Framing and Source Credibility in American Political Discourse About Climate Change

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A dissertation

submitted in partial fulfillment of the

requirements for the degree of

Doctor of Philosophy

University of Washington

2021

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Program Authorized to Offer Degree:

Communication

Abstract

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Climate change represents the greatest threat humanity faces. Despite the widely accepted scientific basis that climate change is human caused, the United States has largely failed to curb its greenhouse gas emissions, setting a dangerous precedent for other countries. Although there are many potential explanations for this inaction, one must certainly be the ways in which American political leaders present this issue to the public. In this dissertation, I first examined presidential and gubernatorial climate change mentions (n = 3,413) for the presence of national security and public health frames. I found that there were partisan and level of office distinctions in how this discourse was presented. Second, I conducted an experiment (n = 601) to determine what effects, if any, a partisan speaker (i.e., Republican or Democratic governor) and frame (i.e., national security or public health) would have on attitudes. I discovered some interesting findings regarding effects of the national security frame. I conclude by offering some advice for climate change communicators based on the results of this project.

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Acknowledgements

Throughout my academic career, I have been fortunate enough to receive constant support from a range of faculty, colleagues, friends, and family. At the University of Washington, I worked under the direction of David Domke. David always pushed me to find my own voice, supported my pursuit to learn statistics, and instilled in me the notion that the words our leaders draw upon matter. I am grateful for all the written feedback, phone calls, and research meetings we've had over the years. I also benefited from the guidance of my other committee members as well. I learned the R programming language from Mako Hill, the intersection of the environment and journalism from Adrienne Russell, experimental design and analysis from John Crowley, and the psychology of climate change from Susan Joslyn. I am indebted to you all for the outstanding feedback and patience you've shown me during the time it took me to complete this project. I would also like to thank my first adviser at the UW, Leah Ceccarelli. Although this dissertation is not a rhetorical criticism, it is stronger because of my academic roots in rhetoric. Before attending the UW, I studied communication at Southern Illinois University. The first graduate course I took was a seminar in environmental communication taught by Jonny Gray. It's safe to say I've been hooked on this field ever since. I'm also thankful for my MA adviser, Norie Ross Singer, who instilled in me a passion for studying climate change communication. My time at SIU wouldn't have happened if it wasn't for Todd Graham. Todd recruited me to debate for SIU as an undergraduate, allowed me to stay on to coach the team as a graduate student, and has been one of my closest friends ever since. Todd, you have taught me so much about what it means to be a debater, coach, scholar, and most importantly, a good person.

My colleagues (and friends) at the University of Washington have provided me with feedback, support, and laughs over the years. Beth Bollinger, Traci Feller, Lauren Fine, Devon Geary, Rico Neumann, and Janny Wang were all members of the directed research group I attended. This group (led by David) was by far the most rewarding part of my graduate school experience. It's been a privilege researching and writing with you all.

I have two friends that I must thank who have been an integral part of my growth as a scholar. Brandon Merrell, who I affectionately refer to as my personal data scientist, has commented on countless drafts and provided me with endless advice on statistics (any statistical mistakes are, however, my own). I cannot count the number of times that Stephen Mar has either helped me with my grammar or listened to one of my rants about anything and everything. I'm sorry if I've messed up any verb tenses in this project. Thank you both for your help and putting up with my constant stream of text messages.

I would be nowhere without the love and support of my family. My wife, Sydney, who accepted my marriage proposal when I was only one week into my program here at UW, has helped me so much throughout this journey. She's been there for me to celebrate when things went my way and has been there for me when things went awry. She's helped me code speeches for countless hours, made sure I stayed alive during my general exams, and has been patient and supportive when the program took longer than expected. My father, Terry, has always supported me. Thank you for instilling me a passion for learning about the world. I am not sure I can ever repay the sacrifices you have made for me, but I hope you know how much they've meant to me. I'd like to thank my grandparents, Jack and Gilda, who never miss a chance to tell me they are proud of the work that I'm doing. Lastly, to my fur boys, Toby and Roman, thanks for always being there for me, especially during my late-night work sessions. Thank you all.

