ORIGINAL ARTICLE

Attention to Science/Environment News Positively Predicts and Attention to Political News Negatively Predicts Global Warming Risk Perceptions and Policy Support

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Contemporary science and environmental news coverage of global warming increasingly portrays scientific consensus. Political news coverage of global warming, however, typically portrays controversy. We hypothesize that attention to science and environmental news is associated with beliefs more consistent with the global warming science and higher risk perceptions, and that the opposite is true of attention to political news. Furthermore, we hypothesize that science-based beliefs and risk perceptions are positively associated with support for policies aiming at reducing global warming. These hypotheses were confirmed by survey data from a nationally representative sample of adults (N = 2,164). These findings support and extend the cognitive mediation model of news learning and have important practical ramifications.

Survey of existing scientific literature reveals overwhelming evidence for the reality and human cause of global warming (Doran & Zimmerman, 2009; IPCC, 2007; Oreskes, 2004). The potential consequences of global warming, if left unmitigated, are projected to be catastrophic and manifold. However, the American public has remained largely passive toward this issue. In a recent Pew Research Center poll, global warming ranked last among 20 domestic priorities for the Obama administration and Congress, with only 30% of the respondents considering it a top priority (Pew, 2009).

To be sure, global warming is a unique public issue. Most people have yet to experience its impact; those who have tend to reside in remote areas of the world,

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thus are unlikely to spread concern via personal connections. For issues such as this, mass media play an extraordinarily large role in creating public awareness, molding issue perceptions, and galvanizing individual actions and policy responses (Dunwoody, 1999; Nelkin, 1995). The amount of coverage on global warming in the United States has fluctuated over the past 2 decades, with the recent years witnessing another upswing (Boykoff, 2007; McComas & Shanahan, 1999). Some researchers, however, have criticized the U.S. media for, among other things, underrepresenting the scientific consensus on the existence and anthropogenic source of global warming (Boykoff, 2008; Boykoff & Boykoff, 2004; Zehr, 2000). Explicitly or implicitly, these researchers have argued that the inaccurate representation of the science of global warming in the U.S. media has contributed to the lack of urgency in the American public opinion in this domain.

Although the criticism of poor media coverage is widely circulated among academics and social critics, empirical evidence documenting the influence of media coverage on risk perceptions regarding global warming is meager. The few existing studies with relevant evidence have mostly suggested that the media have made positive contributions to public knowledge and concern (Krosnick, Holbrook, Lowe, & Visser, 2006; Stamm, Clark, & Eblacas, 2000; Zhao, 2009). Moreover, recent research suggests that the representation of the global warming science is becoming more accurate in the U.S. media (Boykoff, 2007; also see Ward, 2008). But at the same time, conflict and contention still appear to be the dominant theme in the political coverage of the issue. Given the complex nature of the issue of global warming and the diverse coverage it receives, it is important to investigate whether people attending to different kinds of news have learned different things. In this article, we present data from a representative national survey to investigate the relationship between news attention and global warming perceptions. Will attention to science/environment and political news generate different perceptions about global warming? This is the central question the current study seeks to answer. To assess the practical importance of this question, we also extend our examination of the effect of news attention into the policy domain by connecting risk perceptions with support for various emission control policies.

Literature review

This study draws on three bodies of literature: analyses of U.S. media coverage of global warming, previous evidence of media effects on global warming perceptions, and the cognitive mediation perspective on news learning. After reviewing the literature, a predictive model will be presented to delineate the theoretical relationships of interest to this research.

U.S. media coverage of global warming
Research suggests that the contour and nature of news coverage on the issue of global warming are jointly defined by the biophysical characteristics of the phenomenon,

competing political and economic interests, and the conventions of the journalistic profession (Boykoff, 2007; Boykoff & Boykoff, 2007; McCright & Dunlap, 2000, 2003; Williams, 2000). Global warming is by no means a science and environment issue only. It is also an important political issue. Indeed, even the first wave of public interest in global warming was not entirely fueled by environmental concerns—it was also fanned by H. W. Bush's campaign rhetoric wherein he acknowledged global warming as a serious problem and vowed to fight it once he was elected (Boykoff & Boykoff, 2007). In the years to follow, global warming has gained increasing weight as a political issue. Today, the public debate on global warming is often conducted along party lines, with political ideology determining much of what political leaders, pundits, and members of the public have to say on the issue (Maibach, Roser-Renouf, Weber, & Taylor, 2008; Pew, 2008). Indeed, as Nisbet recently commented, global warming "has joined a short list of issues such as gun control or taxes that define what it means to be a Republican or Democrat" (2009, paragraph 9).

