005).

By 2009 in Iran, there was a largely independent digital network, which allowed for the distribution of information outside the control of the state. The results were protests unmatched in size, scope, or duration since the Iranian Revolution in 1979. Social networking sites Facebook and Twitter were used extensively in both campaigns and subsequent protests, with a 25% increase in Iranian participation in social media over the last three months of the campaign. The role of social networking was so vital that the U.S. state department formally asked Twitter on June 16 to delay a network upgrade that would have briefly suspended service (Howard, 2011). The Internet and social media, just a year and a half later, became a central tool of the Arab Spring uprisings that spread throughout the MENA countries. Both of these events, the Iranian protests in 2009 and the Arab Spring beginning in 2010, while fueled differently and of different origins, relied in part on the Internet and social media. However, while the Internet was a significant factor, it is less clear how important it was in stimulating the unrest in Iran (Esfandiari, 2010; Morozov, 2011) and similarly throughout the MENA during the Arab Spring.

Ultimately, the Internet is changing how we access and understand information, which in turn is changing the perceptions and opinions of citizens, and ultimately voters. It may be, as some have

argued, that the Internet allows citizens to be selective in the information they see, allowing them to avoid information that does not conform with their existing beliefs and more frequently access information that does. Prior technologies and more traditional media cannot offer this level of selectivity. Alternatively, the Internet may not be as limiting, but people might be resistant to contrary information (Bakshy et al., 2015). Either way, we test whether digital media consumption is altering the balance of information individuals bring to bear when forming an opinion, and as a result, creating a more polarized and hostile political environment. We expect that engaging in the consumption of political information via selective behavior is associated with more extreme attitudes. Furthermore, this self-selection of information may be facilitated through online platforms, such as social media, which allow political candidates to reach specific users to build support while effective. The result may be increasingly polarized citizens in the MENA. We test these propositions below.

Data, Measurement, and Modeling Strategy

The data for this study come from the fourth wave of the Arab Barometer (2017). These nationally representative survey data were collected face-to-face in 2016 and 2017 in seven MENA countries and states including Algeria, Egypt, Jordan, Lebanon, Morocco, Palestine, and Tunisia. The sample includes 1,200 cases in every country other than Jordan and Lebanon, where 1,500 cases were collected (see Arab Barometer [2017] for a full description of the sampling strategy). While proportionally there were very few missing cases, to avoid bias in our estimates, we decided to replace those missing values for data used in the multivariate models that follow.[1] We relied on multiple imputation, assuming that the data were missing at random, specifying the model using the multivariate normal including all the variables in our regression models that follow. We created 30 replicate data sets and replaced each missing value with the average across those 30 data sets. This avoided the need to pool the imputed data sets and use Rubin's Rules to correct for underestimation in the standard errors in regressions, because we had a sufficient number of random draws to be confident that the error was minimized, as per the central limit theorem.

Our testing strategy here is straightforward. We identified all the indicators of digital information consumption as well as all the indicators of general political attitudes in the Arab Barometer (2017). This exhaustive search produced seven digital information consumption items and four broad categories of general political attitudes. The latter included attitudes about the economy, government performance, institutional trust, and democracy. After examining the distributions of an additive index of the seven digital information consumption items across each of the countries, we estimated separate models for each country of this index as a function of political attentiveness, traditional media consumption, religiosity, gender, age, and socioeconomic status (SES) to demonstrate that there are similar usage predictor patterns across countries (see Appendix A for operationalization and Appendix B for justification of inclusion).[2] The idea here was to provide evidence justifying pooling the data for our models of attitude extremity (which include the

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[1] Thirty-two of the 42 variables we use to create the indices and single-item measures, described below as the proportion of missing values, ranged from less than 1% missing to 12.7% missing.

[2] Find all appendices here: https://www.dropbox.com/s/nfgs02pswi577v1/MENA_appendix.pdf?dl=0

same set of controls). That said, we decided to be cautious, and nonetheless, include context controls (country dummy variables) in all these models.