Chapter 1: Introduction and Conceptual Argument

"As human beings, we are vulnerable to confusing the unprecedented with the improbable. In our everyday experience, if something has never happened before, we are generally safe in assuming it is not going to happen in the future, but the exceptions can kill you, and climate change is one of those exceptions."

–Vice President Al Gore, 2009[1]

Climate change is a societal problem with grave consequences. The Environmental Protection Agency (n.d.-a) defines climate change as "any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among others, that occur over several decades or longer." In the natural sciences, there is a consensus that climate change is anthropogenic, meaning that it is caused by human activities. A remarkable 97% of climate scientists publishing in scientific journals support this view (Cook et al., 2016), along with at least 18 scientific societies in the United States (U.S.), the U.S. National Academy of Sciences, the Intergovernmental Panel on Climate Change (IPCC), and others (National Aeronautics and Space Administration, n.d.). The Fourth National Climate Assessment report in 2018 predicted that droughts, heat-related deaths, wildfires, flooding, tropical storms, and sea level rise will continue to increase and intensify throughout the next century (Plumer & Fountain, 2018). It is estimated that for each additional degree in increased temperature the U.S. will lose 1.2% of gross domestic product, or over $200 billion annually. These consequences will be unequally distributed, exacerbating U.S. income inequality and particularly impacting the most vulnerable members of society (Hsiang et al., 2017). It is the case, though, that the Union of Concerned Scientists claims that "we have the technology and practical solutions at hand to accomplish [emissions reductions]" (Gudema, 2014, para. 70). However, despite the scientific consensus of,

[1] See Gore (2009).

threat posed by, and solutions available for climate change, the U.S. federal government has largely failed to act. Reasons include a mix of polarized political perspectives and ineffective communication strategies about climate change. The purpose of this dissertation is to explore the nexus of political ideology and communication present in this crisis about climate change.

Society is running out of time before it is too late to prevent the worst consequences of climate change. A report by the IPCC in late 2018 warned that the international community had only 12 years to prevent many disasters related to climate change. If the international community keeps temperature increases at or below 1.5 degrees Celsius, the report states that 50% fewer people will experience water-stress, risk of famine would decline, and millions in poor countries would be saved from poverty (Watts, 2018). Furthermore, corporations throughout the world are increasingly recognizing the urgent threat of climate change. According to a recent analysis by the Carbon Disclosure Project, many of the world's largest companies predict that they will face billions of dollars in damages as a result of climate change within the next five years (Plumer, 2019). Furthermore, while there are short-term impacts which justify action, there are even more devastating long-term implications of humanity's impact on the environment. Oceans and vegetation act as natural carbon sinks which absorb anthropogenic carbon dioxide emissions, but there is a limit that the Earth can sustain. According to Green et al. (2019), if current emissions trends continue, society will reach the limit of land-based carbon sinks by 2060. After this point, rapid warming would set in, exacerbating the effects of climate change, making it nearly impossible to make policy, advance human progress, or perhaps, even survive on the planet. Preventing the release of greenhouse gases must sit at the top of the agenda of the U.S. to prevent ecological collapse.

This sense of urgency has led some to call on academics to play a greater role in attenuating the current climate crisis. Cox (2007) argues that environmental communication scholars should treat their discipline as one of crisis akin to conservation biology, where the goal is to prevent ecological collapse. He argues that researchers must call into question communication practices that promote unsustainable policies towards the environment. While others (e.g., Schwarze, 2007) take issue with the notion of environmental communication as a "crisis discipline," instead advocating for one based on judgment, the key tenant is the same: the constitutive power of communication impacts public opinion about and normative behavior towards the environment. Others have also advocated for researchers to re-orient their work towards the fight to reduce greenhouse gas emissions. Aldy and Stavins argue, "We hope this call will be heard by researchers in universities, think tanks, and advocacy groups around the world" to help provide solutions to the climate crisis (2012, p. 2). In an episodic, 24-hour news cycle, maintaining attention on an issue is difficult, and climate change cycles from moments of intense attention to downright ignorance (Anderson, 2009). Scholars can aid in this endeavor by both conducting research about climate change in general and communication about climate change in particular and partnering with nongovernmental organizations and advocacy groups to ensure that successful and ethical communication practices enter the public sphere (Anderson, 2015). Treating environmental communication from the standpoint of crisis furthers the goal of correcting humanity's destruction of the environment.