Journalistic norms also play an important role in shaping media coverage on global warming. For a variety of reasons, including the desire to achieve objectivity and the inability to fully understand the science, many journalists have adhered to the principle of balanced reporting in their coverage of global warming (Boykoff, 2007; Boykoff & Boykoff, 2004, 2007). Nowhere else is this more apparent in the coverage of the anthropogenic causes of global warming. Significant human contributions to global warming have long been accepted as a valid finding by the vast majority of the world's earth and climate scientists (IPCC, 2007; Oreskes, 2004). Yet, content analyses of print and television news coverage show that, for an extended period of time, the U.S. media have consistently assigned equal say to a small group of skeptics and the vast majority of scientists in agreement (Boykoff & Boykoff, 2004, 2007). This rigid adherence to balanced reporting, argue Boykoff and Boykoff, has in effect created a bias against the established science, which in turn may result in misinformed public opinion and ill-advised policy making.

These characteristics of media coverage of global warming are certainly not isolated phenomena. Instead, they are intricately intertwined. Some have argued that the portrayal of scientific uncertainty in the news is a carefully plotted maneuver by those whose political and economic interests are at stake (Michaels, 2005; McCright & Dunlap, 2000, 2003; Williams, 2000). The uncritical use of balanced reporting, at the same time, is also said to have created both "discursive and real political space for the U.S. government to shirk responsibility and delay action regarding global warming" (Boykoff & Boykoff, 2004, p. 134).

Although recognizing these problems and intricacies, we also need to note that news coverage of global warming has shown signs of maturation over the years. In the early days of the news frenzy over global warming, there appeared to be as much confusion and lack of understanding among journalists as there was among the public. Consequently, global warming news in the 1990s was marked by not only indiscriminate balance in reporting, but also factual inaccuracies (Bell, 1994; Palfreman, 2006; Wilson, 1995, 2000). Overtime, the journalist community has

become increasingly familiar with the issue and the science behind it. It probably also has noted the many voices chastising its rigid adherence to balance in both academic and public venues. These seem to have led to some improvements in global warming coverage of late. A recent content analysis, for example, found that balanced accounts of the anthropogenic sources of global warming have decreased from 36.6% in 2003 to just 3.3% in 2006 in U.S. newspapers (Boykoff, 2007; also see Ward, 2008). Possibly, similar trends have also appeared in television and other news media. But again, we need to be wary not to overstate the progress that has been made. Indeed, while the coverage of global warming as an environment and science topic might have attained greater accuracy, there is still much political controversy about this issue that is fueling news interest. Competing political and economic arguments and dueling public figures may still provide fodder for public uncertainty even when the science is portrayed as beyond doubt (McCright & Dunlap, 2000, 2003).

The complexity of the global warming issue and the characteristics and trajectory of news coverage suggest that the influence of global warming news on public perceptions is necessarily complicated. To capture such influence, research needs to heed both the political and the environmental/scientific dimensions of the issue. Examination of news effects in this domain should pay particular attention to perceptions that can be directly influenced by the (mis)representation of the science in the media. The impact of these specific perceptions on risk appraisal and policy support should also be gauged.

News influence on global warming perceptions
It is often suggested that the news media play an important role in informing and shaping public opinion on little known scientific and environmental issues (Dunwoody, 1999; Nelkin, 1995). Polls of the American public on global warming consistently show only moderate issue engagement, at best, and a general lack of a sense of urgency (Leiserowitz, 2007; Leiserowitz, Maibach, &Roser-Renouf, 2009; Maibach et al., 2008; Nisbet & Myers, 2007; Pew, 2009). To what extent is the current state of public opinion shaped by the pattern of news coverage on global warming? There is some informative evidence in the existing literature but overall research addressing this question is limited.

In one of the early efforts to empirically assess the impact of media use on global warming perceptions, Krosnick and his colleagues surveyed a representative sample of adults living in OH (Krosnick et al., 2006). The survey, conducted in December 1995, found that greater viewing of television news was associated with stronger belief about the occurrence of global warming among people who trusted scientists and were highly educated. Newspaper reading, however, was found to be associated with less belief in the existence of global warming among people who trusted scientists but were less educated. The researchers explained this pattern of results in light of the greater focus on controversy in newspaper coverage at that time and the different levels of cognitive skills possessed by high- versus low-education people.

In another study, Stamm and his colleagues surveyed a random sample of the residents in the Washington metropolitan area in 1997 (Stamm et al., 2000). In the survey, respondents reported perceptions about the causes and effects of global warming, as well as effective solutions to the problem. Media and interpersonal sources from which respondents had obtained information about global warming were also identified. Analysis showed that a number of media sources, including television, newspapers, magazines, and books, had made positive contributions to respondents' understanding of global warming, although there were also areas where media use was associated with inaccurate perceptions.

The relationship between media use and global warming perceptions is also the focus of a recent analysis of the 2006 General Social Survey data (Zhao, 2009). In this study, newspaper reading and Web use were found to positively predict perceived knowledge and concern about global warming. However, no media use variable was found to be predictive of perceived scientific agreement, a perception that should be most vulnerable to the balanced reporting of global warming in media coverage.