We also recognize the potential for endogeneity in our models/theory because it is entirely possible that the relationship between extremity and digital consumption may run in the other direction. As discussed above, it is also possible that the effects of social media may be indirect. They may be mediated through increased political attentiveness (see Lee et al., 2018). We address both possibilities methodologically by fitting mediation models to the data. Of course, a mediation model does not eliminate the possibility of endogeneity, but it is a step in the right direction because the model is fit to a directional proposition—that is that digital information consumption stimulates political attentiveness, and this leads to attitude extremity. Mediation models allow us to estimate how much, proportionally, of the relationship between digital consumption and extremity is direct, and how much of that relationship is accounted for indirectly through political attentiveness.

Before getting to these models though, we first fit a confirmatory factor model to the seven digital information consumption items because we believed these items have a latent structure representing two different types of digital information consumption: General use and political use. After constructing extremity indices for each of the four general political attitude categories by folding each indicator within each category (i.e., grouping all those with positions at the poles, favorable and unfavorable, grouping all those that were moderate, and grouping those in-between, maintaining all the original intervals), rescaling them all to range continuously from 0 through 1, and then adding the items together in each respective category to create four continuous indices of attitude extremity (see Appendix A for a full description of the operationalization),[3] we fit our mediation models of each index as a function of the naïve digital information consumption index used in the first set of models, *ceteris paribus*, followed by replicate mediation models but using informed indices (general and political use) based on the results of a confirmatory factor model. This allows us to determine whether the effects of different types of consumption vary, and to see how much of the relationships are mediated by attentiveness. We standardized all the indicators to allow us to compare relative magnitudes as well.

The seven digital information exposure items include the following:

- On average, how often do you use the Internet? (daily or almost daily, at least once a week, at least once a month, a few times a year, and I do not use the Internet)
- Do you use the Internet to find out about political activities taking place in your country? (yes, no)
- Do you use the Internet to express your opinion about political issues? (yes, no)
- Are you a member of, or participant on, a Facebook page? (yes, no)
- Are you a member of Twitter, or a participant with a Twitter account? (yes, no)
- Are you a member of Instagram, or a participant with an Instagram account? (yes, no)

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[3] Each extremity index scaled together well: economy ($\alpha = 0.70$), government performance ($\alpha = 0.71$), institutional trust ($\alpha = 0.68$), and democracy ($\alpha = 0.77$). The distribution of each index and interpretation is included in Appendix C. Find all appendices here: https://www.dropbox.com/s/nfgs02pswi577v1/MENA_appendix.pdf?dl=0

- • Do you have a mobile phone or a smartphone with access to an Internet connection? (yes, no). Mobile phones and smartphones were combined to create one response for both.

We recoded the response direction one each to scale intuitively (higher values being affirmative use) and rescaled them all to range from 0 through 1 maintaining the original intervals. Then we added them all together and again rescaled to range from 0 through 1, to create our naïve digital information consumption index, which scaled quite reliably even though we believe there is a two-factor latent structure ($\alpha = 0.80$).
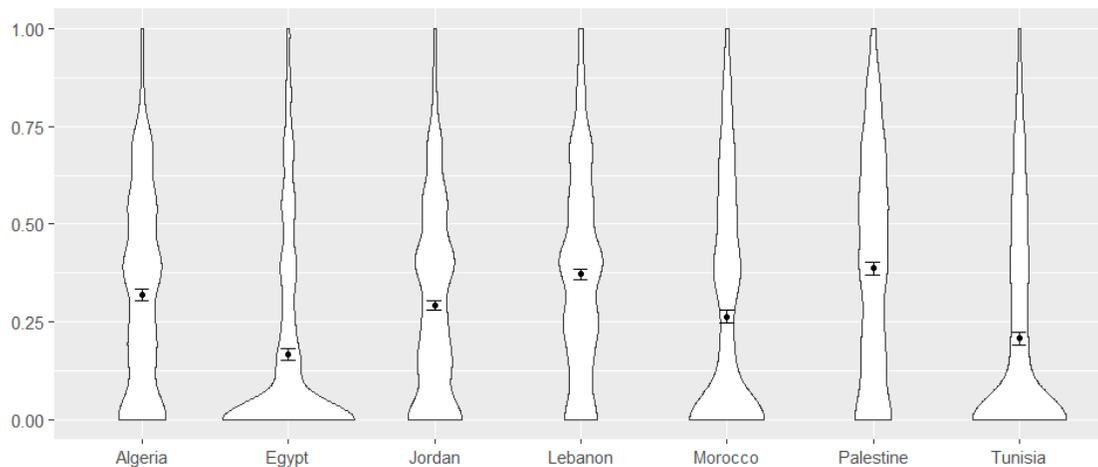
Figure 1. Central tendency and density of digital information consumption across country.