Communication strategies and fossil fuel money have played a role in the manufacturing of scientific controversy about climate change in the U.S. Understanding how conservative politicians, corporations, and think tanks sowed the seeds of climate skepticism illuminates a major impediment to action on climate change. According to Weart (2011), after the scientific

consensus emerged about climate change in the late 1980s, corporations and think tanks began implementing many of the same tactics used to question the health effects of cigarettes in the 1950s and after. The goal, as strategist Frank Luntz made clear in memos to the Republican Party about communicating climate change, was to call into question this scientific consensus as the "window of opportunity" remained open to do so (Ceccarelli, 2011, p. 204). Despite making up only a small minority of scientists, climate change skeptics capitalized on the norm of balance in American journalism. If there was even the slightest dissent from this consensus, news organizations were determined to present two sides of a "controversy" over climate change (Ceccarelli, 2011). This climate skepticism has been funded by the fossil fuel industry (e.g., Exxon Mobil), corporate America (e.g., the National Mining Association), and conservative foundations (e.g., the Koch brothers). This money has funded research at conservative think tanks (e.g., the Heritage Foundation), front groups to shield the identity of sponsoring organizations (e.g., the Global Climate Coalition is funded by oil companies), and "Astroturf" groups (e.g., FreedomWorks) that are driven by public relations firms and front groups funded by the Koch brothers. Additionally, between 1990 and 2020, individual, political action committee, and soft money contributions from the oil and gas industry totaled over $779 million, with 18% of that donated to Democratic and 81% to Republican candidates for public office (OpenSecrets, n.d.). Overall, fossil fuel companies have employed communication strategies and monetary contributions to delay U.S. action on climate change.

At the same time, it is a reality that communicating scientific findings to the public is a difficult task. There are several reasons, many of which deal with the professional norms of scientists. For example, scientists prefer to hedge as they are trained to be skeptical of their own and others' findings. They also, in general, employ technical discourse in their writing, which is

designed to be read by other experts in the field, not necessarily the general public. The norm of objectivity in science also prevents many scientists from advocating on behalf of their findings, leaving this task to journalists, elites, and others (Valenti, 1999). The employment of technical jargon by scientists is difficult for the public to comprehend in many ways because the words mean different things to scientists and the public. For example, when a scientist says there is "uncertainty" in an estimate about a temperature increase, the public often perceives this to mean "ignorance," instead of a "range" of values, usually with 95% confidence (Sommerville & Hassol, 2011). Even when scientific findings make their way into the mass media, they tend to focus on health and medicine, with academic studies from other fields appearing in the media at a rate of well less than one-percent per article. This essentially means that most scientific studies operate within an academic echo chamber and never reach the public's eyes and ears (Suleski & Ibaraki, 2010). All of this culminates in the failure of the "deficit model" of science communication, which states that if the general public receives the facts about climate change, then they will act pro-actively (Hart & Nisbet, 2011). Instead, when the scientific consensus is called into question by manufactured skepticism, when news media rely on the norm of balance to give equal time to this manufactured skepticism, and when scientists fail to effectively communicate their findings, individuals can easily seek out information from sources they find credible that confirm their previously held beliefs. With this in mind, I now turn to a justification for why this dissertation focuses on U.S. political discourse, a prominent voice in this manufactured controversy over climate change.