In a rare experimental study, Corbett and Durfee (2004) presented an under-graduate sample with variations of a news story reporting observed thickening of the Arctic ice. This news story, in isolation, might be interpreted by readers as evidence challenging the occurrence of global warming, thus fostering feelings of uncertainty. However, the study found that when the story was coupled with countering evidence and put in the larger context of the global warming science, the resulting uncertainty could be reduced. This study, while not directly addressing how confirming evidence of global warming might be weakened by simultaneously presented disconfirming views, does suggest that inclusion of competing perspectives in a news story can have important impact on audience reactions.

Taken together, these studies suggest that news coverage can influence public perceptions of global warming, and in a largely positive direction. However, several limitations of the existing research need to be recognized. First, the number of studies is clearly small and some of the data are quickly becoming dated. Given the recent changes in the coverage of global warming (Boykoff, 2007; Ward, 2008), it is imperative to gather more current data to continue to examine news effects in this domain. Second, none of the previous studies have distinguished between science/environment and political coverage of global warming. As such, they are unable to provide insights into the potential dimensionality of the observed news impact. Third, the existing survey studies (Krosnick et al., 2006; Stamm et al., 2000; Zhao, 2009) have focused on media or news exposure rather than active attention. This, as will be discussed below, may not be the most productive approach to understanding the dynamics of news learning. Finally, the experimental study (Corbett & Durfee, 2004), while highly suggestive, does not provide a straightforward answer as to whether balanced reporting cultivates uncertainty. The fact that it was a laboratory study also limits its generalizability to news impact in the real world.

News attention and issue perception

Often media effects research focuses on the relationship between news exposure and attitudinal and/or behavioral outcomes. However, much empirical evidence exists to show that attention to news is a much stronger predictor of news learning than simple exposure (e.g., Chaffee & Schleuder, 1986; Eveland, 2001; Eveland, Shah, & Kwak, 2003; Slater & Rasinski, 2005). Besides, some have argued that examining only the effect of exposure is theoretically uninteresting as it sheds little light on the actual process of news learning (Eveland, 2001).

One important limitation of media effects models that focus exclusively on exposure is their inability to accommodate and integrate findings from another important research tradition in mass communication—audience activity research. Many have argued and found evidence that media use is not entirely passive; instead, it is often driven by prior interests and motivation (Blumler & Katz, 1974; Zillmann & Bryant, 1985). In recent years, a concerted effort has emerged to develop holistic models of mass communication that can integrate the media effects and audience activity perspectives (e.g., Eveland, 2001; Slater, 2007). Although specific postulations vary, these models share the view that motivated orientation toward media content is an important determinant of the outcome of media consumption.

One of such recently proposed integrative models is the cognitive mediation model (Eveland, 2001). According to this model, information processing behaviors, particularly attention and elaboration, are important mediating mechanisms between media use motivations (such as surveillance gratifications sought) and media effects (such as knowledge). The model further posits that attention is a process antecedent to elaboration, thus constitutes a more important mediating step in the sequence of news learning. The cognitive mediation model's predictions regarding attention (and elaboration) have been born out in a series of political news studies, using both cross-sectional (e.g., Eveland, 2001, 2002) and longitudinal data (e.g., Eveland et al., 2003).

In this research, we focus on news attention as a key predictor of global warming perceptions. Previous research has revealed significant and largely positive effects of news attention on knowledge and attitudes about other controversial science issues, such as stem cell research (e.g., Ho, Brossard, & Scheufele, 2008), agricultural biotechnology (e.g., Brossard & Nisbet, 2006), and nanotechnology (Lee & Scheufele, 2006). In this study, we extend this line of research into a new and equally controversial issue domain. We also extend previous research by simultaneously considering attention to different types of news content. In previous science communication research, the attention measures are often geared toward either news in general or science news in specific. Rarely considered is the fact that many science issues, such as stem cell research, are covered under multiple frames in different genres of news (e.g., Dahmen, 2009; Nisbet, Brossard, & Kreopsch, 2003). This fact is important to recognize because individuals seldom pay equal attention to all news. Some people may be particularly interested in politics; others health; others sports; still others the environment. When there is reason to believe that the same issue might appear in

different kinds of news, examining content-specific attention should help us achieve a more nuanced understanding of news learning and effects.

Examining news attention in a content-specific manner extends cognitive mediation research in a direction that is consistent with its general goal of integrating audience activity in the process of news learning. The cognitive mediation model recognizes the possibility that media use can be driven by prior needs and motivations. As such, people are often selective in their news consumption. Part of this selectivity is reflected in variable attention to different types of news. By taking into account such variability in news attention, cognitive mediation research should be better able to capture the role of audience activity in the dynamics of news learning. The fact that issue coverage can vary in different types of news also suggests that greater depth and sensitivity can be achieved in the assessment of news effects by taking into consideration news attention patterns.

