ITZHAK YANOVITZKY

Effects of News Coverage on Policy Attention and Actions

A Closer Look Into the Media-Policy Connection

Studies that examine the media-policy connection often neglect to fully explore the dynamic nature of this association over time. It is suggested that a conceptual framework that separates media effects on policy makers' attention to issues from effects on their actual behavior (or policy actions) may be key for studying the dynamic relationship between information in the media and policy response to this information. Employing this approach to the case of drunk driving between 1978 and 1995, it was found that heightened media attention to the drunk-driving problem at the beginning of the issue-attention cycle (the early 1980s) attracted greater policy attention to this issue and pressured policy makers to generate immediate, short-term solutions to the problem. Yet, once the volume of media attention to this issue started to wane (from the late 1980s onward), policy preferences gradually shifted to long-term solutions.

Early discussions of the relationship between the mass media and public policy making centered on the idea that the mass media occupy a role of liaison between citizens and governments (Siebert, Peterson, & Schramm, 1956). First, the media cover issues that are prioritized by governments and elites. Next, media representations of these issues stimulate public discussions that help to crystallize individual opinions on these matters. Finally, the media collect individual opinions to represent public opinion that policy makers rely on for feedback on their own performance while learning about issues that matter to the public. Later on, as research on the media-policy link became primarily the domain of agenda-setting research (Dearing & Rogers, 1996), researchers have come to realize that a direct, symbiotic link exists between the media and policy agendas. That is, policy makers tend to infer the public's stand on issues from the media agenda (Linsky, 1986) and, at the same time,

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regularly use the media to promote their policies (Kingdon, 1984). Overall, however, the empirical evidence in support of direct media effects on public policy making is contradictory (Edwards & Wood, 1999), leading many to the conclusion that media effects on policy are possible in some instances but not in others (Baumgartner & Jones, 1993; Dearing & Rogers, 1996; Edwards & Wood, 1999; Kingdon, 1984; Linsky, 1986).

The key research question regarding the media-policy link, then, becomes one that inquires about the particular circumstances or conditions under which media effects on policy making are likely to occur and the way they are manifested. Much of the past and present effort to explain the responsiveness or unresponsiveness of policy makers to the media agenda focuses on the influence of external factors such as the number of issues competing for policy attention or the presence of powerful actors (e.g., social movements) that lobby for a particular policy change (Baumgartner & Jones, 1993; Hilgartner & Bosk, 1988). This is essentially a static view of the media-policy link because it ignores the fact that external forces often operate simultaneously on both the media and the policy agenda and that both media coverage of and policy response to issues evolve over time (Dearing & Rogers, 1996). In other words, external factors (most of which tend to exist at the societal level) can only explain a certain portion of the variance in policy makers' response to issues on the media agenda, particularly when this association is examined over time. The other part of the explanation must come from examining the dynamics of policy makers' own response to information in the media as a fairly distinct and homogeneous group. From this perspective, factors such as existing predispositions or ideological stances, personal cost-benefit considerations, and organizational constraints such as regulations and routines may explain the differential responsiveness of policy makers to information in the media across issues and over time.

This approach serves as the current study's point of departure. In contrast to other studies that examine the media-policy link at the societal level, this study uses a more dynamic conceptualization, one that goes on to examine the impact of news coverage on policy makers as a distinct group of individuals by separating media effects on cognitive elements (policy attention) from effects on behavioral elements (policy actions). Based on this conceptualization, it is suggested that the impact of news coverage on the process of policy making is primarily manifested in the timing and intensity of policy response to public problems as well as in the nature of the policy solutions pursued. This proposition is then tested in the context of drunk-driving-related policy in the United States between 1978 and 1995.

The Media-Policy Connection: A Conceptual Framework

Communication theory prescribes that media exposure is the primary condition for media effects on individual judgments and behavior (McGuire, 1989). There is little doubt that policy makers meet this requirement. A recent study that explored patterns of media use by members of Congress (Bennett & Yanovitzky, 2000) found that, on average, legislators spend 1.8 hours each day reading a daily newspaper and 1.5 hours a day watching television news programs. An overwhelming majority of them also consider national and local news media to be the single best source of information on national events and events in legislators' states or districts (compared to interpersonal communication channels). Similar patterns of policy makers' media use were also recorded during the 1970s (Weiss, 1974), the 1980s (Bybee & Comadena, 1984), and the 1990s (Riffe, 1990).

Beyond exposure, however, media effects are contingent on a person's motivation to attend to the message and process the information it contains (McGuire, 1989; Petty & Cacioppo, 1986). Motivation, in turn, is a function of both individual characteristics (e.g., education, interest, and predispositions) and message attributes such as presentation, frames, and quality of persuasive arguments (Kuhn, 1991; Petty & Cacioppo, 1986; Price & Tewksbury, 1997). Policy makers have a strong incentive to process information in the news media (Linsky, 1986). On one hand, given the fluid and competitive nature of the political arena, unresponsiveness of policy makers to issues that climb the media agenda may compromise their current position of power in government (Lemert, 1981; Linsky, 1986). Moreover, allowing the media to construct issues and mobilize public opinion is a politically dangerous position for elected officials and bureaucrats who then risk losing control over how the issue is defined and resolved (Dearing & Rogers, 1996). On the other hand, media construction of a public problem opens a window of opportunity for political gain (Kingdon, 1984). The policy-making process is often opportunistic, and policy makers regularly use the media to accomplish their political goals (Hess, 1984). Favorable media coverage may increase the ability of policy makers to get their policies successfully adopted and implemented (Linsky, 1986) or win them some important political gains with key constituencies (Diani, 1996; Edwards & Wood, 1999).

Policy makers' high stakes in media coverage of public issues motivates them to actively seek, attend, and process related media messages. As a result, they are likely to engage in central processing (Petty & Cacioppo, 1986) of this information. Ironically, this tendency makes them less susceptible

to persuasion efforts because they draw on their prior experience and knowledge to carefully scrutinize and resist persuasive information in the media. Political predispositions, for instance, seem to be particularly powerful in this respect (Bennett & Yanovitzky, 2000; Linsky, 1986). Thus, although heightened media attention may attract policy makers' attention to certain issues (Linsky, 1986; Rogers, Dearing, & Chang, 1991), there is a very low likelihood that this coverage will alter their beliefs and attitudes regarding issues they believe to be important, unless they are challenged by cogent contrary information (Kingdon, 1984). Instead, the effect of media coverage of issues on policy making is likely to be manifested in two forms: the timing of intensive issue-related policy making and the type of policy choices pursued by policy makers.