It is essential to begin with recent U.S. political leadership. Before taking office, former President Donald J. Trump claimed climate change to be a "Chinese hoax," and in office he withdrew the U.S. from the 2015 Paris climate accords that set international targets to keep

temperature increases below two degrees Celsius by the end of the century (Baker, 2017). In response, several governors from around the country formed the United States Climate Alliance. This is an organization of 24 states and one territory with leaders from the Democratic, Republican, and New Progressive parties (United States Climate Alliance, n.d.). Encompassing 49% of the population and $10 trillion in economic activity, these areas functionally represent the third largest economy in the world (Igusky, 2019). The Alliance is committed to reducing greenhouse gas emissions by financing renewable energy technology and making buildings more energy efficient, while at the same time working to make communities more resilient to the effects of a changing climate (Shogren, 2017). Governor Jay Inslee (D-WA), co-chair of the Alliance, said, "This is about controlling our own destiny. There is nothing Donald Trump can do to stop us in our states from advancing these policies" (quoted in Shogren, 2017, para. 11). In this political environment, therefore, distinct leadership approaches are emerging between the U.S. federal government and some of the nation's governors. This dissertation seeks to examine communication approaches about climate action on both the U.S. federal and state levels.

There is a large amount of research on communication about climate change in general, but we need further work to explore the specific foci by U.S. political leaders and any potential impacts. Scholars have noted an emphasis on conservation discourse by politicians that began with Theodore Roosevelt (Buehler, 1998). More recently, politicians have presented the environment as an economic, national security, and public health issue (Bricker, 2012; Broda-Bahm, 1999; Hess et al., 2014). Analyzing these themes is important because political leaders are increasingly "going public"—that is, seeking to mobilize public opinion rather than target behind-the-scenes negotiations among political actors (Kernell, 2007). When "going public," politicians draw on their credibility (Cohen, 2015) and seek to "frame" situations to promote a

specific interpretation of an event (Entman, 2004). Previous empirical scholarship has shown that the credibility of a messenger can significantly affect attitudes (Druckman, 2001a). Source credibility is especially important on an increasingly polarized issue such as climate change (e.g., McCright & Dunlap, 2011a) because the lack of consensus among political elites leads people to consider other factors such as the party affiliation or the credibility of the speaker when forming their public attitudes (Brulle et al., 2012; Zaller, 1992). Given these dynamics in American politics, knowing what political leaders are saying is important to understanding how the issue of climate change is constituted in the public sphere. In the following sections, I present a framework for the topic of interest in this study, beginning with the importance of studying the discourse of presidents and governors, moving to a discussion about the polarization of climate change, and introducing the potential themes emphasized by political leaders in their climate change discourse. In so doing, I discuss the political communication concepts of framing and source credibility.

Political Communication

Scholarship can help us understand the communication decisions made by politicians about climate change. The language and images emphasized by politicians in the public sphere can shape how citizens understand events, issues, ideas, parties, and more. Edelman (1977) argued that the employment of symbolic language led individuals to acquiesce to their social status in society, such as impoverished individuals accepting an unfair distribution of resources. Through discursive categorization, government leaders prioritize certain problems over others, such as economic growth over environmental protection. A specific example is documented in Lakoff's (1996) pioneering work on moral values in American political discourse. He noted that liberals and conservatives offer diverging understandings of how the country, which he

represented through a parenting metaphor, should operate. For example, a conservative politician might speak in moral terms about the dominance of humanity over nature, while a liberal politician might deploy the moral language of nurturance to support environmental protection (Lakoff, 2010). The strategic language by politicians is conceptualized as *political communication* by Manheim (1991), which he defined as "the art of getting what you want at the least personal expense. Political communication is the art of getting it merely by expending words" (p. 4). Political communication in the public sphere matters at a minimum because politicians tend to believe that their words influence public attitudes (Coe & Neumann, 2011), and that "Language never simply reflects society; rather, the words people choose always influence the way we—all of us—think, feel and behave" (Domke & Coe, 2010, p. 32). With this in mind, an examination of discourse by American politicians is warranted because their language is strategically crafted and may influence attitudes on the issue.