Global warming appears to be an ideal context in which to test the influence of attention to different types of news. As discussed earlier, global warming is not a science and environment issue only; it also ranks among the most controversial and most dividing issues in American politics (Nisbet, 2009). As such, global warming receives extensive coverage in both science/environment and political news. Furthermore, the coverage of the science of global warming has grown more accurate over the years, with increasing emphasis on scientific consensus and certainty (Boykoff, 2007; Ward, 2008). The political coverage of the issue, however, remains to be dominated by dispute and contention, thus may continue to foster doubt and uncertainty among the public. Given these characteristics of the global warming coverage, also in light of previous news attention research in both science and political communication, we propose the following hypotheses for this study:

> **H1:** Attention to science and environment news will be associated with beliefs more consistent with the science and higher risk perceptions about global warming.

> **H2:** Attention to political news will be associated with beliefs less consistent with the science and lower risk perceptions about global warming.

There is ample evidence in science communication that knowledge and risk perceptions are strong drivers of policy preference (e.g., Ho et al., 2008; Lee & Scheufele, 2006). Similar findings have also been reported in the context of global warming (e.g., Maibach et al., 2008). To assess the practical importance of news consumption, we examine policy support as a consequent of science-based beliefs and risk perceptions in this study. Specifically, we predict the following:

> **H3:** Beliefs more consistent with the science and higher risk perceptions about global warming will be associated with stronger support for policies aiming at reducing global warming.

A predictive model

The key hypotheses for this study are presented in Figure 1 as part of a larger predictive model. The basic framework of this model is derived from the cognitive
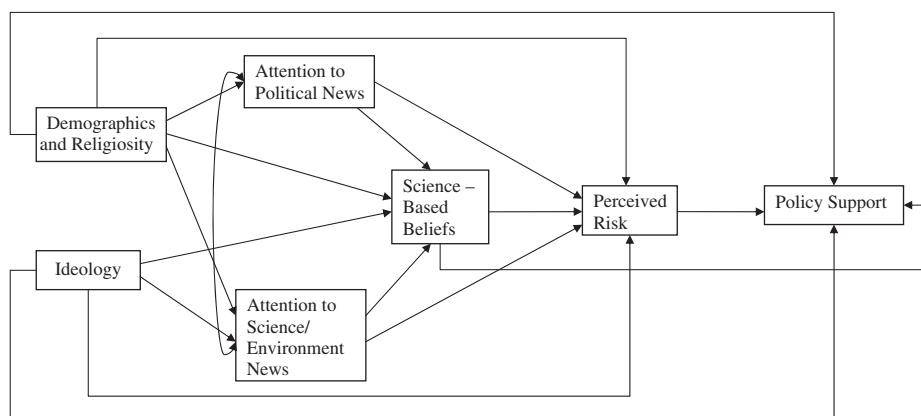
Figure 1 A predictive model of the effects of news attention on global warming perceptions.

mediation theory. The key relationships in the model are between attention to political and science/environment news on the one hand and science-based beliefs and risk perceptions about global warming on the other. The two news attention variables are expected to be positively correlated. Science-based beliefs are considered antecedent to perceived risk, thus mediating part of the effects of news attention on the latter variable. Both science-based beliefs and perceived risk are expected to influence policy support, the final outcome in the model.

Demographic variables, political ideology, and religiosity are included as exogenous control variables, influencing both news attention and the subsequent perception and policy support variables. We do not specifically predict the effects of the demographic variables. However, based on previous research (Maibach et al., 2008; Pew, 2008; Zhao, 2009), we expect political ideology to have strong influence on many of the endogenous variables, with liberal tendencies associated with more attention to science/environment news, more accurate science-based beliefs, greater perceived risk, and greater support for emission control policies. Research on the relationship between religiosity and global warming perceptions is still lacking. However, studies in other domains of science communication have shown religiosity to be an important factor in issue attitudes (e.g., Ho et al., 2008; Nisbet, 2005). We therefore include religiosity in our model to both explore and control for its potential influence on not only global warming perceptions, but also news attention and policy support.

Method

A survey was designed by the researchers and fielded by Knowledge Networks, a marketing research company, using its nationally representative online panel. This panel consists of about 50,000 U.S. residents, age 18 and older, recruited through probability sampling and using known published sampling frames that cover 99% of the U.S. population. The within-panel completion rate for the survey is 54%.

Sample

Altogether, a total of 2,164 adults participated in the survey. About half of the respondents (50.1%) were male. A 15.3% were aged between 18 and 30, 15.2% between 31 and 40, 20% between 41 and 50, 21.2% between 51 and 60, and 28.3% 61 and older. The racial composition of the sample was 79.2% non-Hispanic white, 8% non-Hispanic black, 6.3% Hispanic, and 6.5% other races. A 31.6% of the sample had a Bachelor's degree or higher; 29% had some college; 30.1% completed high school; 9.3% had less than high school. A 34.4% of the sample were Democrats, 30.1% Republicans, 23.1% Independents, 11.6% other or no party. Population weights were used to adjust the sample to census parameters in data analysis.