Similar to media organizations, policy makers' work is guided by routines (Edwards & Wood, 1999; Kingdon, 1984). At any given moment, the political system is grappling with a great number of tangible problems that vie for leaders' attention. Because leaders can only attend to a very small number of them at a time, they typically rely on these routines to prioritize their activities (Hilgartner & Bosk, 1988). As a result, policy making tends to be characterized by long periods of relative stability and incrementalism (Baumgartner & Jones, 1993). From time to time, however, this equilibrium is punctured or interrupted by sudden demands for a dramatic change that force leaders to respond quickly to restore equilibrium without fundamentally changing the nature of the system (Baumgartner & Jones, 1993). Because the majority of these sudden demands are communicated through the media (Edwards & Wood, 1999; Kingdon, 1984), policy makers tend to interpret sudden fluctuations in media attention as a cue for action (Linsky, 1986). One would, therefore, expect that the volume of issue-related policy measures would be higher following increased media attention to this issue. Over time, as media attention to this issue wanes, the volume of policy measures should stabilize once again. Furthermore, the degree of policy change in response to increased media attention will depend on the tone set by the media (Baumgartner & Jones, 1993; Zaller, 1992). Enthusiastic, one-sided treatment of the issue will result in a rapid policy change. Debate and criticism are predictive of slower and gradual policy actions.

Besides influencing the timing and intensity of policy making, media attention to issues may also be related to the particular policy choices pursued by policy makers regarding a certain problem. In much the same way that media representations of issues shape lay people's judgments (Gamson, 1992; Iyengar, 1991; Iyengar & Simon, 1993; Price & Tewksbury, 1997), they are likely to influence policy makers' views of public problems (Linsky, 1986). For example, policy makers may use media representations to attribute

responsibility to a problem (Iyengar, 1991), learn about some of its solutions (Price & Tewksbury, 1997), or use it as a benchmark against which to evaluate their own performance in dealing with the problem (Iyengar & Kinder, 1987). Nonetheless, as noted above, policy makers are less susceptible to such effects (i.e., priming and framing) because personal knowledge and experience as well as ideological and organizational constraints (e.g., budgetary constraints or the party's stand on issues) effectively inoculate them against media frames (Edwards & Wood, 1999; Kingdon, 1984). Bennett and Yanovitzky (2000), for example, found that policy makers have an almost uniform tendency to disagree with the statement that many of their policy decisions (and of other policy makers, for that matter) are influenced by media coverage of issues. Rather, policy makers are likely to follow media prescriptions of responsibility and solutions to problems if they already fit into their own belief structure (Gusfield, 1981; Roessler, 1999) and if they present an opportunity for political gain (Kingdon, 1984). When these conditions are met, one would expect that the majority of policy actions following peaks in media attention will be in line with those prescribed in the media (i.e., immediate, short-term solutions to the problem), but as media attention fades over time, institutional and long-term solutions are preferred (Baumgartner & Jones, 1993).

Hypotheses

The conceptual framework that guides the current study draws heavily on processes of media effects at the individual policy-maker level. This study, in contrast, seeks to test hypotheses about the media-policy connection at the societal level by analytically extending the process of effect at the individual level to represent similar processes at the aggregate or the group level (see Price, Ritchie, & Eulau, 1991). For the analytical extension to be valid, both micro- and macro-level units must represent similar constructs (Nass & Reeves, 1991) and individuals (or fairly homogeneous groups of individuals) need to be implicated in the relationship between these constructs (Pan & McLeod, 1991). Because policy makers have been shown to constitute a fairly homogeneous group of individuals in terms of political motivation, professional concerns, and contact with external sources of influence on their political decisions and behavior (Baumgartner & Jones, 1993; Edwards & Wood, 1999), it seems reasonable to argue that the cognitive process by which each individual policy maker reacts to information in the media is substantively similar to that of other policy makers. If this assumption is correct, three specific predictions regarding the association between media attention to public issues and related policy making may be drawn from the discussion above.

The first two pertain to the association between media coverage and policy attention to issues (as a measure of a cognitive response), whereas the last relates to the potential effect of this coverage on policy makers' actual behavior.

Hypothesis 1: Heightened policy attention to a public issue will be prompted by increased media attention to the same issue. Particularly, the volume of issue-related ad hoc activities by policy makers (as a measure of policy attention) will be greater than similar routine activities.

Hypothesis 2: Following a decrease in media attention to this issue, policy attention to the same issue will decrease as well. Specifically, the volume of issue-related ad hoc activities by policy makers will be lower than similar routine activities.

Hypothesis 3: The nature and volume of policy makers' actions will correspond to the solutions advocated in the media regarding this problem and the frequency in which they were mentioned. As media coverage decreases, the volume of policy actions will decrease as well and actions designed to achieve short-term solutions will be replaced with actions designed to achieve long-term solutions.

It is worth noting that three elements separate these hypotheses from traditional formulations of similar predictions within the domain of agenda-setting research. First, unlike other formulations of similar hypotheses, a distinction is made here between media effects on policy attention and media effects on policy actions. This, in turn, requires the use of measures that are sensitive to this distinction. This point will be further clarified in the discussion of the study's methodology.

Second, although many similar hypotheses argue for an association between changes in media attention to issues and changes in related policy, the language used here implies a causal influence from media coverage to policy making. This, to a great extent, is a function of the longitudinal methodology used in this study (see below). It should be noted, however, that in theory, there are two alternative explanations for any observed relationship between media coverage and policy making. One concerns the possibility of a reversed causal direction wherein media attention and prescriptions of solutions to public problems are influenced, to some degree, by the type of solutions (short-term or long-term) adopted by policy makers and the intensity in which they pursue them. The other pertains to the possible influence of a third variable, such as available policy options, on both media attention and prescriptions of solutions and policy makers' actual actions. Both are tested empirically in this study as well.

Last, and more important, taken together, the study's hypotheses aim at capturing a process of change over time in policy response to media coverage of an issue. As noted above, this is an attempt to move from a static

conceptualization of this association to a more dynamic framework of examining and understanding this association. More specifically, it is an attempt to model the impact of the well-documented media issue-attention cycle on public policy (Dearing & Rogers, 1996; Downs, 1972). For this reason, these hypotheses are tested with longitudinal data on media attention and policy response to the problem of drunk driving (DD) between 1978 and 1995. The choice of DD and this particular time period as the focus of investigation was motivated by findings of previous studies on the DD case (e.g., Borkenstein, 1985; Gusfield, 1981; McCarthy, 1994). These studies showed that although DD was recognized as a major public problem by federal agencies, state and local police, and the research community beginning in the 1970s, this problem received very little media attention until the beginning of the 1980s. The intensity of anti-DD policy actions was low as well during the same period. Then, coinciding with the rise of the grassroots movement against DD (e.g., Mothers Against Drunk Driving), both media and policy attention to the DD problem escalated rapidly throughout the mid-1980s. The use of longitudinal data, therefore, is expected to sort out the nature and direction of the media-policy association in the DD case.

Methodology

Media Attention

Media attention to the DD problem between 1978 and 1995 is the independent variable in this study. Three major national news sources, the *New York Times*, *Washington Post*, and *Associated Press* (AP) wire service, were selected to represent the national media environment. The *New York Times* and *Washington Post* were chosen for their intermedia agenda-setting power and the strong relationship that exists between these daily national newspapers and other national news sources, including television networks (Dearing & Rogers, 1996; Neuman, 1990; Yanovitzky & Bennett, 1999). In addition, there is evidence that both newspapers are central to elites and policy makers (Bennett & Yanovitzky, 2000; Dearing & Rogers, 1996; Hess, 1984). The AP wire service was included because it feeds many national and local news outlets (both print and electronic) and thus approximates well the national news environment (Fan, 1988). Using a single news story as a coding unit, the Lexis-Nexis on-line database was searched to generate a census of all DD-related news stories that appeared in these national news sources between January 1, 1978 and December 31, 1995. Because a conservative measure of media attention was sought, only news stories whose primary theme was the issue of DD were included in the analysis.[1] The main criterion

for exclusion was any mention of DD in passing. For example, a news story in the *Washington Post* that simply compared the success of a citizens' group against child molesters to that of citizen groups against DD (Mathews, 1982) was excluded from the analysis.