Communication researchers have intensely studied the American presidency. Tulis (1987) developed the concept of the *rhetorical presidency* to highlight the increased number of public speeches delivered by presidents beginning with President Woodrow Wilson. Society should not consider the rhetorical presidency as inherently good or evil because it can be differently enacted. It is thus important for individual citizens to understand this presidential power fully developed in the 20th century (Tulis, 1987). Building upon this concept, Beasley (2010) urges scholars to examine both discursive presidential power and expanded institutional power, such as the use of executive orders and signing statements. Stuckey (2010) further contends that too much research about the American presidency focuses on the logical appeals made by presidents at the expense of focusing on appeals to credibility and emotion. With the rise of the Internet and new media outlets, Scacco and Coe (2016) argue that we have now

entered the *ubiquitous presidency*. It is increasingly rare for a president to speak to the American public through the news media. Instead, presidents are more likely to go meet the people directly, make themselves more accessible, offer more personal information, and invite a diverse group of Americans to the decision-making arena. In line with this theory, presidents have increasingly "gone public" (Kernel, 2007) with direct appeals to the public to gain support for their policies, and "gone local" (Cohen, 2010) by taking their message on the stump to gain positive coverage in local news outlets. These theoretical explanations of American presidential discourse are important to consider because they help an educated citizenry understand the strategies presidents might deploy when they insert their voice into the public sphere.

While scholars have devoted much effort to examining America's presidents, the nation's governors are an understudied area, especially on an issue such as climate change. Often considered a steppingstone to the White House, 17 governors have served as president and another 55 have been nominated by major parties for the office (Eagleton Institute of Politics, n.d.). With the "'presidentialization' of gubernatorial elections" (Salmore & Salmore, 1996, p. 51), America's governors have gained "increased power, media access, and visibility" (Hansen, 1999, p. 170). For example, governors are increasingly working with their attorneys general to sue the federal government on issues such as environmental policy, assisted suicide, immigration, and health care (Grove, 2016). As previously noted, the United States Climate Alliance was established by several governors in direct response to then-President Trump's decision to withdraw the U.S. from the Paris climate change accords (United States Climate Alliance, n.d.). Surprisingly however, relatively little empirical scholarship exists on the discourse of governors. One study examined the educational rhetoric of America's governors from 2001-2008, finding that education was often defined through the lens of economic

efficiency (Carpenter & Hughes, 2011), while other scholarship looked at specific governors (e.g., Ann Richards and Nelson Rockefeller) and concepts (e.g., metaphor and style) but did not take a systematic approach to studying this discourse (Buerkle et al., 2003; Dow & Tonn, 1993; Jamieson, 1980; Makay, 1970; Martin, 2004; Persico, 1972; Turek, 2014). Unfortunately, none of this research examines the environmental discourse of governors, a gap I seek to address.

The issue of climate change is increasingly polarized in the United States. In recent decades, the gap in concern about climate change has widened between Republicans and Democrats (Norman, 2017). In 2000, 46% of Democrats said they were worried about climate change, compared to 29% of Republicans, a difference of 17 percentage points. By 2017, this gap had widened to 48 percentage points. Moving beyond individual attitudes about climate change, there are also partisan differences on the factual question of whether a scientific consensus exists: 86% of Democrats surveyed in a 2018 Gallup poll said that there exists a scientific consensus on climate change, compared to 42% of Republicans (Brenan & Saad, 2018). Scholars have built upon these observations and identified political ideology as the strongest predictor of climate change attitudes. McCright and Dunlap (2011a), after examining 10 years of Gallup data, concluded that white conservative males were the most likely to exhibit climate change skepticism. Further research has demonstrated that in-group membership prompts concerns about the science of climate change among even open-minded conservatives (Kahan & Corbin, 2016) and conservatives with high science literacy (Kahan et al., 2012). The 2018 Gallup survey also provided evidence of gender, age, and educational gaps in concern about climate change. Women (54%) were more likely than men (42%), college-educated individuals (59%) were more likely than non-college graduates (44%), and those under 34 years of age (58%) were more likely than those over 55 (40%) to express concern about climate change. Similarly,

research has shown that gender, education level, and age are strong predictors of climate change attitudes (Hamilton, 2011; McCright, 2010; McCright & Dunlap, 2011b). The existing evidence points to the increasing polarization of climate change attitudes among the U.S. population. With this in mind, I choose to focus in this dissertation on individuals who identify as Republicans because they exhibit the least amount of support for climate change mitigation.