Measures

News attention

News attention was measured by asking "How closely do you follow news about each of the following?" Responses were indicated on a scale from 1 (*not at all*) to 4 (*very closely*). The content types included national politics ($M = 2.59$, $SD = .97$), state politics ($M = 2.23$, $SD = .85$), local politics ($M = 2.14$, $SD = .86$), the environment ($M = 2.23$, $SD = .80$), and science and technology ($M = 2.18$, $SD = .84$). The first three content types are taken as indicators of attention to political news, the last two attention to science and environment news.

Science-based beliefs

Three beliefs about global warming reflecting basic understanding of the science were measured. The first was certainty about the occurrence of global warming, measured on a 9-point scale from 1 (*extremely sure that global warming is not happening*) through 5 (*don't know*) to 9 (*extremely sure that global warming is happening*) ($M = 6.88$, $SD = 2.07$). The second was a dichotomous measure of perceived human cause (1, *global warming is caused mostly by human activities* [57%]; 0, *other opinions*). The third was a dichotomous measure of perceived scientific agreement (1, *most scientists think global warming is happening* [46%]; 0, *other opinions*).

Perceived risk

A large number of measures were taken to assess the perceived risk of global warming. The first group of measures asked how much respondents thought global warming would harm them personally, their family, their community, people in the United States, people in other modern industrialized countries, people in developing countries, future generations of people, and plant and animal species (1 *not at all* to 4 *a great deal*, $\alpha = .97$, $M_{average} = 2.74$, $SD = .92$). The second group of measures asked how soon global warming would start to harm people in the United States/other people around the world (1, *never*; 2, *in 100 years*; 3, *in 50 years*; 4, *in 25 years*; 5, *in 10 years*; 6, *they are being harmed now*; $\alpha = .97$, $M_{average} = 4.03$, $SD = 1.82$). The third group of measures asked whether global warming would cause more or less of the following worldwide over the next 20 years, if nothing was done to address

it: intense hurricanes, extinctions of plant and animal species, famines and food shortages, droughts and water shortages, people living in poverty, refugees, severe heat waves, forest fires, disease epidemics, intense rainstorms (1, *many less* to 5, *many more*; α = .97, $M_{average}$ = 4.14, SD = .77). The fourth group of measures asked how likely each of the following would be caused by global warming over the next 20 years, if nothing was done to address it: expanding deserts, melting ice caps and glaciers, abandoning large coastal cities due to rising sea levels (1, *very unlikely* to 4, *very likely*; α = .90, $M_{average}$ = 3.09, SD = .86). Average scores of these four subscales were used in data analysis. Some of the risk questions allowed for "Don't know" responses. These responses were treated as missing data and were replaced with subscale averages for individual respondents prior to analysis.

Policy support
Respondents were asked on a 4-point scale from 1 (*strongly oppose*) to 4 (*strongly support*) how much they would support or oppose five emission reduction policies: (a) regulate carbon dioxide as a pollutant (M = 3.01, SD = .83); (b) require electric utilities to produce electricity from renewable energy sources (M = 2.90, SD = .94); (c) require automakers to increase fuel efficiency (M = 3.12, SD = .90); (d) fund more research into renewable energy sources (M = 3.42, SD = .69); and (e) provide tax rebates for people who purchase energy-efficient vehicles or solar panels (M = 3.17, SD = .78).

Political ideology
Respondents indicated their political ideology on a 5-point scale from 1 (*very liberal*) to 5 (*very conservative*) (M = 3.09, SD = 1.02).

Religiosity
Religiosity was measured by asking how often respondents attended religious service. Answers ranged from 1 (*never*) to 6 (*more than once a week*) (M = 3.29, SD = 1.83).

Demographics
Demographic variables used in this study included gender (1, *female* [52%]; 0, *male*), race (recoded as 1, *white* [69.3%]; 0, *other*), age (M = 46.36 years, SD = 16.82), and education (in four ordered categories—see sample description, M = 2.69, SD = 1.01).

Analysis strategy
The predictive model for this research was tested using structural equation modeling (SEM). The statistical package was Amos 17.0 and the method used was maximum likelihood estimation. Because most of the constructs in the model were measured with multiple items, we specified a hybrid model containing both structural relationships and measurement models for latent variables (Byrne, 2001; Stephenson & Holbert, 2003). A two-step approach was taken toward model estimation, first establishing the adequacy of the measurement component, and then estimating the

full model as a whole (Anderson & Gerbing, 1988). Model fit was assessed primarily using comparative fit index (CFI) and root mean square error of approximation (RMSEA). We report the chi-square statistic (χ^2) but its significance level was not taken as a reliable indicator of model fit due to its tendency toward overrejection with large samples (Hu & Bentler, 1999).