Although the use of online databases is fairly common for retrieving newspaper stories (Roberts, 1997), sampling errors may challenge both the internal and external validity of the study. Beyond failures to select data sources that are representative of the entire universe of sources, sampling errors are typically a product of a misspecified search phrase (Salton & McGill, 1983). A well-specified search phrase is measured against its ability to minimize two types of errors: errors of omission (recall) and errors of commission (precision). Recall addresses the concern that the search phrase used does not adequately capture the entire universe of relevant content items. Precision, on the other hand, addresses the concern that the search phrase used captures a substantial number of nonrelevant content items.

To estimate the levels of recall and precision associated with the search phrase used (in syntax form: 'atleast2 drunk! or drink! or intoxicated or impaired w/1 driv!'), a procedure suggested by Wray and his colleagues (Wray, Maxwell, & Hornik, 1998; also see Yanovitzky & Bennett, 1999; Yanovitzky & Blitz, 2000) was followed. First, of the 216 months of media coverage included in the analysis, one third (75 months) were randomly selected to generate a subsample of DD-related news stories. Next, to capture the entire universe of DD-related news stories that appeared during these months, an open search phrase (the combination of 'drinking and driving' anywhere in the text) was employed. This procedure generated a total of 2,123 news stories that were then reviewed to determine whether they were relevant to the topic of DD following the criteria described above. Of these, only 1,058 news stories (49%) were found to be relevant. In the next step, the proposed search phrase was used to retrieve relevant news items from the same sample. This procedure generated 1,026 news items, of which 1,014 (98.8%) were relevant by the same criteria. To minimize the possibility of a selection bias, a second coder was asked to review the subsample of news stories and then to determine their relevancy. Agreement on relevant DD-related stories between the author and the second coder was calculated using Scott's pi (Scott, 1969) and reached an acceptable level after correcting for chance agreement ($\Pi = .82$).

An estimate of news stories recall was calculated separately for each month by dividing the number of relevant news stories retrieved by using the proposed search phrase by the number of relevant news stories retrieved by using the open search phrase. On average, the proportion of news story recall for each month was found to be high (recall = .96, $SD = .025$). News stories'

precision was calculated separately for each month by dividing the number of relevant news stories retrieved by the proposed search phrase by the total number of both relevant and nonrelevant news stories retrieved by the same search phrase. On average, the proportion of precision for each month was high (precision = .98, *SD* = .013). Hence, concerns regarding the semantical validity (Krippendorff, 1980) of the proposed search phrase were removed, and it was used for retrieving a census of all DD-related news stories from 1978 to 1995 (*N* = 15,914 news stories).

All stories were coded for the presence or absence of certain definitions of the DD problem (i.e., crime, alcohol problem, traffic safety problem, public health problem, and a normative problem), references to possible solutions (i.e., tougher laws, stiffer punishments, strict enforcement, treatment, education and prevention, and passive safety measures), and the news story valence (i.e., number of references to opinions that favor or oppose measures aimed at reducing the DD problem). Due to the large number of news stories in the analysis, computer-assisted content analysis was used to quantify occurrences and co-occurrences of variables in the text following a procedure reported elsewhere (Fan, 1988; Nacos et al., 1991; Roberts, 1997). Next, 10 independent coders were asked to code a randomly selected sample of 20 stories. As part of their training for the task, they were asked to read a detailed set of coding instructions prior to and during the coding process. All coders (including the author and the computer) completed this task. The results of estimating intercoder agreement using the rigorous Krippendorff's alpha (Krippendorff, 1980) demonstrated high levels of computer-human coding agreement ($.74 > \alpha > .86$ for 11 content categories).

Policy Attention and Action

DD-related policy making between 1978 and 1995 is the dependent variable in this study. There is little agreement in the literature regarding appropriate measures of policy making (Dearing & Rogers, 1996). Some studies used measures of policy attention such as the number of congressional hearings on a certain issue (Baumgartner & Jones, 1993), the number of days of congressional hearings (Edwards et al., 1994), and the number of references in the Congressional Record database to a particular policy issue (Trumbo, 1995). Others focused on policy actions such as issue-related federal legislation (Yanovitzky & Bennett, 1999), the annual amount of federal funding appropriated for fighting a public problem (Gonzenbach, 1996; Rogers et al., 1991), or the creation of new government bodies (Walker, 1977).

Both policy attention and actions are theoretically important for testing this study's predictions concerning media effects on the process of policy

making. Level of policy attention taps into the more immediate response of policy makers to increased level of media attention to a problem. In this respect, one can think of policy attention as a cognitive response to media cues. Policy actions, on the other hand, are measures of policy makers' behavior. As such, they are slower to change in response to increased media attention because they are constrained by external circumstances and organizational routines (e.g., legal and budgetary considerations, committee work, etc.). For this reason, both types of measures are included in this study.

Policy attention. The current study uses two measures of policy attention. The first is the number of congressional hearings on the issue of DD. All congressional hearings ($N = 87$) between 1978 and 1995 that were indexed under the term "drunk driving" were retrieved from the Congressional Information Service (CIS) database that is available both on-line (Lexis-Nexis) and through the Library of Congress archives. As some (e.g., Edwards & Wood, 1999) have suggested that hearings involving routine congressional work (e.g., appropriations, nominations, and reauthorizations) are likely to falsely inflate policy attention, routine and nonroutine (or ad hoc) hearings were recorded separately. In addition to producing a more reliable and valid measure of policy attention, this procedure also allows one to compare the trends in routine and ad hoc congressional hearings over the research period and therefore test more explicitly the prediction that intensive media coverage of DD is more likely to influence the nonroutine work of policy makers.

The second measure of policy attention is all DD-related bills that were introduced to the United States Congress from 1978 to 1995 (see Yanovitzky & Bennett, 1999). The study used introduced bills rather than actual laws because the latter is heavily dependent on external constraints (e.g., time, cost, the legislative procedures) and do not adequately represent legislators' motivation to act in response to increased media attention to issues. Introduced bills are superior in this respect because they are closer in time to the actual stimulus and are less constrained by political obligations, administrative processes, or economic cost compared to passing a bill in Congress.

Information on all DD-related federal bills ($N = 118$) was obtained from CIS by using the keyword "drunk driving." Records included in this database provide information on the date, number, and content of bills introduced each year to the United States Congress. Each bill was then coded for type and content. Types of bills included bills aimed at increasing deterrence (including reducing the legal minimum drinking age), bills to establish drunk drivers' liability for damages to property, appropriation bills, and public education bills aimed at increasing public awareness of the DD problem.