The distributions of this index across each of the countries in the data are displayed in the violin plot contained in Figure 1. Violin plots are particularly informative because they allow us to simultaneously see the central tendency and density on the index while comparing across countries. Digital information consumption varies across countries. The central tendency (the mean) shows that usage is highest in Palestine followed closely by Lebanon, then Algeria, Jordan, and Morocco although they are close to the same average usage. Behind these countries is Tunisia, and the lowest is Egypt. Notice that the density of the distributions across countries tells the story a bit more completely. The density for both Tunisia and Egypt as well as Morocco is skewed toward low usage. Palestine and Lebanon are relatively evenly distributed, suggesting that there are many citizens at all levels of usage, and Algeria and Jordan are not too far off. While, again, there is clear country-level variation here, that does not necessarily mean that the effects vary. In the results section below, we examine whether the predictors of usage vary significantly, the structure of how digital information is used, and whether consumption is consequential for attitude extremity.

Table 1. Models of Digital Information Consumption Across Country.

	Algeria	Egypt	Jordan	Lebanon	Morocco	Palestine	Tunisia
Attentiveness	0.09**	0.12**	0.15**	0.16**	0.23**	0.12**	0.09**
	(0.02)	(0.03)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
Trad media	0.04	0.11**	0.06**	0.13**	0.15**	0.21**	−0.06**
	(0.02)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Religiosity	−0.14**	−0.08**	−0.06**	−0.13**	−0.16**	−0.14**	−0.06**
	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)
Female	−0.00	−0.05**	−0.06**	0.01	−0.01	−0.05**	−0.09**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Age	−0.62**	−0.43**	−0.55**	−0.53**	−0.55**	−0.59**	−0.45**
	(0.03)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.03)
SES	0.33**	0.39**	0.33**	0.39**	0.40**	0.35**	0.42**
	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)
n	1,200	1,200	1,500	1,500	1,200	1,200	1,200
R^2	0.46	0.35	0.36	0.39	0.60	0.37	0.45

Note. Missing values were replaced using multiple imputation. *SE* in parentheses. **$p \leq .01$, *$p \leq .05$.

Model Results

The results of our models of digital information consumption across countries are presented in Table 1. We rely on ordinary least squares regression here because the index of digital information consumption is distributed continuously after adding all items together and imputing based on the multivariate normal. What is clear from these results is that the predictors of digital information consumption are highly consistent across countries with only minor variations. Political attentiveness is positively and significantly related to our naïve index of digital information consumption across all seven countries. Traditional media consumption is largely positively related to digital information consumption, with minor exceptions (it is not significant in Algeria, and the relationship is negative in Tunisia). Religiosity is negatively and significantly related to digital information consumption across all seven countries. Gender is also a bit inconsistent. Women are less likely to consume digital information in four of the seven countries (Egypt, Jordan, Palestine, and Tunisia), but the relationship is not significant in the other three countries. Older respondents are less likely to consume digital information across the board. SES is positively and significantly associated with all seven countries. Altogether, these results confirm that there is some uniformity in the pool of users in our sample. This gives us a profile of the users where digital consumption effects on attitude extremity may be concentrated. It also gives us reason to justify pooling the data across countries. However, there are certainly still many contextual cultural factors that vary and for which we cannot control. Accordingly, our models of attitude extremity that follow will still add country-level controls to account for some of this variation.

Before getting to the models of attitude extremity, we first examine the latent structure of digital information consumption. Referring back to the seven indicators presented in the previous section, it is obvious that some of those indicators gauge general Internet/social media use, while others are aimed at ascertaining the degree to which respondents were gathering political information. We thought it prudent

to recognize and measure these differences. The possibility that general use and political use may have varying effects on political attitude extremity makes perfect sense. Simply put, if citizens are selectively exposing themselves to political information, the filter bubbles created in this manner may be more consequential than just general Internet use. That said, those general use items gauge social media use, which as described in our theoretical section, rely on algorithms that respond to users' selective exposure, so they, too, should have positive effects on attitude extremity.

Table 2. Two-Dimensional Confirmatory Factor Analysis of Digital Information Consumption.

