

What makes gun violence a prominent issue?

A computational analysis of compelling arguments and partisanship

Abstract

Drawing upon theories of compelling arguments and selective exposure, this study examines the impact of mainstream and partisan media on U.S. public opinion regarding a highly polarized issue: gun violence. Results demonstrate that episodic framing of gun violence in the mainstream media increases the issue prominence among conservatives than liberals, thus to some extent narrowing the opinion polarization. Exposure to conservative media, however, makes people believe gun violence is a less important issue.

Keywords: agenda setting, framing, compelling arguments, selective exposure, machine learning, panel survey

The political climate in the United States is increasingly polarized (Pew Research Center, 2017). Liberals and conservatives are divided on a wide range of political values to the point that they inhabit almost two different worlds. One possible explanation of this trend is media fragmentation, particularly with the rise of partisan media. Conservative- and liberal-leaning media have been depicting two distinct versions of social reality and their impact on political polarization has been profound (Mitchell, Gottfried, Kiley, & Matsa, 2014; Stroud, 2011). Emerging partisan news websites such as *Breitbart* have become an especially powerful voice, competing with not only traditional partisan media but also those in the mainstream.

This study takes an agenda-setting perspective to explicate the influence of mainstream and partisan media on public opinion. Agenda-setting theory asserts that the news media can determine the public perception of the most important problems facing the nation (McCombs, 2014). As Stroud (2011) argued, the media's agenda-setting function of building a shared issue agenda among citizens is crucial to democracy, because it allows the government to better allocate limited resources and take actions more efficiently. In a fractured media landscape, however, various media outlets may set different agendas by prioritizing different issues. Even if the news media do cover the same issues, they may emphasize different aspects of a given issue, which may alter the perceived importance of the issue by the public. The latter process is described as the "compelling arguments" hypothesis (Ghanem, 1996, 1997). The exposure to different media outlets may lead to a divided public with different issue priorities, and ultimately divergent interests and goals.

Drawing upon agenda-setting theory and the compelling arguments hypothesis in particular, this study explores the link between news coverage and the potential shift of public opinion on a particular issue—gun violence. The United States has the highest rate of gun-related

homicides in the developed world, which is nine times as high as in Canada and 29 times as high as in Denmark (Aizenman, 2018). Despite the seriousness of the issue in reality, little action has been taken at the Congressional level partly because Republicans and Democrats remain split on most gun-related policies (Pew Research Center, 2018a). After all, the U.S. public even disagree on whether gun violence is an important issue that should be tackled. While the majority of Democrats ranked gun violence as one of the most serious problems facing the nation, less than a third of Republican voters agreed (Dam, 2018). In fact, despite several transient spikes in response to the deadliest mass shootings, the U.S population continues to perceive gun violence as less important than other issues such as immigration, healthcare, and race relations. After the Parkland shooting in February 2018, a record high of 13% of Americans mentioned guns or gun control as one of the most important problems facing the country (Jones, 2018). The percentage fell, however, to just 1% a year after the tragedy. Aside from the deep-rooted gun culture in the United States, what else contributes to the public indifference toward and partisan divide over the gun violence issue? To answer these questions, the study tests the compelling arguments hypothesis. We expect that that framing gun violence episodically or thematically—focusing on individual stories or broader context of an issue (Iyengar, 1991)—in different media may generate distinct influences on the public of varied political orientations.

Specifically, this study employed the state-of-the-art machine learning method to examine 25 media outlets' news coverage of gun violence, and then paired the results with a two-wave panel survey conducted during the 2018 U.S. midterm elections. The study advances previous literature in several important ways. First, based on the examination of thematic and episodic frames as compelling arguments, the study adds a strong theoretical link between agenda setting and framing theory. Second, the study used a matching strategy to investigate the

compelling arguments hypothesis at the individual level (Rössler, 1999; Shehata & Strömbäck, 2013), an underdeveloped and yet a more suitable approach to measure media effects because it considers individual variances in terms of media exposure. Third, the study explores the impact of a variety of media outlets—mainstream and partisan, traditional and emerging, thus depicting a more holistic picture of the emerging media landscape than previous research that focused on a selected few traditional media organizations.

Agenda Setting, Framing, and Compelling Arguments

Agenda-setting theory proposes that the salience of object can be transferred from the news media to the public's mind (McCombs, 2014). The more emphasis the news media place on a certain issue or political candidate, the more likely the public will perceive the issue or the politician as important. Attribute agenda setting, the second level of the theory, further suggests the salience of attributes that describe a given object can also be transferred from the media to the public agenda (McCombs, Llamas, Lopez-Escobar, & Rey, 1997). That is, the news media not only determine what we think, but also how we think about.