Policy actions. Two measures of DD-related policy actions are used in this study. The first is the annual amount of federal appropriation for curbing DD between 1978 and 1995. The annual amount of federal funds is indicative of the volume of activities against DD carried out by a governmental agency (Gonzenbach, 1996; Rogers et al., 1991). This measure was further broken down to funding for enforcement of anti-DD laws and funding for education and prevention programs. Data were obtained directly from the National Highway Traffic Safety Administration (NHTSA) following a specific request by the author. These data may also be obtained through NHTSA "Budget in Brief" annual reports. To allow for estimates of real changes in levels of federal expenditures from year to year, all annual expenditures were converted into constant (or 1995) dollars using the gross national product (GNP) deflator. It is worth noting that this particular measure probably underestimates the actual level of federal expenditure allocated by all governmental agencies for the purpose of intervening in DD behavior. Nonetheless, based on similar case studies (see Gonzenbach, 1996), it seems reasonable to assume that any difference between the actual level of federal appropriation to curb DD and the measure used here was fixed at any given time point and therefore introduce little, if any, bias into the measurement of this variable over time.

The second measure of policy actions is the adoption of anti-DD laws by all 50 states and the District of Columbia between 1978 and 1995. Federal anti-DD laws were often aimed at mandating state legislators to adopt tougher laws against DD, particularly per se laws (laws setting the legal blood alcohol level at .10 or less), minimum drinking age laws, and mandatory administrative license revocation (ALR) laws. Federal funding for highway safety and maintenance programs was withheld from states that did not comply with these guidelines, thus serving as an incentive to state legislatures. For this reason, the proportion of state legislatures that adopted anti-DD laws over the research period better represents the legislative behavior of policy makers nationwide. Data were obtained from a NHTSA-funded study that examined the relationship of alcohol safety laws to DD behavior with particular focus on ALR and per se laws (Voas & Tippetts, 1999).

Results

Media Attention to the DD Issue

Figure 1 displays the number of DD-related news stories in each month from 1978 to 1995. Although the monthly number of stories is quite volatile over this time period, the pattern of change in media attention to the DD problem

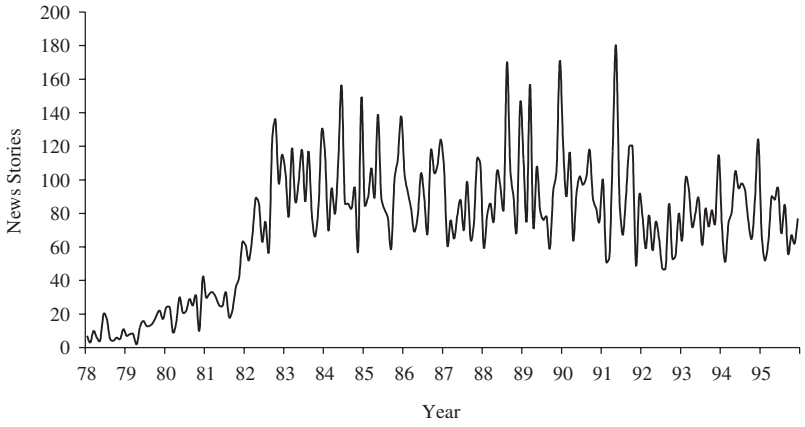


Figure 1. National News Coverage of the Drunk-Driving Issue, United States, 1978-1995 (*N* = 216 months)

is immediately apparent. There was little media attention to the DD problem between 1978 and 1980 (an average of 7 stories per month). Then, media attention to the problem peaked rapidly between 1981 and 1983 (by about 80%) and from 1984 onward, stayed at about the same level (perhaps even started to decline at the beginning of the 1990s). It is worth noting that this observed trend in news coverage of DD is virtually identical to the one reported by McCarthy (1994) based on a sample of DD-related news stories from 5 national daily newspapers, 112 local newspapers, and the three major television networks and thus further validates the claim about the representativeness of the measure of national news coverage used here.

The majority of these news stories (81%) can be simply characterized as episodic journalistic reports on actual DD incidents (i.e., accidents, arrests, court proceedings) that took place in communities nationwide. The remaining stories were (although not exclusively) reports on DD-related policy measures such as legislation and appropriation, publicized police sobriety checkpoints and other enforcement efforts (particularly around major holidays), reports about DD-related studies (e.g., evaluations of anti-DD measures such as raising the minimum drinking age and setting lower legal BAC levels), and more thematic discussions of the social implications of DD behavior. Ninety-six percent of these stories were coded as favorable toward social measures against DD (i.e., a one-sided issue) suggesting, at least in theory, a greater potential for media effects on policy makers' response to this issue (Baumgartner & Jones, 1993; Zaller, 1992).

With very few exceptions, the definition of DD as a crime was the most frequently used in DD-related news stories over the entire research period (48% of all DD-related news stories). The phrase "drunk driving is the most frequently committed violent crime in America" alone was used in as many as 1,415 news stories between 1981 and 1995. Tougher laws and strict enforcement were introduced in the media as an effective resolution to the DD problem even before media attention to the problem peaked in the early 1980s (an average of 2.71% and 1.3%, respectively, of all DD-related news stories). Nonetheless, their prominence on the media agenda clearly increased between 1981 and 1984 (to an average of 9.37% and 6.53%, respectively). Media discussions of tougher laws typically focused on two categories of anti-DD legislation: increasing legal penalties for DD and limiting alcohol availability to young drivers.

DD-Related Policy Attention and Actions

Table 1 compares the trend in DD-related news coverage between 1978 and 1995 to the trends in DD-related policy attention and actions. Columns 3 through 6 in this table document changes over time in policy attention to the DD issue. From 1978 to 1980, only 5 DD-related bills were introduced in Congress. The number of bills jumped to 25 in the following period (1981-1984), continued to increase (although not monotonically) from 1985 to 1988 (39 bills), and then gradually declined from 1989 to 1991 (25 bills) and from 1992 to 1995 (24 bills). The number of bills aimed at increasing legal deterrence of drunk drivers was substantially higher than that of other types of bills throughout the entire research period. Overall, deterrence bills occupied about 60% of the DD-related congressional legislative agenda.

A similar pattern characterizes DD-related congressional hearings. Ad hoc DD-related congressional hearings focused on topics such as the legal minimum drinking age, strategies to curb DD, bans on alcohol advertising, alcohol warning labels, and the creation of nationwide information systems for the close monitoring of recidivist drunk drivers. Routine DD-related congressional hearings, on the other hand, centered on DD-related appropriations, reauthorization, and nominations. Recall that according to study hypotheses, media attention to the DD problem is expected to affect ad hoc congressional hearings that, unlike routine hearings, are less likely to be influenced by institutional and organizational routines. As Hypothesis 1 suggests, the number of DD-related ad hoc congressional hearings increased rapidly from 1981 to 1984 (a total of 13 hearings) in comparison to the previous period (a single hearing between 1978 and 1981). Whereas the number of routine congressional hearings increased as well during this time, the observed

Table 1
Trends in National News Coverage of Drunk Driving (DD) and DD-Related Policy Attention and Actions, United States, 1978-1995