	B	SE	p Value
General Use			
Frequency of use	0.88	0.01	0.00
Facebook	1.02	0.01	0.00
Twitter	0.82	0.01	0.00
Instagram	0.83	0.01	0.00
Smartphone	0.69	0.01	0.00
Political Use			
Find out about	0.95	0.01	0.00
Express views	0.91	0.01	0.00
Observations = 9,000			
Comparative fit index = 0.997			

Note. The model relies on diagonally weighted least squares (DWLS) to estimate the parameters because the covariates are all categorical.

Our two-factor confirmatory factor analysis results are presented in Table 2. We estimated the model using a DWLS procedure because the covariates are all categorical. Again, we fit a two-factor model expecting frequency of Internet use in general, Facebook use, Twitter use, Instagram use, and having access to the Internet via a smartphone to all load on the first factor (general use), and whether people relied on the Internet to find about politics and to express their political views to load on the second factor (political use). The model fits well, suggesting there is a latent structure here.[4] As expected, the indicators all showed significant positive factor loadings, with standardized coefficients ranging from 0.69 to 1.02 (see Table 2). All of these are quite large. The comparative fit index is greater than 0.90, indicating the model fit is good. Similarly, the *p* value here is greater than .05, suggesting that the model has a close fit. As such, we constructed two more separate additive indices, one relying on the five general-use items (α = 0.79), and one built from the two political-use items (α = 0.72). Both were rescaled to range from 0 through 1 maintaining the original intervals. Altogether, this gives us three digital information consumption indices, which we will use below to measure consumption and polarization.

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[4] We also considered exploratory factor analysis. Included in Appendix D model is a scree plot along with justification for a two-factor model. Find all the appendices here:
https://www.dropbox.com/s/nfgs02pswi577v1/MENA_appendix.pdf?dl=0

Table 3. Models of Attitude Extremity.

	Economy			Government Performance			Institutional Trust			Attitude About Democracy		
Full index	0.10**			0.03**			0.04**			0.01**		
	(0.01)			(0.01)			(0.01)			(0.00)		
General		0.09**			0.03**			0.04**			0.01*	
		(0.01)			(0.01)			(0.01)			(0.00)	
Political			0.06**			0.02**			0.01*			0.01**
			(0.01)			(0.00)			(0.00)			(0.00)
Attentive	0.03*	0.04**	0.02*	0.02**	0.02**	0.02**	−0.01**	−0.01*	−0.01*	0.01**	0.02**	0.01**
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.004	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)
Trad media	−0.05**	−0.04**	−0.04**	−0.02**	−0.02**	−0.02**	−0.02**	−0.02**	−0.02**	−0.01**	−0.01**	−0.01**
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)
Religiosity	0.03**	0.03**	0.02*	0.01*	0.01*	0.01*	−0.00	−0.00	−0.01	0.01**	0.01**	0.01**
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Female	−0.09**	−0.10**	−0.10**	−0.03**	−0.03**	−0.03**	−0.06**	−0.06**	−0.06**	−0.02**	−0.02**	-=−0.02**
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Age	0.02*	0.02*	−0.00	0.03**	0.02**	0.02**	0.02**	0.02**	0.01	0.01*	0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
SES	−0.09**	−0.09**	−0.07**	0.00	0.00	0.01**	−0.02**	−0.02**	−0.01**	−0.02**	−0.02**	−0.02**
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
ACME	0.00*	0.00**	0.00	0.00**	0.00**	0.00	−0.00*	−0.00	−0.00	0.00**	0.00**	0.01**
ADE	0.03**	0.03**	0.00**	0.04**	0.03**	0.01**	0.04**	0.04**	0.01**	0.01**	0.01	0.04**
% Mediated	0.04*	0.03**	0.01	0.08**	0.06**	0.08	−0.06*	−0.02	−0.23	0.19**	0.14*	0.19**
N = 9,000												
R²	0.13	0.13	0.13	0.02	0.02	0.02	0.09	0.09	0.08	0.03	0.03	0.03

Note. ACME = a verage causal mediation effect; ADE = average direct effect.
Ordinary least-squares estimates are standardized, *SE* in parentheses. **p ≤ .01, *p ≤ .05. Missing values replaced using multiple imputation. The mediation model treatment values were set at the mean for each respective digital consumption measure, and the control variables were all set to 0. Country-level dummy control estimates are not presented here.