One less developed area of research that connects the two levels of agenda-setting theory is the “compelling arguments” hypothesis (Ghanem, 1996, 1997). It suggests that certain attributes of an object have particular resonance with the audience, and are therefore more effective than other attributes in altering the public's perceived salience of the object. Along this line of thought, compelling arguments “are *frames*, certain ways of organizing and structuring the picture of an object that enjoy high success among the public” (McCombs, 2014, p. 1971, italics added). The difference and convergence between attribute agenda setting and media framing is debatable (McCombs & Ghanem, 2001; Scheufele & Tewksbury, 2007). One common thread we emphasize here is that both theories assert some aspects of news coverage are

more important than others. As Reese (2001) argued, one can frame a certain issue in multiple ways, but a frame must be shared on some level for it to be communicable and effective.

Compelling arguments are the frames that are effective in raising the public's awareness of a given issue.

Empirical evidence has been found for the compelling arguments hypothesis. For example, Kioussis (2005) examined five U.S. presidential elections (1980-1996) and found that media salience of some attributes about political candidates, morality in particular, was positively associated with the those candidates' perceived public salience. Similarly, Sheaffer (2007) found that negative media coverage of the economy increased the perceived salience of the issue on the public agenda, and this effect was stronger than the effect of media salience alone. More recently, Saldaña and Ardèvol-Abreu (2016) proposed a new concept, compelling association, based on the emerging Network Agenda Setting Model. The study found evidence that some bundles of attributes of a given object in media coverage can resonate with the audience better than other bundles, which could increase the public salience of the object.

As these studies reveal, not all attributes are equally powerful in setting the agenda and some attributes may even decrease the public salience of an object. An analysis of the 1990 German national election found that a newspaper's positive tone to describe the environment reduced the perceived salience of that issue, a process described as "agenda deflating" (Schoenbach & Semetko, 1992). In the U.S. context, Yioutas and Segvic (2003) observed that in covering the Clinton/Lewinsky scandal the news media most frequently touched on "sex scandal/adultery," an attribute of low relevance among the audience that negatively affected the story's salience for the public. The authors suggested that the compelling arguments effect explains how, despite the media's extensive coverage of the scandal, Clinton's approval ratings

remained unaffected. Taken together, research about compelling arguments sheds light on how a particular type of news coverage will increase or decrease the issue priority among the public.

Notably, previous research has mainly examined compelling arguments as *substantive* or *affective* attributes, using the terminology of attribute agenda setting (McCombs et al., 1997). Substantive attributes are the cognitive characteristics that describe an object (e.g., qualifications and personalities of a political candidate), while affective attributes are concerned about the valence of the message (e.g., positive, neutral, and negative). Although the compelling arguments hypothesis theoretically builds a link between attribute agenda setting and framing, the empirical research has not tapped into the nuances of media framing, which are beyond substantive and affective attributes. Among other framing approaches, this study focuses on the distinction between *thematic* and *episodic* frames, hypothesizing that these two different ways of framing news will affect the salience of a given issue differently.

Thematic versus Episodic Frame as Compelling Arguments

Episodic and thematic framing were identified by Iyengar (1991), and distinguished by the content scope of a news story. An episodic frame focuses on concrete events or an individual's story, while a thematic frame situates the story in a broader context (Iyengar, 1991). In the case of gun violence, DeFoster and Swalve (2018) noted that there have been significant shifts over the past 20 years in how gun violence has been framed in the news: from isolated events that included more individual-level, episodic frames to wider "societal-level thematic concerns," treating severe gun violence incidents like mass shootings as "exemplar(s) of a broader problem" (p. 10). In contrast, Holody and Daniel (2017) found that the media framing of the 2012 Aurora mass shooting focused more on individual- than societal-level issues, as compared to previous media coverage of mass shootings. They speculated that news media adopt

episodic frames to cover individual events due to the assumption that the audience already have baseline familiarity with the ongoing debate about the gun violence issue.

In terms of framing effects, researchers hold distinct views about the relative effects of episodic and thematic framing, and empirical findings are mixed. Iyengar (1996) argued that episodic framing tends to blame individuals for the issue, thus shielding society and government from responsibility. Thematic framing does the opposite. For example, when news media cover poverty episodically, the “blame” for being poor would be directed more at individuals. On the other hand, with more thematic coverage of poverty, audiences would consider broader societal factors. Empirically, researchers found that thematic framing has the effect of increasing public support for governmental or public policy solutions to issues like climate change (Hart, 2011) and social security (Springer & Harwood, 2015).

Other researchers found that stories with an episodic frame are more powerful in stimulating emotional responses among the audience, which could in turn have a more powerful influence in altering public opinion. For example, Gross (2008) observed that some episodic framing of stories about mandatory minimum sentences elicited higher levels of empathy, which was related to more opposition to the practices. Similarly, Aarøe (2011) also found that the effectiveness of episodic framing increased with the intensity of emotions elicited by the frame. In contrast, thematic frames in some instances were found to decrease the audience’s emotional involvement in a story. As Boukes and colleagues (2015) explained, episodic framing elicits more sympathy on the part of the viewer when stories touch on a broader issue using “common” individuals as “exemplars.”