		DD-Related Policy Attention				DD-Related Policy Actions			
		DD-Related Congressional Bills		DD-Related Congressional Hearings		DD-Related Federal Appropriation		Diffusion of DD-Related Legislation	
Period	Average Number of News Stories Per Month	All Bills	Deterrence Bills	Routine Hearings	Ad Hoc Hearings	Deterrence Appropriation[a]	Education Appropriation[a]	BAC Laws[a]	ALR Laws[a]
1978 to 1980	14.8	5	5	0	1	.09	.047	.44	0
1981 to 1984	78.5	25	9	5	13	.026	.052	.70	.98
1985 to 1988	93.4	39	23	11	16	.012	.10	.03	.09
1989 to 1991	96.3	25	14	13	4	.0001	.09	.02	.07
1992 to 1995	76.3	24	12	16	7	.005	.065	.01	.065

Note. BAC = blood alcohol concentration; ALR = administrative license revocation.
a. Entries represent the rate of change between adjacent periods adjusted for each period's length

change in the volume of routine hearings (from 0 in the first period to 5 in the second) was not as substantial as the one observed for ad hoc hearings. From 1985 to 1988, the number of ad hoc hearings continued to be higher than that of routine hearings (16 compared to 11) but, as proposed by Hypothesis 2, routine hearings were increasingly more common from 1989 to 1995 (29 vs. 11 ad hoc hearings) when media coverage started to wane.

The remaining columns in Table 1 examine the proposition of Hypothesis 3 that policy actions will decrease as media attention to the DD problem wanes and that, over time, ad hoc solutions to the problem (i.e., deterrence) will be gradually replaced by more institutional, long-term solutions (i.e., investments in education and prevention programs). Before analyzing the information contained in these columns, however, it is worth noting that DD-related policy actions in the beginning of the 1980s centered primarily on deterrence measures. On average, appropriation for enforcement of anti-DD laws was about 4 times higher than that for education and prevention programs both in the early 1980s and throughout the remaining research period (not shown in Table 1). In addition, the proportion of state legislatures that adopted tougher anti-DD laws, such as administrative license revocation (ALR) and lower legal blood alcohol concentration (BAC) levels, increased rapidly between 1978 and 1984 and continued to increase more gradually thereafter (not shown in Table 1). This focus on deterrence is consistent with the findings regarding the nature of policy attention to the DD problem as well as with the Hypothesis 3 expectation that policy actions will correspond to the solutions advocated in the media.

Returning to Table 1, we note that changes in the volume of policy actions across periods are presented as the rate of change between adjacent periods.[2] The measures of policy actions used in this study are either cumulative (diffusion of DD-related legislation across states) or incremental by nature (DD-related appropriation). This forces the trend in these variables to be linear and incremental over time, thus creating the illusion that the volume of policy actions increased continuously over time. Rate of change, in this respect, is a more sensitive measure of fluctuations in the volume of policy actions.

The results demonstrate that the diffusion rate of both ALR and BAC laws increased rapidly between 1981 and 1984 in comparison to the remaining periods (both before and after). Furthermore, from 1985 onward, the rate of diffusion continued to increase but at a more gradual pace than before. A somewhat different pattern characterizes appropriation for enforcement of anti-DD laws. As Table 1 shows, appropriation for enforcement increased rapidly between 1978 and 1980, before media attention to the DD problem increased. From 1981 to 1995, rates of change increased at a decreasing rate.

A possible explanation for these differential patterns is that different types of policy actions vary in the level of institutional and organizational constraints that are attached to them. Specifically, federal appropriation is the outcome of a lengthy and stable political process that encompasses many governmental units and bureaucratic routines and therefore is less susceptible to rapid change in response to sudden inputs to the political system. Finally, the pattern of change in federal appropriation for prevention and education programs seems to follow the Hypothesis 3 prediction that, over time, policy actions aimed at establishing long-term solutions to the problem will increase at an accelerated rate. Between 1984 and 1995, appropriation for DD-related prevention and public education programs more than tripled (from $33.4 million in 1984 to $83.4 million in 1995), and the rate of change in this measure increased at an accelerated rate (although most of these changes were incremental).

To recap, policy attention to the DD problem seems to follow the same pattern that characterizes media attention to the problem. From very little attention to DD between 1978 and 1980, policy attention peaked rapidly from 1981 to 1984, remained relatively high throughout the late 1990s, but declined thereafter. There is also evidence that policy attention centered primarily on increased deterrence as a possible solution to the DD problem, which is consistent with the relatively high volume of policy actions aimed at increasing deterrence throughout the entire research period. As expected, the volume of policy actions peaked between 1981 and 1984 (with the exception of federal appropriation for enforcement and prevention that increased more gradually) and continued to increase at a slower pace thereafter. Finally, a closer examination of the rates at which the volume of policy actions progressed from 1985 onward revealed a pattern of deterrence measures that increase at a decreasing rate and prevention measures that increase at an accelerated rate. Although most of these findings are consistent with the study's hypotheses, a more direct test is needed to establish a causal association.

The Media-Policy Association

Before testing the hypotheses regarding the effect of news coverage on policy making, it was necessary to demonstrate that a reversed causal direction is less likely (i.e., that the volume of policy actions determines news coverage of DD) and that the observed association is not a function of a third variable (i.e., a spurious association) such as available policy options. These two alternative hypotheses were tested using a common time-series regression technique, first-order distributed-lag regression model (Ostrom, 1990) that is presented in the following equation:

$$Y_t = b_0 + b_1 Y_{t-1} + b_2 X_{t-1} + e,$$

where Y_t is the dependent series at time t, Y_{t-1} is the dependent series lagged by a single time point, and X_{t-1} is the independent series that is also first-order lagged. Similar to the logic of a Granger Causality Test (Granger, 1969), X is said to cause Y when lagged values of X are significantly related to Y after controlling for the previous history of Y (i.e., lagged values of Y). The benefit of including the previous values of the dependent variable as an additional independent predictor is the ability to control for external influences on this association (including that of a secular trend) that may lead to a spurious relationship. Moreover, because most time series in social sciences are first-order autoregressive processes (McCleary & Hay, 1980), including the first-order lagged values of both variables, effectively addresses the requirement of prewhitening (i.e., making a series stationary) them before they enter the regression model (Granger, 1969).

Using this procedure, two distributed-lag regression models were estimated. The first estimated the trend in DD-related bills between 1978 and 1995 (N = 17 years) from the trend in DD-related news coverage over the same period and lagged values of the dependent series (DD-related bills). This model showed a statistically significant contribution of the trend in DD-related news coverage, $B = .007, SE = .003, p < .05$, to trend in DD-related bills over and above that of the secular trend in this series and the contribution of other external variables. The second model estimated the independent contribution of the trend in DD-related bills (as a measure of DD-related policy making) to the trend in DD-related news coverage while controlling for the secular trend in news coverage. There was no evidence of a significant independent contribution of DD-related policy making to DD-related news coverage over the research period. These findings, therefore, support the proposition that the direction of effect was from news coverage of DD to DD-related policy making and that this association cannot be fully accounted for by the effect of a third variable. Similar tests using other measures of policy making (i.e., ad hoc congressional hearings, routine congressional hearings, DD-related appropriation, and rates of diffusion of anti-DD laws across states) generated results that were consistent with this pattern of findings.