The results of the tests on whether each of these measures of digital information consumption is related to political attitude extremity and whether these relationships are mediated by attentiveness are presented in Table 3 (see Appendix E[5] for a description of the mediation model process and results of the first stage). Again here, we were able to rely on ordinary least squares because each of the measures of attitude extremity showed continuous distribution after the multi-item indices were constructed and imputed. Also, it is important to note that we standardized all the indicators here for comparative purposes. This way we can describe the effects in terms of changes in standard deviations. We first interpret the straight additive relationships in our models in Table 3, and then we interpret the mediation analysis.

The first obvious and quite striking observation that can be made here is that all three of our measures of digital information consumption consistently and positively predict attitude extremity across all four attitude domains.[6] The estimated relationships are significant in all 12 models. The next general observation is that the magnitude of the effects is on par if not larger than most of those of the other variables in the models. It is clear that the magnitude of the varied effects across the three measures of digital information exposure does not vary greatly, suggesting that filter bubbles exist on the Internet in general. No matter how people are consuming digital information, their consumption correlates strongly with attitude polarization. This is perhaps the most interesting of the comparative results. Separating digital consumption into three indices and showing that there is a strong relationship among each of these measures and extremity adds strength to the argument that selective exposure is taking place on social media, generally. It is not even necessary to ask people if they are selective on social media to identify a relationship. They tend to be more extreme simply by using the Internet.

Specifically, the estimates for the three digital information exposure items range from 0.01 (political use in the institutional trust model and all three indices in the democracy models) to 0.10 (the naïve index in the government performance model). The difference in the positive effects here is from a 0.01 unit standard deviation change in attitude extremity with every 1 unit change on the political consumption index to a 0.10 unit standard deviation change in attitude extremity for every 1 unit change on the naïve index. It is clear here that digital consumption appears to be most strongly related to attitudes about the economy (mean of the estimates = 0.08). The next strongest relationships show up in the government performance and institutional trust models (averaging 0.03 in both), and the weakest relationships are those in the attitude about democracy models, averaging only 0.01.

As for the control variables, first, attentiveness is positively and significantly related to attitude extremity in nine of the 12 models, with an average effect of 0.02 standard deviations changes in attitude extremity with every 1 unit change in attentiveness. Interestingly, though there is a weak but significant negative relationship with institutional trust extremity (mean = −0.01). Traditional media consumption is negatively and significantly related in all 12 models, with an average effect of 0.02. Religiosity is positively

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[5] Find all appendices here: https://www.dropbox.com/s/nfgs02pswi577v1/MENA_appendix.pdf?dl=0

[6] We also modeled each of the four domains individually as function of our full digital information consumption index separately for each country. The results are largely consistent with those of the pooled models, with a few exceptions noted in Appendix F along with the results. Find all appendices here: https://www.dropbox.com/s/nfgs02pswi577v1/MENA_appendix.pdf?dl=0

and significantly related to attitude extremity in nine of the 12 models, averaging 0.02 in those models. Women are less likely to have extreme opinions across the board, averaging 0.04. Age is a significant predictor of attitude extremity in eight of the models, averaging 0.02. Finally, SES is negatively related to attitude extremity in 10 of 12 models, averaging 0.04. Importantly here, overall, the control variables perform well, adding credibility to the assertion that the relationship between digital information consumption and attitude extremity is not spurious. So far, the evidence provides support for the proposition that consumption of information on the Internet stimulates attitude polarization. Next, though, we move on to mediation analysis to see how these results hold up.

The mediation results are at the bottom of Table 3.[7] Generally, the results suggest that digital consumption does have a direct relationship with attitude extremity and that this relationship is only partially mediated by political attentiveness, and this mediation effect is not consistent across issue domains. To begin with, the average direct effect was significant in 11 of the 12 models. As for the average causal mediation effects, political attentiveness accounted for a sizable proportion of the variance explained by each of the digital consumption measures in the attitude about democracy models. In fact, attentiveness accounted for up to 19% of the relationship between digital consumption and extremity in these attitudes. Attentiveness also accounted for 4% of the relationship between the full index and 3% of the relationship between the general index and attitudes about the economy. In the government performance models, attentiveness accounted for 8% of the relationship between the full index and extremity and 6% of the relationship between the general index and attitude extremity about government performance. Finally, in the institutional trust models, attentiveness was only significant in the full index model, and interestingly the percentage mediated was negative; this means the relationship between digital consumption and attitude extremity actually decreases as attentiveness goes up. Altogether, attentiveness does seem to have some mediating effect on the relationship between digital consumption and attitude extremity, but this mediating effect is only partial. Again, there was a significant direct effect in 11 of the 12 models.