Different from the framing effects research reviewed above, central to this analysis is whether episodic or thematic framing makes a more compelling argument to persuade the

audience into believing an issue is important. As discussed above, a compelling argument should have a particular resonance with the audience. Research shows that a negative tone in media coverage often increases an issue's public salience because negative information captures the public's attention much more than positive information (Sheafer, 2007). Likewise, episodic framing should have a stronger appeal to audiences than thematic framing because of the former's capability to elicit emotional responses. In the case of gun violence, public opinion polls show that only major mass shootings will increase the issue's overall public salience (Jones, 2018), suggesting that public opinion may be more responsive to gun violence incidents than broader discussions. Based on the literature and anecdotal evidence, it stands to reason that episodic frame should work as a more compelling argument to cover the gun violence issue. We test the first level agenda-setting effect as the baseline and then examine the compelling argument hypothesis.

H1: Exposure to gun violence on top of the news media will increase the perceived importance of the issue by the public.

H2: Exposure to episodic—but not thematic—coverage of the gun violence issue in the news media will increase the perceived importance of the issue by the public.

Agenda setting theory, including the compelling arguments hypothesis, may provide different explanations for different media and audiences. In a polarized political environment, an argument considered compelling to conservatives might not resonate with liberals, and vice versa. Given that gun violence is highly polarized issue, whether conservatives or liberals are more susceptible to the compelling arguments effect is a matter of debate. Aalberg and Beyer (2015) showed that liberal audience groups favored human-interest frames in covering the issue of “irregular immigration” while conservatives opposed them. Therefore, it is likely that episodic

framing of the gun violence issue would be more effective on liberals than conservatives. On the other hand, a ceiling effect is possible because if the public already perceives an issue to be important at the outset, exposure to media content would only marginally increase the public salience of the issue. Given that public opinion polls consistently show liberals are more likely than conservatives to believe gun violence is an important issue (Dam, 2018), it would be reasonable to assume that the media's agenda-setting effect should be stronger on conservatives. Since either direction is possible, we pose the following questions:

RQ1: To what extent does political orientation moderate the relationship between media exposure to gun violence and perceived issue importance?

RQ2a-b: To what extent does political orientation moderate the relationship between the exposure to episodic (a) and thematic (b) framing of the gun violence issue in the news media and the perceived importance by the public?

Beyond the consideration of political orientation, individuals' selective exposure to partisan media may further help explicate this phenomenon.

Partisan Media and Selective Exposure

The theory of selective exposure suggests that individuals actively seek out news and information to reinforce their existing views (Stroud, 2011). This is because people tend to enjoy messages that are aligned with their own beliefs and avoid challenging information, as cognitive dissonance theory establishes (Festinger, 1962). Applying the theory to a polarized media environment, scholars have found that citizens are more likely to expose themselves to like-minded partisan media (Wicks, Wicks, & Morimoto, 2014). However, as Garrett (2009) pointed out, a preference for opinion-reinforcing political information does not always co-exist with

systematic avoidance of opinion challenges. Recent research confirms that the majority of people do not limit their media use to partisan media (Guess, 2016).

Regardless of one's media diet, the impact of partisan media appears to be significant. Research consistently shows that exposure to like-minded partisan media influences political attitudes, which ultimately contributes to political polarization (Levendusky, 2013; Stroud, 2010). For people who are engaged in cross-cutting media exposure, they also tend to be influenced by pro-attitudinal partisan media to a larger extent than other media sources (Garrett, Weeks, & Neo, 2016).

Examining the effect of partisan selective exposure in the realm of agenda-setting research is important. When partisan media are powerful in shaping different issue priorities and opinions among their followers, a unified sense of community is at stake. However, the literature is underdeveloped. Stroud (2011) observed that conservative and liberal media could determine the issue priorities for conservatives and liberals respectively, but the study was based on indirect evidence. Among the few studies that tackled selective exposure and attribute agenda setting, researchers did find that the exposure to partisan media significantly influenced how people perceived a particular issue (Hyun & Moon, 2016; Muddiman, Stroud, & McCombs, 2014). This study seeks to extend this line of research by contributing more empirical evidence and, more importantly, by incorporating the compelling arguments hypothesis. As argued above, it is important to understand what kind of media coverage is effective in making an issue prominent on the public agenda. Here we further expect that the compelling arguments effect should be strengthened (or may only exist) when considering partisan selectivity in this polarized media environment. Again, we first examine the baseline agenda-setting effect on the issue of gun

violence, and then test the compelling arguments hypothesis, focusing on the distinct effects of thematic and episodic frames.

H3: Exposure to gun violence on top of the pro-attitudinal partisan media will increase the perceived importance of the issue by the public.

H4: Exposure to episodic—but not thematic—coverage of gun violence in the pro-attitudinal partisan media will increase the perceived importance of the issue by the public.

Method

This study examines agenda setting and the compelling arguments hypothesis at the individual level based on a matching strategy that pairs content analysis of media messages and a two-wave panel survey (Rössler, 1999; Shehata & Strömbäck, 2013). This approach is advantageous because, first, it considers each respondent's specific media diet and exposure. Second, the use of panel data captures the amount of opinion change between the first and second survey waves, providing more evidence for causal inference.