Our data contain sampling weights. However, most SEM software packages, included Amos, do not currently have the ability to allow for weighting in raw data analysis. To get around this problem, we used SPSS to produce a covariance matrix of all the variables in our analysis using the weighted data. This covariance matrix was then used as input for Amos to conduct model estimation.

Because we did not use raw data in the SEM analysis, we were not able to formally test multivariate normality using Amos's normality check function. However, inspection of the univariate distribution of all the variables did not reveal any problematic skewness or kurtosis based on criteria suggested by West, Finch, and Curran (1995, |skewness| <2, |Kurtosis| <7). The largest skewness value in our data was -1.155 and the largest Kurtosis value was -1.996. Moreover, previous research has shown that maximum likelihood estimation, which was used in our analysis, is rather robust to minor violations of the normality assumption (West et al., 1995).

Results

Model estimation

We first evaluated the adequacy of the measurement scales used in this research. The key variables in our predictive model—political news attention, science/environment news attention, science-based beliefs, perceived risk, and policy support—were all measured with multiple items. These variables were specified as latent constructs, each manifesting itself in a series of observed indicators. An omnibus confirmatory factor analysis model was created including all five latent variables, their respective indicators, and free correlations among the latent variables. Four error correlations were allowed based on the results of preliminary testing and conceptual linkages between item pairs (e.g., an error correlation was allowed between two of the risk indicators that assessed, on different scales, the potential consequences of global warming in the next 20 years).This measurement model was found to be consistent with the data, $\chi^2(105, N = 2,164) = 658.60, p < .001, \text{CFI} = .972, \text{RMSEA} = .049$, 90% confidence interval (CI) of RMSEA $= .046-.053$. The factor loadings ranged from .58 to .93 ($M = .76, Mdn = .82$).

Having obtained evidence of adequate measurement, we moved on to test the predictive model as a whole. Because the demographic variables were included mainly as control, insignificant paths from these variables were dropped after preliminary analysis. All structural relationships of theoretical interest (including those involving political ideology and religiosity) were retained in the model regardless of their significance level in preliminary testing. The final model overall fit the data well, $\chi^2(186, N = 2,164) = 1136.41, p < .001, \text{CFI} = .956, \text{RMSEA} = .049$, 90% CI of
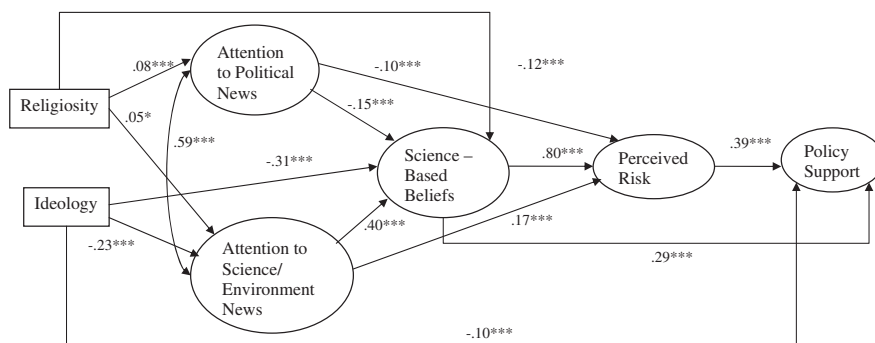
Figure 2 Model estimation results. $\chi^2(186, N = 2,164) = 1136.41$, $p < .001$, CFI = .956, RMSEA = .049, 90% CI of RMSEA = .046−.051. Demographic effects and nonsignificant paths are not included. Ovals represent latent variables. Rectangles represent observed variables. Path coefficients are standardized regression weight.

RMSEA = .046−.051. Estimates of the structural relationships in the model are presented in Figure 2. For the sake of clarity, effects of demographic variables and nonsignificant paths are not included in the figure.

The principle focus of this study was the relationships between news attention and global warming perceptions. As is shown in Figure 2, the two attention variables, while positively correlated ($r = .59$, $p < .001$), exhibited opposite relationships with the perception variables. Attention to science/environment news was positively associated with science-based beliefs ($\beta = .39$, $p < .001$) and perceived risk about global warming ($\beta = .17$, $p < .001$); H1 was supported. Attention to political news, however, was negatively associated with both science-based beliefs ($\beta = -.15$, $p < .001$) and perceived risk ($\beta = -.10$, $p < .001$); H2 was supported. Consistent with H3, both science-based beliefs ($\beta = .29$, $p < .001$) and perceived risk ($\beta = .39$, $p < .001$) were positively associated with policy support. Science-based beliefs and perceived risk were also positively associated with one another ($\beta = .80$, $p < .001$).

Also as expected, conservative ideology was negatively associated with attention to science/environment news ($\beta = -.23, p < .001$), science-based beliefs ($\beta = -.31$, $p < .001$), and policy support ($\beta = -.09, p < .001$). The direct relationship between ideology and perceived risk was not significant ($\beta = .001$, *ns*), however, suggesting that its impact on perceived risk was primarily mediated by news attention and science-based beliefs. Religiosity was positively associated with attention to both political news ($\beta = .08, p < .001$) and science/environment news ($\beta = .05, p = .02$) and negatively associated with science-based beliefs ($\beta = -.12$, $p < .001$). Its relationships with perceived risk ($\beta = .01$, *ns*) and policy support ($\beta = -.01$, *ns*) were not significant.