Next, to estimate the dynamic relationship between news coverage and policy attention and actions, two longitudinal data analysis techniques were employed. The first of the two concerns the media's impact on policy attention and focuses on the proposition of Hypothesis 1 that periods of intensive media coverage are likely to result in heightened policy attention to the problem. Assuming that this proposition is correct, the presence of media messages should facilitate changes in policy attention that otherwise would be

slower to occur. Specifically, DD-related news coverage should contribute to the likelihood that DD-related bills would be introduced in Congress over and above the contribution of the past history of this variable to this likelihood.

To test this prediction, a variation of a Cox regression model for discrete-time data (Cox, 1972), the proportional odds model (Allison, 1997), was used. The proportional odds model uses a logistic function and a partial maximum-likelihood estimation method to model the instantaneous probability of a certain event to occur at a certain time interval, such as a probability that an anti-DD law will be introduced in a certain month. The probability that a particular event would take place is assumed to be a linear function of both time-varying and time-invariant random variables (Allison, 1997). The proportional odds model is formally represented by the following equation:

$$\log \frac{P_{it}}{1-P_{it}} = \alpha_t + \beta X_{it},$$

where P_{it} is the conditional probability of a DD-related bill to be introduced to Congress at time interval t, α_t represents the baseline likelihood of this event occurring at each time interval, and X_{it} is a vector of time-varying explanatory variables (news coverage and cumulative number of bills) that are measured at each time interval in the analysis (216 months, in this case). When the likelihood of a repeated event (i.e., introducing a DD-related bill) is estimated, the proportional odds model requires that each time interval (a single month, in this case) be treated as a single observation (Allison, 1997). Subsequently, the analysis is performed on all available time intervals (216 months) for which the criterion for censoring is whether an event occurred during a particular month.

It is worth noting that this particular estimation method may introduce a downward bias into the estimated regression coefficients and standards errors due to unobserved heterogeneity (i.e., dependence among multiple observations). One method to correct for unobserved heterogeneity is to include the cumulative number of bills that were introduced up to a certain interval as a control variable (for an actual application of this approach, see Myers, 1997). Therefore, the regression model estimated in this analysis included a single predictor (the cumulative number of DD-related news stories in each month) and the control variable, in which a statistically significant coefficient implies that media coverage affected the likelihood of introducing a DD-related bill in Congress. Substantively, this model tests the proposition that periods of increased media attention to DD create a sense of urgency among legislators and push them to introduce DD-related bills faster than otherwise expected. This proposition was examined separately

for all DD-related bills ($N = 118$) with relation to all DD-related news stories and bills aimed at increasing deterrence ($N = 72$) with relation to deterrence-framed DD-related news stories. Given that increasing deterrence of drunk drivers was the dominant response of policy makers to the problem, examining the latter case is useful for estimating the impact of DD-related media frames on policy making in addition to the volume of media attention to this problem alone. The results of this analysis are shown in Table 2.

The results in Table 2 support the proposition that DD-related media coverage was influential in attracting policy attention to the DD issue. For both DD-related bills in general and bills aimed at deterrence in particular, this analysis shows a statistically significant contribution of media coverage to the likelihood of introducing a bill in Congress when controlling for the number of previous bills. Nonetheless, the coefficients that describe the size of this effect are not easily interpretable because they represent the predicted change in the log likelihood of an event in discrete time. However, by using the exponential transformation $100(e^{\beta} - 1)$ for quantitative predictors, these estimates are expressed as the predicted percentage change in the likelihood of this event to occur faster than expected for each additional unit of the explanatory variable (Allison, 1997). Once transformed, the coefficients suggest that (a) general media coverage of DD was associated with a 3.53% decrease in the expected time of introducing any DD-related bill and (b) media coverage of DD that focused on deterrence resulted in a 7.68% decrease in the expected time of introducing a DD-related bill aimed at increasing deterrence. The fact that the contribution of deterrence-framed news stories to the introduction of deterrence bills was more than twice the contribution of all DD-related news stories to the introduction of DD-related bills in general suggests that both media attention to the DD problem and the frames used to describe it were important determinants of DD-related policy attention between 1978 and 1995.

A second longitudinal analysis technique, Fan's (1988) ideodynamic model, was used to estimate the effect of DD-related news coverage on policy actions (Hypothesis 3). This model uses a nonlinear estimation procedure to predict daily changes in public opinion and behavior from daily media coverage of issues. The four important assumptions of this model are that (a) media messages can both persuade and dissuade individuals to change their attitudes and behaviors, (b) the media's persuasive force is proportional to the ratio of adopters to nonadopters in the population, (c) an impact of a single news story declines over time in an exponential manner with a half life of one day (i.e., a story retains half of its impact in the following day), and (d) when media coverage is neutral or absent, public opinion or behavior are characterized by

Table 2
Proportional Odds Model of the Effect of Drunk-Driving-Related Media Attention on the Likelihood of Introducing a Bill in Congress During a Certain Month Between 1978 and 1995

Explanatory Variable	*b* (*SE*)
All bills	
Previous bills	–.75 (.13)*
All news stories (past month)	–.036 (.004)*
–2 log likelihood	675.7
Chi-square	399.3
Degrees of freedom	2
N	216
Deterrence bills	
Previous bills	–.76 (.20)*
Deterrence news stories (past month)	–.08 (.012)*
–2 log likelihood	265.15
Chi-square	209.8
Degrees of freedom	2
N	216

Note. Regression coefficients represent the predicted change in the log likelihood of an event for a unit increase in the explanatory variable.
*$p < .001$.

inertia (Hertog & Fan, 1995). The basic ideodynamic equation reflects all of these assumptions.

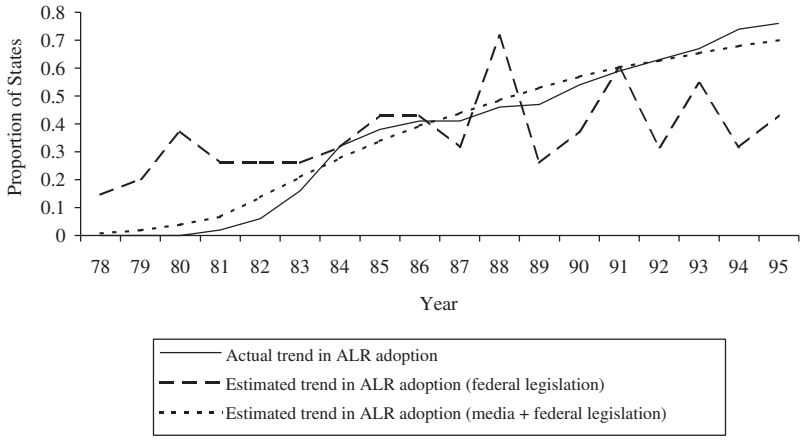
$$P_t = P_{t-1} + k_1\left(\sum_{i=0}^{t} Pnews_{t-i}\,0.5^{(i-t)}\right)(1-P_{t-1}) - k_2\left(\sum_{i=0}^{t} Cnews_{t-i}\,0.5^{(i-t)}\right)(P_{t-1}),$$

where P_t is the predicted proportion of adopters at time t, P_{t-1} is the predicted proportion of adopters at the previous time point, k_1 and k_2 are recruiting constants for adopters and nonadopters, respectively. And $Pnews_{t-i}$ and $Cnews_{t-i}$ is the cumulative number of persuasive (pro) and dissuasive (con) news stories prior to time t whose persuasive force declines over time in an exponential manner with a half life of one day. The k parameters are, therefore, an estimate of the proportion of the population who will change their minds at the direction of the position advocated by a single news story on any given day (i.e., these estimates are presumed to be constant over time).[3]