An ideal approach is to content analyze all media outlets used by each survey respondent and then compare the results with the respondent's issue agenda. However, as Stroud (2011, p. 147) acknowledged, "conducting a content analysis of thousands of newspapers, radio stations, cable news stations, and Internet Web sites is not possible." This methodological constraint explains the fact that the existing studies examined only a selected few media outlets, or turned to other more manageable proxies. The media landscape is even more complex today when people consume news across a variety of media platforms. For example, one may listen to NPR on his or her commute, check out the website of NPR while at work, and receive NPR's news notifications on social media. The ideal approach would mean measuring each respondent's

exposure to each of the media sources from multiple platforms. This would be almost impossible for a self-reported survey because of the recall error. Moreover, a lengthy survey questionnaire (e.g., 30 media sources \times three platforms = 90 questions) would negatively affect the response rate and quality.

This study developed an approach to at least partially address these limitations and advance previous literature methodologically. In the survey, the study asked each respondent to report the frequency of obtaining news from a particular media source (e.g., NPR) without specifying media platforms. Then each individual's uses of different media platforms were included as control variables. To match the survey data, this study relies on an online media dataset and a computational analysis approach to examine news coverage from each media outlet's website instead of content analyzing the same media in different formats. The assumption is that the same media outlet should offer similar content across platforms and that news websites should provide the most comprehensive archive, thus best representing the media's overall agenda. More importantly, this approach makes it possible to process a large amount of media data from a wide variety of media outlets, which can better reflect the diversity of media choices and audience preferences in today's media environment.

Media Agenda: A Computational Analysis

The content analysis results are from a larger project, which examines gun violence coverage over the course of 2018. Based on the synthesis of a number of sources (Alexa, 2018; Pew Research Center, 2018b; Statista, 2018), a list of 30 news media outlets was created. The list contains news media from the left, center, and right sides of the ideological spectrum, and include both traditional and emerging media outlets. News articles were retrieved using Crimson Hexagon's Foresight social media analytics platform. Among the 30 media outlets, 25 are

archived in Crimson Hexagon and therefore are included in the final analysis. The 25 media outlets were categorized into three media types: 1) traditional mainstream news media; 2) conservative media, and 3) liberal media. See Appendix 1 for specific media outlets in each category. The following Boolean keywords were used to search in news headlines for articles about gun violence: gun OR firearm OR nra OR “2nd amendment” OR “second amendment” OR AR15 OR “assault weapon” OR rifle OR “brady act” OR “brady bill” OR “shooting.” This search resulted in a total of 42,917 articles.

Manual Content Analysis. A stratified sample of 2,392 articles was drawn for manual content analysis to develop human coding labels for training computer models, as described below. The unit of analysis was a news headline. Two communication student coders were trained to determine whether a news article is indeed about gun violence, and whether the article employs an episodic or thematic frame. The intercoder reliability test was conducted based on a random sample of 200 news headlines, reaching 0.97 krippendorff’s α for relevance and 0.87 α for the type of frame. The coders then coded the rest of the data.

Text Classification using BERT Model. Supervised machine learning (SML) uses a set of prelabeled cases to build a concise model that can automatically assign labels to unknown cases (Kotsiantis, 2007). In terms of Natural Language Processing (NLP) tasks, human coders label a sample of text documents (e.g. news headlines, tweets), and the annotations are used to train a SML model. The recently proposed model—Bidirectional Encoder Representation from Transformations (BERT)—significantly improves the performance of SML by adding an important layer of information (Davlin, Chang, Lee, & Toutanova, 2018). Based on the pre-training of a deep neural network on a large text corpus (i.e., Wikipedia pages and books), the BERT model produces embeddings (i.e., vectors of numbers) that represent the meaning of

sentences. This is superior to other text classification models (e.g., the bag-of-words) that process each word separately because BERT represents words considering their relationships and the context of communication. Computer scientists have fine-tuned BERT by adding a prediction scheme to continue SML on a variety of specific tasks (Davlin et al., 2018; Metz, 2018). To put it simply, the machine will first obtain some knowledge from BERT about how to classify texts. Then learning how humans do so will further improve the classification accuracy.

For this analysis, we input the news headlines into the BERT model and then fine-tuned the model for our own analysis by adding the two prediction schemes based on neural network classification (i.e., relevance, episodic vs. thematic frame) on top of the model respectively. Based on a 10-fold cross validation¹, the model to predict relevance reached 0.93 precision, 0.95 recall, and 0.94 F-score.² The model to predict episodic and thematic frame reached 0.95 precision, 0.89 recall, and 0.92 F-score. The two models were then used to predict the relevance and frames of the entire remaining news article in our dataset.