All the demographic variables had influence on one or more endogenous variables. Female respondents showed less attention to political news ($\beta = -.06$, $p < .001$), more accurate science-based beliefs ($\beta = .06, p = .003$), greater perceived risk ($\beta = .11, p < .001$), and less policy support ($\beta = -.05, p = .015$). White

respondents reported less accurate science-based beliefs ($\beta = -.10$, $p < .001$), less perceived risk ($\beta = -.05$, $p = .003$), but greater policy support ($\beta = .09$, $p < .001$). Education was positively associated with attention to political news ($\beta = .30$, $p < .001$), attention to science/environment news ($\beta = .24$, $p < .001$), science-based beliefs ($\beta = .06$, $p = .02$), and policy support ($\beta = .05$, $p = .019$), but negatively associated with perceived risk ($\beta = -.09$, $p < .001$). Finally, age was positively associated with attention to political news ($\beta = .31$, $p < .001$), attention to science/environment news ($\beta = .11$, $p < .001$), science-based beliefs ($\beta = .05$, $p = .033$), perceived risk ($\beta = .06$, $p < .001$), and policy support ($\beta = .08$, $p < .001$).

Altogether, the variance explained by the model was 16% for attention to political news, 11% for attention to science/environment news, 32% for science-based beliefs, 77% for perceived risk, and 48% for policy support.

Auxiliary analyses

Our model specified news attention as antecedent to global warming perceptions. Given the cross-sectional nature of the data, it is reasonable to wonder about reverse causation, that is, whether the observed relationships in fact reflected the impact of global warming perceptions on attention to relevant news. To explore this possibility, we estimated an alternative model featuring reversed paths between the two groups of variables. As in the previous modeling process, nonsignificant paths from demographic variables were dropped after preliminary analysis. Other model specifications were kept the same. Because the original model and the alternative model were not nested, model fit was compared using two information-based fit indices: the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) (Byrne, 2001). The absolute values of these indexes are not indicative of the merits of a single model. They become meaningful only when different models are compared against one another, in which case lower values indicate a better fitting model. The AIC and BIC values for the original model were 1316.41 and 1827.58, respectively, and those for the alternative model were 1367.17 and 1889.70, respectively. Although the difference in AIC cannot be interpreted as meaning significantly better or worse fit, some have suggested that a difference of 10 in BIC represents near certainty in the superiority of the model with the lower value (Raftery, 1995). The model comparison results, thus, favored the original model as providing much better fit to the data than the alternative model.

Discussion

The most interesting and important finding from this study is the pattern of relationships between news attention and global warming perceptions. Attention to science/environment news was associated with more accurate science-based beliefs and greater perceived risk, whereas attention to political news was associated with less accurate science-based beliefs and lower risk perceptions. These relationships emerged after accounting for the effects of demographics, political ideology, and

religiosity as well as the positive relationship between the two attention variables. Through the mediation of the perception variables, political and science/environment new attention indirectly predicted policy support, with the former associated with lower support and the latter stronger support for a number of emission reduction policies.

Before interpreting these results, it is important to acknowledge that our study had a cross-sectional design thus could not establish causality. Demographics, ideology, and religiosity are clearly exogenous influences in the model, but the relationships among the other variables are open to alternative specifications. In particular, one might argue that news attention might be a consequent of risk perceptions—that is, greater perceived risk leads to greater attention to particular types of news. Although this is a reasonable argument, comparative analysis showed that our proposed model was more consistent with the data than an alternative model with reversed paths between global warming perceptions and news attention. Moreover, the existing literature contains both longitudinal and experimental evidence showing that news attention is an important causal determinant of news effects (e.g., Eveland et al., 2003; Slater, Goodall, & Hayes, 2009). These findings, taken together, suggest that treating news attention as an antecedent of global warming perceptions in this study is appropriate.

If global warming perceptions are indeed influenced positively by attention to science/environment news and negatively by attention to political news, the next logical question is why? Part of the answer, we think, lies in the recent changes in the news coverage of global warming. The coverage of global warming in the 1990s and early 2000s was characterized by much scientific inaccuracy, including a false sense of uncertainty (Boykoff & Boykoff, 2004; McComas & Shanahan, 1999; Zehr, 2000). Journalists' lack of understanding of the science certainly played a role in this problem, particularly in the early years (Wilson, 1995, 2000). Their rigid adherence to balanced reporting, however, might have played an even bigger role in maintaining this sense of uncertainty in the news despite increasingly clear scientific evidence (Boykoff & Boykoff, 2004; Palfreman, 2006). In the last few years, however, encouraging changes have occurred. Unwarranted balance in the reporting of the scientific basis of global warming, such as its anthropogenic sources, has decreased significantly (Boykoff, 2007; also see Ward, 2008). This suggests that, as far as science/environment news is concerned, the public is getting more accurate information today than before. Their science-based beliefs about global warming, consequently, tend to become more accurate as they attend to such news more closely.