Climate Change Discourse of American Politicians

Scholars in communication have long studied the environmental discourse of American political leaders. Most of this work has focused on either a singular presidency (e.g., Bricker, 2012) or a rhetorical concept in a singular speech (e.g., Wolfe, 2007). A recurring finding is that presidents will "foreground" economic matters when discussing environmental messages (Bonnefille, 2008; Bricker, 2012; Buehler, 1998; Carcasson, 2004; Cox, 2004; Daughton & Beasley, 2004; Moore, 2004; Short, 2004; Vickery, 2004). For example, a systematic analysis identified economic language in over 60% of spoken presidential climate change invocations (Calderwood, 2019a). In this project, I seek to conceptually expand research on political discourse about climate change through the lens of *framing*. Framing is defined by Entman (1993) as, "select[ing] some aspects of a perceived reality and mak[ing] them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation" (p. 52). For example, Entman (1991) explored the ways in which news media differed in how it framed two similar situations: A Soviet and American shooting down of a passenger airliner. In this instance, the American news media promoted the interpretation that the Soviet Union intentionally ordered the shooting down of the plane by dedicating more coverage, humanizing the victims, and focusing blame on the leadership in Moscow because these ideas were congruent in the minds of their

American readership. In contrast, American news media focused on the technical failures that led to the U.S. shooting down of a passenger airliner because anything else would be incongruent with their readership. Available evidence suggests that both of these situations were accidents, but the news media promoted one as intentional and one as accidental. Political leaders can also attempt to promote a specific understanding of the problem at hand, potential causes of the problem, solutions to the problem, and any potential moral judgments (Entman, 2004). With this example in mind, political actors likely employ frames when invoking climate change.

In this dissertation, I wish to examine two potential framing emphases of climate change by U.S. political leaders: emphases on *national security* and *public health*. Economic messages are prevalent in political discourse about climate change, but research on the presence and effects of these messages is exhaustive (e.g., Calderwood 2019a; McCright et al., 2015), leading me to focus on national security and public health messages. Theoretically, it is important to study national security justifications to act on climate change for two reasons. First, raising the topic of national security with an audience invites additional lines of argument that might not have existed otherwise (Bricker, 2012). Opponents might be unlikely to raise objections based on national security unless they are initially brought up by the speaker proposing the policy change. Second, and perhaps most importantly, when balancing national security against climate change, it is easy to see the non-environmental side prevailing (Fletcher, 2009). For example, while in 2021 less than a majority of Americans (38%) said climate change was a top policy priority, terrorism (a national security issue) was rated higher at 63% (Pew Research Center, 2021). The importance placed on national security issues like terrorism and the military broke along partisan lines in the same poll. For example, 68% of Republicans said that terrorism was a major policy priority, compared to a lower, but still a majority, 58% of Democrats. Likewise, 51% of

Republicans rated the military as a top issue, compared to only 28% of Democrats.[2] National security discourse is also employed by presidents when they discuss a variety of policy issues, including the environment. Broda-Bahm (1999) identified national security discourse in the speeches, policies, and titles of new government officials (e.g., Pentagon Undersecretary for Environmental Security) during the Clinton administration. George W. Bush also deployed national security discourse in his climate change speeches, and he emphasized "safety" in relation to climate change in a similar fashion to how he invoked it to discuss the Patriot Act (Bonnefille, 2008). Overall, the four presidents of Bush, Clinton, Bush, and Obama mentioned national security in almost 15% of their climate change invocations, and the volume of this discourse significantly increased with the passage of time. The employment of national security frames in climate change invocations broke along party lines, with Republican presidents having had a significantly higher probability of invoking national security than Democratic presidents (Calderwood, 2019a). Thus, it is clear that national security justifications prior to the Trump administration were increasingly prevalent in the climate change discourse of America's political leaders, and I wish to extend research in this area.