Public Agenda: A Panel Survey

A two-wave national panel study was conducted during the 2018 U.S. midterm elections. Both waves of the survey were conducted and administered by Qualtrics, a U.S.-based international survey firm. To supply a network of diverse respondents, Qualtrics aggregates samples from over 20 online panel providers. In this study, quotas on gender and age were specified so that the sample matches the distribution of these two demographics of the U.S. national population. The first wave of data collection took place between October 2nd and 19th, when 2,017 respondents completed the survey questionnaire. The second wave was conducted between November 14th and December 4th. A total of 1,039 respondents returned and completed the survey, resulting in a 51.5% return rate.

Measurements

Perceived Issue Importance. In order to measure the change of perceived issue importance over time, respondents in both waves were asked to evaluate the importance of the gun violence issue based on a seven-point scale, with 1 being “not important at all” and 7 “extremely important.”

Importantly, the perceived issue importance recorded in the second wave was the dependent variable for each model, while the response in the first wave was used as a control. In other words, the models estimate the media’s agenda-setting effect on the *change* in perceived importance of the gun violence issue between the two panel waves.

Issue and Frame Exposure Indices. Following the matching procedure to measure individual level agenda-setting effects (Rössler, 1999; Shehata & Strömbäck, 2013), indices of issue and frame exposure were created for each individual respondent by taking into account the person’s specific media use. For each of the 25 media outlets mentioned above, the respondents were asked to report their frequency of news consumption based on a five-point scale (1=Never, 5=Always).

The *issue exposure index* was calculated for each respondent regarding the three media types (mainstream, conservative, and liberal). The salience of gun violence in each news outlet—measured as the frequency of issue coverage—was multiplied by respondents’ reported frequency of using that specific media outlet. For each respondent, the index considers the media exposure between the dates the respondent completed the two waves of the survey. These 25 products, each representing a specific media outlet, were added based on the three media types and then averaged. That is, the issue exposure index captures the likelihood of every individual respondent being exposed to the gun violence issue in a certain media type during a certain time

period. The frame exposure indices were created in a similar way. The *episodic framing exposure index* considers the salience of episodically framed news articles measured in proportion to each media outlet and each respondent's media use. The same was done to create the *thematic framing exposure index*.

Media Use. The respondents' news consumption patterns were included as control variables. We measured traditional media use by asking the respondents to report their frequency of getting news from printed newspaper, printed news magazine, television news, and radio (Cronbach's $\alpha = 0.68$). Similarly, online news consumption was computed by respondents' self-reported frequency of using online news websites and news apps (Cronbach's $\alpha = 0.56$). Informational use of social media was constructed based on respondents use of Facebook, Twitter, Reddit, YouTube, Snapchat, and Instagram (Cronbach's $\alpha = 0.85$).

Political Orientation. The study measures the respondents' political orientation by asking, "when it comes to politics and public affairs, where would you place yourself on a scale of 0-10, where 0=Strong liberal (left-leaning) and 10=Strong conservative (right-leaning)?"

Other Control Variables. In addition to the control variables introduced above, the analysis also controls the effect of *political interest* by averaging two items based on a five-point Likert scale, with 1 being "strongly disagree" and 5 "strongly agree": "I'm interested in information about what's going on in politics and public affairs" and "I pay close attention to information about what's going on in politics and public affairs." Since the analysis is about one's perception of the gun violence issue, each respondent's *gun ownership* and *prior experience with guns* was also controlled. Finally, demographic variables include *gender* (female = 50.5%), *age* ($M = 49.08$, $SD = 15.85$), *education* (mode = some college), *race/ethnicity* (mode = white), and *income* (mode = \$50,000 to \$74,999).

Data Analysis

This study conducted lagged hierarchical regressions and presented two sets of regressions: one for general media exposure to the gun violence issue and the other for media exposure to episodically or thematically framed news coverage. Model 1 is the baseline model that contains all control variables including political orientation and perceived issue importance in the first wave. We then examined the effects of different media exposure indices on the change in the public's issue salience. Finally, interaction terms that consider the interaction between each media exposure index and political orientation were added to investigate how the effects of different media outlets might vary by audience types.

Results

The purpose of the study is to test the compelling arguments hypothesis with respect to the gun violence issue. Table 1 and 2 summarize all results of this study. To establish the baseline agenda-setting effect, H1 expects that a greater amount of exposure to gun violence coverage in the mainstream news media will make people believe the issue is more important. However, the results show that this relationship was not significant for mainstream news media. H1 was not supported. In addition, it turns out that exposure to conservative media had a negative impact on public salience of the issue ($\beta = -.098, p < .01$). That is, the more one is exposed to the gun violence coverage in conservative media, one will attach less importance to the issue. Moving to H2, the study does not find support for the compelling arguments hypothesis for the general public: exposure to episodic framing of gun violence did not raise one's awareness of the issue importance.

In addressing RQ1, our results demonstrate that political orientation moderated the relationship between media exposure and perceived issue importance. As Figure 1a shows,

Gun Violence Compelling Argument

compared to liberals and people who are politically neutral, conservative-oriented respondents were more likely to be influenced by the mainstream news media (interaction term $\beta = .152, p < .01$). That is, exposure to mainstream news media will make conservatives perceive gun violence as a more important issue more so than liberals.