Conclusion

In this research, we consider how digital information consumption is polarizing consumers of digital information, using the case of the Middle East. The mechanism is based on the method we use to select and then comprehend information. Our findings are consistent with the research that suggests people prefer information that is consistent with their predispositions, and the Internet facilitates selective exposure more easily than traditional media, so consumers are more likely to be forming attitudes based on one-sided information and developing a more polarized perspective (Gainous & Wagner, 2011). Indeed, as the preference for one-sided information continues to be in demand, the likely result will be the decline of more balanced sources of information.

However, we recognize that there is research showing that the effect of the Internet on the construction of filter bubbles is not as deterministic or expansive as our findings suggest (see, e.g., Bruns,

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[7] The mediation model treatment values were set at the mean for each respective digital consumption measure, and the control variables were all set to zero.

2019; Van Aelst et al., 2017). We note that nonpolitical and social lines can lead to information sharing and engagement with greater cross-cutting political information (Garrett & Stroud, 2014). Indeed, recent work has found that many social media consumers are using mainstream news websites and portals as a significant portion of their news consumption (Guess, 2021). Nonetheless, our findings suggest there is something to the idea of filter bubbles in particular contexts. The bubble does not have to be impervious to work. Dissonant information that makes it into the bubble can be, and often is, ignored or discarded (Bakshy et al., 2015). Furthermore, for highly partisan users the bubble can be very real, and this group may well be driving much of the traffic (Guess et al., 2018). In a closed state with limited access to information, the digital bubble may be sought out to counter state media. The power of the Internet is significant where traditional state institutions have failed, with more disruptive forces reshaping communication (Bennett & Pfetsch, 2018).

In addition to providing supporting evidence for existing public opinion knowledge, this study contributes to the study of the MENA in two significant ways. First, our finding suggests that the Internet affects attitude formation in ways that are parallel to what has been found in studies based on the U.S. population, but perhaps far more potent. As individuals use the information-saturated Web, they are exposed to a relatively wider range of information options relative to other information environments. This wider selection allows individuals to avoid information that is in dissonance with their values and/or seek out information that is in consonance with theirs. In the MENA context, it may well be that since information challenging the state is limited or not accessible in traditional media, the Internet and social media are inevitably a forum for opposing information. Previous research has already found evidence that exposure to transnational Arab TV can limit beliefs in national political identities (Nisbet & Myers, 2010) or generate anti-American views (Nisbet & Myers, 2011). In the MENA, people who go online are seeking the very information sphere that is not available in traditional outlets, making digital information inherently polarizing.

Our second contribution involves the institutional, cultural, and governmental variability among states in the MENA. To date, all the research focusing on this phenomenon is based on data coming from the Western context, which can be misleading (Hallin & Mancini, 2012). Our study is the first large examination of the relationship between digital selective exposure via social media and attitude extremity outside this context, situated in the volatile area of the Middle East. We test the assumptions about the Internet and measure the actual effects of digital media consumption on attitudes across the region. In particular, we assess the relationship between digital information consumption and attitude extremity across a range of attitude objects in the Middle East using survey data from the Arab Barometer (2017). The variety of institutional and cultural contexts that exist within the Arab Barometer (2017) sample allows us to test whether the selective exposure hypothesis is bound by conditions not present in other studies. The results indicate that digital information consumption consistently predicts attitude extremity in this context. The nature of the limited MENA information sphere itself may well matter.

Furthermore, while the importance of the Internet in shaping attitudes is clear, and the implications are significant, this study leads to several more paths of inquiry. While we did not focus this research on disinformation, the availability of online networks to push false and potentially inflammatory opinions is

apparent. It is likely a cat-and-mouse game going forward. As governments and Internet companies attempt to control their networks, people are likely also to be learning how to navigate around filters. The underlying truth may be that the Internet is opening a venue for insular politics with a consistent demand for one-sided material as a going concern.

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