Scholars studying the climate change discourse of American politicians, however, have devoted less attention to the employment of *public health* themes. Public health messages are interesting to study because, theoretically at least, they may encounter less resistance from individuals. For example, whereas a national security theme might open up additional lines of argumentation, it is difficult to imagine someone credibly arguing that climate change policies would actually *harm* public health instead of helping it. Additionally, the effects of air pollution and breathing-related health problems (e.g., asthma) are much more proximal to individuals than

[2] This includes both those that identify with the Democratic and Republican parties and those that lean towards the Democratic and Republican parties.

a potential national security threat posed by climate change. Notably, politicians connected public health and climate change during the Clinton and Obama administrations (Bunyavanich & Walkup, 2001; Hess et al., 2014). However, a survey by Maibach et al. (2015) found that while more than 60% of Americans said that climate change is a public health issue, barely 25% could correctly identify a problem related to public health and climate change. This is perhaps unsurprising given the findings of a content analysis of American and French news outlets that showed public health, despite recent political rhetoric, as rarely associated with climate change (Depoux et al., 2017; Weathers, 2013). I also expect that when public health is invoked in climate change invocations it will break along party lines. In general, individuals who identify as Democrats are much more likely to support spending on public health initiatives and health care reform than their Republican counterparts (Blendon et al., 2010), which might explain why the Clinton and Obama administrations began to tie public health with climate change. According to a Pew Research Center (2019) poll, this partisan divide remains with Democrats (73%) being more likely to favor spending increases on health care than Republicans (27%).[3] With this in mind, I predicted that Democratic leaders would generally offer more public health frames in their climate change discourse than their Republican counterparts. Thus, I offer my first set of hypotheses:

> H_{1a}: Republican presidents and governors will be more likely to employ national security frames than Democratic presidents and governors when they invoke climate change.
>
> H_{1b}: Democratic presidents and governors will be more likely to employ public health frames than Republican presidents and governors when they invoke climate change.

[3] This includes both those that identify with the Democratic and Republican parties and those that lean towards the Democratic and Republican parties.

I was also interested in comparing any potential differences in the employment of these frames when controlling for the level of office held by the speaker and their political party affiliation. Thus, I offered two research questions:

> RQ_{1a}: Are there differences between presidents and governors in how frequently they employed a general environmental focus when discussing climate change, controlling for party affiliation?
>
> RQ_{1b}: Are there differences between presidents and governors in how frequently they employed national security frames when discussing climate change, controlling for party affiliation?
>
> RQ_{1c}: Are there differences between presidents and governors in how frequently they employed public health frames when discussing climate change, controlling for party affiliation?
>
> RQ_{2a}: Are there differences between presidents and governors in the same party in how frequently they employed a general environmental focus when discussing climate change?
>
> RQ_{2b}: Are there differences between presidents and governors in the same party in how frequently they employed national security frames when discussing climate change?
>
> RQ_{2c}: Are there differences between presidents and governors in the same party in how frequently they employed public health frames when discussing climate change?

Effects on Public Opinion

Framing

Framing as a concept was originally theorized as an explanation for citizen lack of knowledge, that is to say that scholars believed it was easy to manipulate individuals through the employment of frames. However, while some individuals are easily manipulated, most do not respond automatically to the interpretation suggested by a frame. Instead, citizens use frames as a rational heuristic for understanding complex political arguments (Druckman, 2001b). While politicians might employ frames in an attempt to win over an audience, it is not a guaranteed result and requires more theorization regarding which conditions and what messages lead to