<Insert Figure 1 about here>

The picture becomes more complete when delving into the compelling arguments effect (RQ2a-b). The results show that conservatives were more responsive to episodic framing than liberals and politically neutral respondents. According to Figure 1b, exposure to episodically framed news coverage about gun violence shortened the gap between liberals and conservatives in terms of their perceived importance of the gun violence issue (interaction term $\beta = .143, p < .05$). By contrast, thematic framing decreased the issue importance among liberal-oriented respondents to a greater extent than the rest of the population (interaction term $\beta = .125, p < .05$; see Figure 1c).

H3 and H4 examine the effects of selective exposure to partisan media. However, neither hypothesis was supported in this analysis. It is worth noting, though, that the interaction between exposure to thematically framed news in conservative media and political orientation was significant at the 0.1 level (interaction term $\beta = 0.118, p = 0.098$). As Figure 1d shows, while this type of media framing in conservative media did not increase perceived issue importance among like-minded respondents, it did make people from the opposite political camp believe the issue was less important.

Discussion

Drawing upon the literature of compelling arguments and selective exposure, this study examines the impact of different news media outlets on U.S. public opinion regarding an

important and a highly polarized issue facing the country: gun violence. Among other findings, our study shows that episodic framing of gun violence in the mainstream news media increases the perceived issue importance among conservatives, thus to some extent narrowing the opinion gap between conservatives and liberals. Exposure to conservative media, on the other hand, makes the audience believe gun violence is a less important issue. Results of the study shed light on whether media coverage, as well as what kind of media coverage, makes gun violence a prominent or less prominent issue on different publics' agendas. The research also makes a number of theoretical and methodological contributions as detailed below.

The most notable finding is that news coverage about gun violence in the mainstream news media, and episodically framed news in particular, raised the awareness of the issue importance among conservatives to a significantly greater extent than the rest of the population. The finding is important in several aspects. First, it suggests that mainstream news media still have agenda-setting power in this high-choice media environment, at least at the individual level. Despite the recent attacks on the mainstream media and the public's declining faith in the press, our research shows that some people—conservatives in particular—who are exposed to the mainstream media are still likely to be susceptible to the media's agenda-setting effect. It may be that conservatives who consume more mainstream media are also thus exposed to more alternative discourses about gun violence that do not already align with their viewpoints. Haider-Markel and Joslyn (2001) found that, when exposed to alternative arguments, Republicans would change their opinions about concealed carry gun laws. In line with previous research, our study indicates that exposure to mainstream news media may help reduce political polarization to a certain degree.

Second, our findings provide empirical support for the compelling arguments hypothesis, which asserts that not all news coverage can raise the public salience of the issue. In the case of gun violence, it appears that episodically framed news focusing on concrete gun violence incidents or individuals' stories are more effective in setting a certain public's agenda perhaps because of episodic frame's power to elicit empathy among the audience (Gross, 2008; Aarøe, 2011).

Third, our study shows the mainstream media's agenda-setting power, and the compelling arguments effect in particular, was moderated by political orientation. The finding that liberals are not as subject to the media effects than conservatives can be explained by the ceiling effect. Consistent with the public opinion polls (Dam, 2018), our data shows liberals already believed gun violence was a very important issue in the first wave of the survey ($M=6.30$, $SD=0.86$). Compared with liberals, the perceived issue importance among conservatives was significantly lower ($M=5.77$, $SD=1.10$), thus allowing more room for media's agenda setting. Given that episodic framing is effective in eliciting emotions (Gross, 2008; Aarøe, 2011), our finding may also reflect liberals and conservatives' differing approaches to empathy. Whereas liberals both want to and do feel more empathy toward others, conservatives are less motivated to feel empathy and do indeed feel less empathy (Hasson, Tamir, Brahm, Cohrs, & Halperin, 2018). It is possible that, with a higher predisposition toward empathy to begin with, liberals are more immune to the effects of episodic framing in news coverage. Conservatives, on the other hand, may be more susceptible to episodic framing because the empathy mechanism has a greater effect.

Another intriguing finding is conservative media's "agenda-deflating" effect (Schoenbach & Semetko, 1992). As the results show, the more one is exposed to conservative

media, the less importance one will attach to the gun violence issue. This pattern becomes more noticeable with respect to the effect of conservative media's thematic framing on liberals. Given that the majority of Republicans favor protecting gun ownership rights over gun control, it makes sense that their like-minded media would frame the gun violence issue in a way that would cause the audience to believe the issue should not take the priority over others. While the study does not find empirical support for selective exposure, it offers some new thoughts in considering this highly partisan media environment. For some issues such as the one analyzed here, perhaps the research focus should not be solely on how partisan media can increase the perceived issue importance among their pro-attitudinal audience, because this might not be the media's intention in the first place. Investigating how partisan media "deflate" the agenda among their pro-attitudinal as well as counter-attitudinal audience might be a fruitful direction for future research. Moreover, researchers could also further examine what kind of thematic framing serves as the compelling *counter*-argument.