Figure 2 represents the application of the ideodynamic model to the relationship between DD-related news coverage and the proportion of states adopting ALR laws (a measure of policy-makers' behavior). The specific model used to generate the estimate of ALR laws adoption from media

coverage deviates in three important ways from the basic ideodynamic model that is described above. First, as DD-related news coverage was overwhelmingly one-sided, the impact of dissuasive information was irrelevant and the dissuasive recruitment parameter (k_2) was set to zero accordingly. Second, because the proportion of states that adopted tougher anti-DD laws is likely to be a function of related federal legislation, federal bills (measured as whether a federal bill was introduced in each specific day estimated) were included in the model as an additional predictor (with an additional parameter to be estimated). Finally, although the basic ideodynamic model does not give much thought to the time lag of media effects on behavior, an effort was made to identify the optimal lag of effect from DD-related news coverage to legislators' behavior. Substantively, the expected time lag of effect for attitudinal change is already specified in the ideodynamic model under the assumption that the impact of a single news story declines over time in an exponential manner with a half life of one day. Because behavior and not attitudes are predicted here, it is reasonable to expect that external constraints on policy-makers' behavior (i.e., organizational routines) will produce an additional time lag needed for attitudinal change to be transformed into actual behavior. This time lag was determined empirically by testing models with different lagged values of news stories (with lags ranging from 1 to 4 weeks and then from 2 to 12 months) and selecting the model that best fit the data.[4] Accordingly, it was determined that the optimal time lag of media effects on legislators' behavior was 3 months.

The analysis in Figure 2 tests three alternative hypotheses regarding the observed trend in the proportion of states adopting ALR laws. The first is that the observed trend is a linear function of time (i.e., it merely represents the secular trend in this legislative behavior). This hypothesis is particularly viable given the monotonic increase in this series over the research period. The second suggests that the trend in the proportion of states adopting ALR laws is determined primarily by the amount of federal legislation aimed at encouraging states to adopt such laws. The third proposes that both federal legislation and DD-related news coverage can better account for this trend in legislators' behavior (when one may conclude that news coverage had an independent effect on legislative behavior if it is shown that including news coverage in the model in addition to the amount of federal legislation results in a better fit to the observed trend than that of the second model). To estimate how well each of these alternative models fits the actual data, three goodness-of-fit statistics were used. The first, the R^2 is self-explanatory. The two others, Akaike Information Criterion (AIC) and the Schwartz Information Criterion (SIC), are often superior to R^2 as a measure of goodness-of-fit because they penalize more harshly for loss of degrees of freedom (particularly



	R^2	AIC	SIC
Time (linear)	.94	-3.25	-3.2
Federal legislation	.18	.31	.26
Legislation + media	.98	-3.52	-3.47

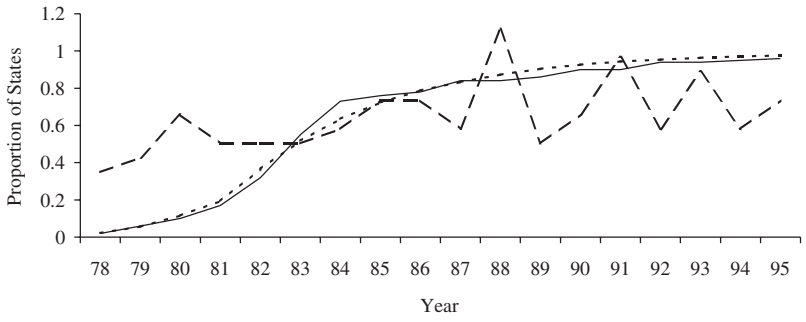
Figure 2. Predictions of the Proportion of States Adopting Administrative License Revocation (ALR) Laws From Drunk-Driving-Related Federal Legislation and Media Coverage Using the Ideodynamic Model, 1978-1995

Note. AIC = Akaike Information Criterion; SIC = Schwartz Information Criterion.

the SIC) and are more stable in small samples (Diebold, 1998). Contrary to the R^2 statistic, AIC and SIC values can be both positive and negative when smaller values indicate a better fit to the data.

The goodness-of-fit statistics at the bottom of Figure 2 confirm what is already apparent from the graphic representation—namely, that the combination of federal legislation and DD-related news coverage generated an estimated series of legislators' behavior that fits the actual series exceptionally well, slightly better than that of the secular trend in this behavior. Estimates of recruitment coefficients indicate a change of .0003% in adoption rate for each additional news story and .004% for each additional DD-related federal bill (.005 for bills aimed at increasing deterrence).[5]

Figure 3 shows similar results regarding the observed trend in the proportion of states adopting per se laws. This series' curvilinear shape suggests that a linear model representing the expected secular trend in this behavior will not fit the actual series well, as confirmed by all three goodness-of-fit statistics. As before, estimates of the series from federal legislation alone fall short of representing the actual series, although they seem to be in the right direction. In contrast, the series estimated from both federal legislation and



	R^2	AIC	SIC
Time (linear)	.83	-.98	-.93
Federal legislation	.31	.37	.42
Legislation + media	.99	-3.83	-3.78

Figure 3. Predictions of the Proportion of States Adopting Blood Alcohol Concentration (BAC) Laws From Drunk-Driving-Related Federal Legislation and Media Coverage Using the Ideodynamic Model, 1978-1995

Note. AIC = Akaike Information Criterion; SIC = Schwartz Information Criterion.

DD-related news coverage fits the actual series well, with an estimated .0007% change in law adoption rate nationwide for each additional news story and .0008% for each additional DD-related federal bill (.0011% for bills aimed at increasing deterrence).

These findings support the Hypothesis 3 prediction that a positive and strong association exists between DD-related news coverage and policy actions over the research period. Specifically, the results suggest that the increased volume of DD-related policy actions between 1981 and 1984 was largely driven by increased media attention to the problem. As media attention waned from 1985 onward, policy actions continued to increase but at a decreasing rate. This may imply that the media's role in promoting policy change has shifted from mobilization to maintenance.

Discussion

Overall, the results of the current study support the proposition that intensive periods of media attention to issues are instrumental in attracting policy attention to public problems that are low on policy-makers' agendas while creating a sense of urgency among policy makers to generate immediate,

short-term solutions to public problems. The findings also suggest that this impact is likely to be contingent on several key factors. For one, the degree of the media-policy association seems to vary over the life course of the issue on the media agenda. The impact of media attention on policy making is strongest at the beginning of the media issue attention cycle. Once media attention decreases in intensity, related policy outputs decrease as well and gradually shift from ad hoc solutions to long-term solutions for the problem.