However, there is no reason to believe that uncertainty and controversy have faded away in the political coverage of global warming. In fact, if anything, the political bickering over global warming has only intensified under the current gloomy economic conditions. Although the new administration has vowed to tackle global warming as a top priority, vested political and economic interests, fluctuating oil price, slow progress on renewable energy sources have all worked to make the political debate over global warming ever so vociferous. Ill-advised communication

strategies by environmental advocates, ironically, seem to have also added to the level of contention in the public discourse over this issue (Nisbet, 2009).

If the coverage of global warming is indeed marked by increasing accuracy in science/environment news but continued controversy in political news, our finding becomes comprehensible and not all that surprising. When attention is available, news content can exert strong impact on people's knowledge, beliefs, and judgments (Lee & Scheufele, 2006; Ho et al. 2008; Slater, Hayes, & Ford, 2007). To the extent that people pay close attention to political news, they are more likely to perceive global warming as an ongoing matter of debate, with unclear or unknown consequences that may or may not deserve serious attention. Conversely, when people follow science/environment news closely, they are more likely to view global warming as a well-defined public issue, with grave and potentially irrevocable consequences that demand immediate responses from individuals, industries, and governments.

Certainly, attention to science/environment news and attention to political news need not be mutually exclusive. Many people monitor both types of news rather closely, as is evidenced by the positive correlation between the two attention variables in the current data. However, the possibility of concurrent attention to science/environment and political news should not obfuscate the importance of their independent effects. Indeed, our findings highlight the value and necessity of distinguishing different news genres when it comes to controversial science issues. The current state of public opinion on global warming, as is shown by our data, is on some level jointly shaped by countervailing influences from different types of news content.

In addition to the key findings on news attention, this study also produced some interesting results on ideology and religiosity. Consistent with previous research (Maibach et al., 2008; Pew, 2008; Zhao, 2009), political ideology was found to be an important predictor of individuals' standings on the issue of global warming. Of particular interest, this study revealed a direct relationship between ideology and science beliefs, after controlling for education and news attention. This relationship suggests that ideology may powerfully influence science beliefs through other, perhaps noninformational mechanisms, such as simple value-based judgments. This again reminds us that much of diversity in public opinion on global warming is partisan in nature and the current divide may not be easily bridged through enhanced science education.

This study also found that religiosity was positively associated with both types of news attention but negatively associated with science-based beliefs about global warming. This latter relationship is certainly intriguing but its interpretation is unclear at this point given the crude measurement of religiosity in this study. Nonetheless, the observation of this relationship is enough reason to urge greater research attention to the role of religion in people's perceptions about global warming. Such attention is sorely needed as increasing efforts are being spent to mobilize faith-based communities to join in the fight against global warming (Garrison Institute, 2007).

Their practical significance aside, the findings of this study also have theoretical implications. The justification for focusing on news attention in this study was offered by the cognitive mediation model of news learning (Eveland, 2001). Although we did not test this model in its entirety, the mediating role of news attention observed in this study was consistent with the model's propositions. Our study also extends previous cognitive mediation research by focusing on attention to different types of issue-relevant news. This study found that attention to science/environment and political news had opposite relationships with global warming perceptions. This finding suggests that a broad focus on attention to news in general (or a singular focus on the seemingly most relevant type of news) can often be limited. To achieve a thorough understanding of news learning, close attention should be paid to the nature of the issue at hand and the current pattern of news coverage. Without differentiating relevant types of news, important news effects could be obscured. Without fully capturing the role of audience selectivity in news attention, the theoretical and practical insights the cognitive mediation model has to offer can also be restricted. Indeed, in addition to global warming, many other controversial issues in the news today tend to get covered under multiple frames (e.g., stem cell research, Dahmen, 2009; Nisbet et al., 2003). Allowing for dimensionality in news attention should add significantly to the explanatory power of research addressing news effects related to these issues.

Finally, the limitations of this study should be acknowledged and addressed by future research. First, as mentioned earlier, our findings were based on cross-sectional data. Even though our model was favored in the model comparison analysis, experimental or longitudinal designs are needed to establish causality on firmer grounds. Second, we interpreted our key findings in light of the current patterns of news coverage on global warming. However, empirical data documenting the recent changes in global warming coverage are still limited. Confirming evidence from further news content analysis will greatly enhance our confidence in the current interpretations. Third, this study only examined variation in news attention across topical areas. Other types of variation in news attention, such as variation across media channels, may also have influence on public perceptions of global warming. Future research should extend the current study to investigate these potential influences.

Acknowledgments

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