In addition to specific findings, this study makes a meaningful theoretical contribution to agenda-setting and framing research. As an important advancement of agenda-setting theory, the compelling arguments hypothesis suggests that certain attributes are more powerful than others for increasing an issue's prominence among the public. The powerful attributes, as agenda-setting scholars have argued, operate like frames because they have more resonance with the audience, and are thus capable of making more compelling arguments to set the public agenda. Despite the discussion about the similarity between compelling arguments and frames, previous research has focused on substantive and affective attributes defined in agenda-setting research, without exploring the nuances of different frames. This study measured episodic and thematic frames as compelling arguments, finding evidence that these two media frames did vary in their

agenda-setting impact among different groups of audiences. Doing so adds a theoretical link between agenda setting and framing theory. It is important to note that communication researchers remain undecided about the convergence of the two theories, and that determination is beyond the scope of this research. The contribution of this study is to shed light on the connection between compelling arguments and frames. To reiterate, we suggest that compelling arguments are frames that are effective in shaping the public's issue priority.

Methodologically, using the matching strategy to measure agenda setting at the individual level combined with the state-of-the-art machine learning method makes it possible to analyze media effects by taking into account the large diversity of individuals' media diets. This study considered not only traditional news media, but also a number of emerging partisan media outlets. Therefore, results of the study should better reflect this rapidly changing, high-choice media environment. In addition, the use of panel data is more effective in measuring opinion change over time, which is better for making causal inference.

The results should be interpreted with the following limitations in mind. Like any other individual-level agenda-setting research, media exposure was estimated. Because of the methodological constraints, it is not possible to capture each respondent's media exposure across media platforms in a precise manner. Second, the ceiling effect among liberals may be related to the operationalization of the perceived issue importance variable. Future research could consider using open-ended questions to measure respondents' thoughts about the most important issues facing the country.

Endnotes

1. Cross-validation is a technique to evaluate predictive models by partitioning the human labeled sample into a training set to train the model, and a testing set to evaluate the model performance. For example, one trained model was used to predict whether the news headlines in the testing set were relevant to gun violence. Then the performance of the trained model was evaluated by comparing the predicted labels and the actual human coding. In our 10-fold cross-validation, the human labeled sample was randomly partitioned into 10 equal size subsamples. Among the 10 subsamples, nine were used as training data, and the remaining one was used as the testing data. The cross-validation process was then repeated 10 times and the validation metrics were averaged.

2. Precision is the ratio of true positives to the total predicted positive observations. For example, in predicting relevant news headlines, the prediction score measures out of all the headlines predicted by the model as relevant, how many of them were indeed relevant coded by humans. Recall is the ratio of true positives to all observations in the actual case. The recall score measures out of all the news headlines coded as relevant by humans, how many of them were predicted by the model. F-score is the weighted average of prediction and recall.

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Table 1. Effects of Issue Exposure on Perceived Issue Importance

	Model 1	Model 2	Model 3
Prior issue importance (W1)	0.565***		
Age	-0.003		
Gender	0.028		
Household income	0.021		
Education level	-0.017		
Race			
Black/African American	0.017		
Hispanic/Latino	-0.016		
Asian	0.003		
Native American	-0.059*		
Other	-0.014		
Online news use	-0.033		
Social media news use	0.034		
Traditional media use	0.078**		
Gun ownership	0.110***		
Personal relevance to guns	0.121***		
Political interest	-0.042		
Political orientation	-0.114***		
<i>Issue exposure</i>			
Mainstream media		0.066	
Conservative media		-0.098**	
Liberal media		-0.003	
<i>Interaction Term</i>			
Mainstream media × Political orientation			0.152**
Adjusted R ²	48.7%	49.8%	50.1%
ΔR ²		1.1%	0.2%

Note. N = 1,039. Cell entries are final-entry ordinary least squares (OLS) standardized coefficients (β). W1 = Wave 1. † $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