Other key factors involve the specific characteristics of the issue at hand and particularly impinge on the likelihood that increased media attention to issues will actually result in policy actions rather than increased policy attention alone. For example, it is clear that in the case of DD, media attention to the issue was overwhelmingly one-sided (i.e., against DD) simply because there was no one who would argue for involvement in DD behavior. Coupled with the media's enthusiastic endorsement of specific solutions to this problem (i.e., increasing deterrence measures), the fact that a significant impact of news coverage on DD-related policy making was present is not surprising but rather expected (cf. Zaller, 1992). It seems reasonable to expect that issues surrounded by social debate and criticism (i.e., gun control and abortion) will be presented as such in the media and would be predictive of slower and gradual change (if any) in policy actions over time.

The other side of this is policy-makers' own stands on the issue prior to its discovery by the media. Previous evidence regarding DD-related policy (McCarthy, 1994; Reinarman, 1988) suggest that policy makers were already supportive of increasing deterrence measures against drunk drivers before media attention to this problem peaked during the early 1980s and therefore had little problem generating policy responses that were similar to the ones advocated in the media. This implies that the impact of media attention on policy is also a function of the extent to which media framing of public problems serves policy-makers' interests or the interests they represent. If media frames of problems put policy makers in an uncomfortable position, they are likely to respond more slowly to the problem by sticking to organizational and institutional routines (e.g., convening a panel or a committee to study the issue). One may also hypothesize, based on the results of the current study, that the ability of news coverage to promote policy changes is contingent on policy options that are available to policy makers and the degree of freedom or flexibility (political, economic, and moral) they have to pursue such options—both of which were fairly high in the DD case. Thus, although the case of DD may be considered unique in several respects, it begins to draw our attention to several dimensions of interest in terms of the expectation for media effects on policy that can then be examined in the context of other public issues.

Other potential limitations of this study should be noted before the implications of this study are discussed. One is that the issue of DD was examined in isolation from media and policy attention to other public problems. There is little doubt that the simultaneous competition between issues that seek media and policy attention has an important role in shaping the dynamics of the media-policy connection and that studying several issues at a time may be desirable (Hilgartner & Bosk, 1988). Still, given that public problems tend to follow the same trajectory on the media's agenda (Downs, 1972; Gonzenbach, 1996; Rogers et al., 1991), focusing on the dynamics of this association surrounding a single issue may be particularly informative as it allows for a more focused investigation (Dearing & Rogers, 1996). In other words, although the results drawn from analyzing the DD case cannot be generalized to the media-policy connection in the context of other issues, what may be generalizable are findings about the dynamic nature of this association and those dimensions—such as the particular timing along the media issue-attention cycle in which the relationship is examined and the particular characteristics of the issue at hand—that seem to be important in the explanation of this relationship. A second potential shortcoming, as already noted, is that the theoretical links examined here are primarily drawn from individual-level processes that were not directly observed with the available data. For this reason, the analysis performed here cannot confirm the presence of these processes but can only speak to their plausibility. Finally, and on a related note, the use of aggregated secondary data in this study did not allow for testing the study's hypotheses as rigorously as possible or testing more elaborated hypotheses about the media-policy connection. For example, the available policy measures could not offer a sharp enough distinction between policy attention and actions at the aggregate-level simply because they were not designed to be sensitive to this distinction when collecting the data. Nonetheless, the results clearly suggest that this distinction—vague as it may be in this study—is still important for our understanding of the dynamic impact of news coverage on policy making.

To summarize, the main contribution of this study is in conceptualizing and examining the media-policy connection as a dynamic process. Many studies that examine the media-policy connection simply seek to demonstrate an association between the media agenda and the policy agenda at a given point or over time (Dearing & Rogers, 1996) without testing hypotheses on the dynamic mechanisms that produce this association. At minimum, the findings of the current study point to the importance of separating media effects on policy attention from effects on actual policy outputs as key for studying this dynamic relationship. From this perspective, the question of whether there are effects of news coverage of issues on related policy making

may be less important than the question about the particular circumstances under which news coverage is likely to influence policy-makers' decisions and behavior. More specifically, whereas heightened media attention to issues is almost always expected to result in policy-makers' increased attention to this issue, it is the extent to which media attention is capable of moving policy makers from the attention phase to the action phase that seems to be worthy of scholarly attention. Thus, future research into the media-policy connection may greatly benefit from employing an approach similar to the one taken here to other public issues to uncover the particular circumstances (i.e., the degree of public debate around issues, the degree to which news coverage serves policy-makers' interests, and available policy options) under which media effects on policy outputs are likely.

Notes

1. To qualify, a story had to be one of the following: (a) a report on a drunk-driving (DD)-related accident, (b) a report on DD-related actions by the police or the criminal justice system (e.g., arrests or prosecution of drunk drivers, court decisions in DD cases, and notifications on planned DD-related police activities such as sobriety checkpoints), (c) a report on DD-related legislative measures (i.e., laws or bills that were passed or introduced in Congress or state legislatures), (d) a report on DD-related scientific studies or DD-related local and national statistics, (e) an interview with DD victims, activists, or public officials, (f) an editorial or a letter to the editor concerning the DD problem, or (g) a thematic story on one or more aspects of the problem (e.g., a profile of MADD's leader, a historical account of anti-DD measures, a discussion about the efficacy of different measures and their social implications, etc.).

2. The rate of change between periods was calculated using the following formula:

$$\text{Rate} = \left(\frac{F_s}{B_s}\right)^{\frac{1}{k}} - 1,$$

where F_s represents the score at the end of a given period (i.e., 1980, 1984, 1988, 1991, and 1995), B_s is the score at the end of the previous period (1978, 1980, 1984, 1988, and 1991) that serves as a baseline for a comparison, and k is the length of the interval (3 or 4 years). This procedure is appropriate for comparing rates across compounded intervals of differential length.

3. To estimate k_1 and k_2, the researcher employs a nonlinear estimation procedure, the Generalized Reduced Gradient code (for details, see Fylstra, Lasdon, Waren, & Watson, 1998) which minimizes the square of the distance between the observed values of the outcome measure (proportion of adopters) and those predicted from media coverage that operates on some baseline of the outcome measure (typically, the first observation of adopters to nonadopters ratio in the data set). In addition, the model's reliance on a moving average process and difference equations permits the researcher considerable flexibility in estimating linear and nonlinear models and also effectively removes the concern that estimates of media impact will be biased due to serial correlation (Gonzenbach & McGavin, 1997).

4. Because the estimation procedure requires that the researcher specify a certain day on which the outcome of interest is to be estimated, the last day of each year (December 31) was chosen. Insofar as the choice of this date is flawed (i.e., does not accurately represent the actual time when measures of the observed outcome were taken), the fit between the predicted and observed values of the outcome variables is likely to be poor regardless of the time lag used.

5. The recruitment coefficients estimated by the ideodynamic model are not easily interpreted. Although, in theory, they represent the average impact of a single news story on the outcome of interest (the rate of adopting a new law, in this case), in practice they are vulnerable to the sampling procedures used (i.e., the number of news sources from which the sample of news stories was retrieved). Specifically, additional news stories would decrease the magnitude of these constants. Therefore, whereas the sample of news stories used in this analysis is assumed to be representative of the national news environment, limiting the use of these coefficients for the purpose of comparing effects of media coverage across different models is probably more helpful.

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