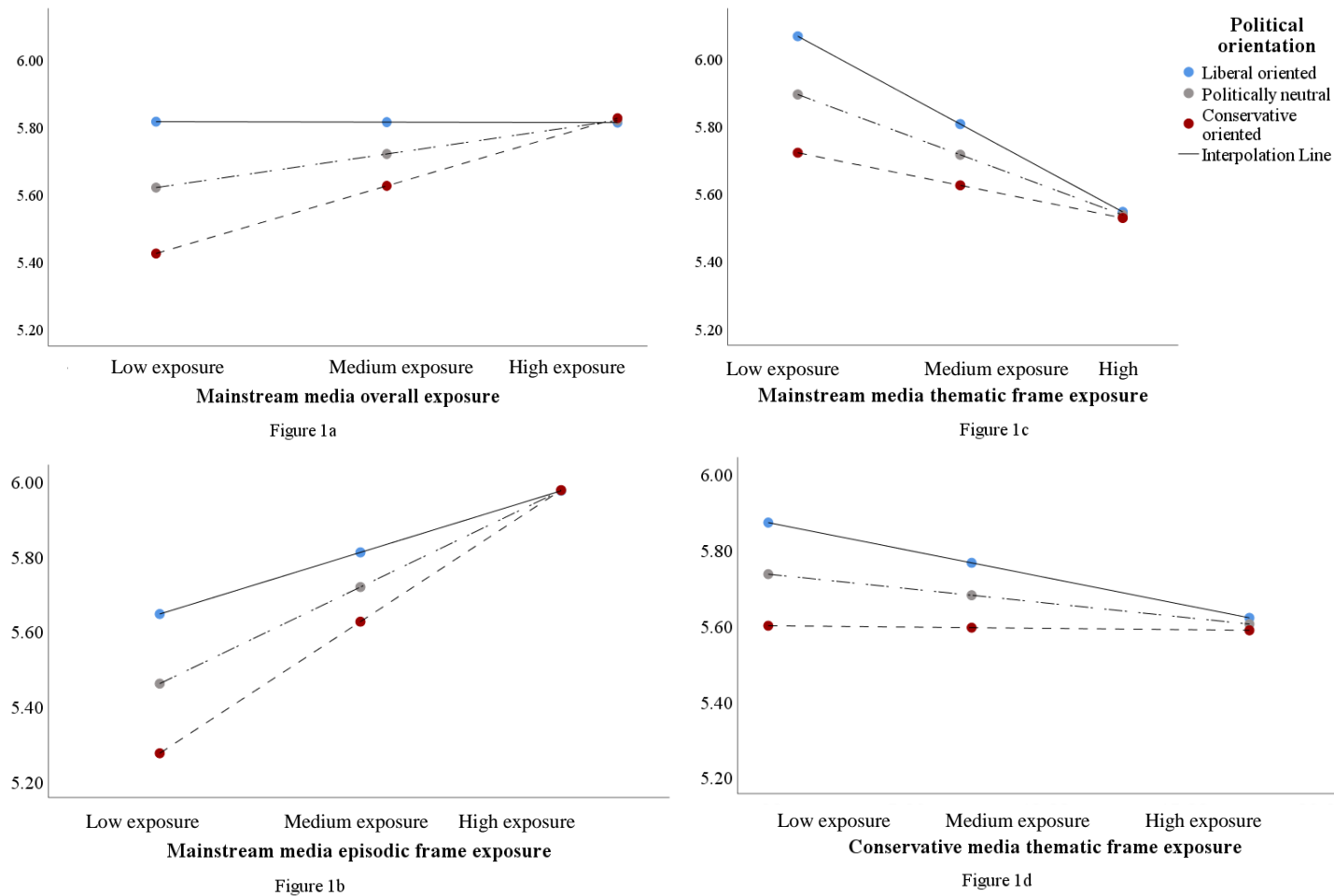
Table 2. Effects of Episodic and Thematic Frame Exposure on Perceived Issue Importance

	Model 4	Model 5	Model 6	Model 7
<i>Thematic frame exposure</i>				
Mainstream media	-0.145			
Conservative media	0.000			
Liberal media	0.042			
<i>Episodic frame exposure</i>				
Mainstream media	0.205			
Conservative media	-0.105			
Liberal media	-0.015			
<i>Interaction Terms</i>				
Mainstream thematic × political orientation		0.125*		
Conservative thematic × political orientation			0.118†	
Mainstream episodic × political orientation				0.143*
Adjusted R ²	49.7%	49.9%	49.8%	50.0%
ΔR ²	1.0%	0.2%	0.1%	0.3%

Note. N = 1,039. Cell entries are final-entry OLS standardized coefficients (β). W1 = Wave 1. † $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$. The co-efficient of all the control variables are the same as in Model 1, Table 1.

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Figure 1. Interaction between Media Exposure and Political Orientation



Note: “Liberal oriented” = 1 SD below the population mean (2.44); “Politically neutral” = population mean (5.27); “Conservative oriented” = 1 SD above population mean (8.10); Y-axis represents the respondents’ perceived importance of the gun violence issue on a seven-point scale.

Appendix 1. News Media Categorization

Type of outlet	Outlet name
Mainstream media	ABC News CBS News NBC News CNN PBS NPR <i>Chicago Tribune</i> <i>Los Angeles Times</i> <i>New York Times</i> <i>Newsweek</i> <i>USA Today</i> <i>Wall Street Journal</i> <i>Washington Post</i>
Conservative media	Fox News <i>TheBlaze</i> <i>Breitbart</i> <i>The Daily Caller</i> <i>Newsmax</i>
Liberal media	<i>The Atlantic</i> <i>Buzzfeed</i> <i>Daily Kos</i> <i>Huffington Post</i> <i>Mother Jones</i> <i>Slate</i> <i>Vox</i>