successful framing. And indeed, scholarship suggests that frames by political actors generally have strong effects only under certain conditions. In their review of the evolution of framing research in political communication, Chong and Druckman (2007) identified three instances in which individuals are highly susceptible to framing: those with high political knowledge surprisingly, those who are frequently exposed to a frame making it more available and accessible in their minds, and those who are unmotivated and thus likely to be influenced by frames of any sort. Additionally, they argue that frames are likely to have less of an effect when individuals have strong prior views and are highly motivated to determine the accuracy of the message. There are several studies that point research toward what we might call "strong" framing effects. First, Rowling et al. (2015) experimentally demonstrated that message frames that were echoed, or repeated, by several levels of government officials were most likely to influence the respondents. Even in a competitive framing environment, where individuals were exposed to both interpretations of a situation, framing effects were only slightly diminished. Second, Druckman (2001a) found that framing effects were impacted by the perceived credibility of the source. For example, a source high in credibility was more successful in achieving the desired effects than a low credibility source. Likewise, when individuals are engaged in interpersonal conversations with diverse viewpoints about the topic, framing effects have been amplified or reduced by source credibility (Druckman, 2004; Druckman & Nelson, 2003). Finally, when engaged in competitive framing environments, the side that has the most resources and more frequent messaging is likely to have a stronger effect than one sponsored by a group with less resources (Niederdeppe et al., 2014). Evidence, in sum, indicates that under specific conditions a speaker can frame a message to effectively promote a particular understanding of an issue or event.

The framing effects of climate change messages is a growing area of research across a wide range of disciplines in the social sciences. Nisbet (2009) established a typology of eight varying frames emphasized in climate change communication (e.g., economic competitiveness). Since this time, a large number of studies have advanced our understanding of the effectiveness, or lack thereof, of framing in climate change messages. Hart and Nisbet (2011) showed that a message framed with low social distance from an audience was more effective than one framed with high social distance (e.g., a farmer in Georgia versus a farmer in France). Likewise, Scannell and Gifford (2011), testing the concept of psychological distance, discovered that those receiving a message framed around the local impacts of climate change were more likely to support climate change mitigation. When exposed to a message with a frame promoting internal efficacy, or the belief that an individual can influence his or her government, individuals were more likely to express support for participating in climate change mitigation (Hart & Feldman, 2016). Keeping with the positivity of the previous work, Morton and colleagues (2011) found increased support for climate change mitigation policies when individuals were exposed to a positive frame, as in one that talked about preventing the loss of something the individual currently possesses. Conversely, when exposing individuals to certain frames, McCright and colleagues (2015) found mixed results. They discovered that exposing individuals to particular frames (e.g., national security, public health, Christian stewardship, and economic) had little to no effect on support for reducing greenhouse gas emissions, a measure of their *overall support* on the issue. While there is some evidence to suggest that climate change frames can influence the beliefs of individuals, the overall results are mixed, justifying further research in this area.

The experimental evidence on national security frames in climate change messages is mixed, but overall demonstrates their ineffectiveness because they tend to *decrease*, rather than

increase, support for climate change mitigation. Experimental evidence shows that conservative audiences will respond negatively in the face of a national security frame (Myers et al., 2012). When measuring *emotional response*, conservative respondents were more likely to exhibit anger, and less likely to exhibit hope, in the national security condition than in any other condition. Much like with the findings from Hart and Nisbet's (2011) study on social distance, a national security frame creates "boomerang" effects, where attempts at producing positive reactions actually makes things worse. This effect is seen most recently in Zhou's (2016) experiment that found a national security frame, irrespective of partisan cue, significantly reduced support for government action on climate change among Republican respondents. While one study found that national security messages can promote the belief that reducing greenhouse gas emissions is positive for national security, partisan identification moderates this support (McCright et al., 2015). Within this sample, Democrats were more likely to respond positively to the national security frame than Republicans. Given the increased presence of national security discourse in climate change messages, and the potential boomerang effects that lower support for climate change policies, further research on national security frames in climate change messages is warranted.

There is an increasing amount of experimental evidence about the effects of public health frames in climate change communication. To begin, respondents reading a public health essay mostly exhibited support for climate change action, but results were inconsistent for those most likely to hold skeptical views about climate science (Maibach et al., 2010). On the other hand, Myers and colleagues (2012) identified a public health frame as more effective than national security at promoting hopeful emotions about climate change action, especially among those most likely to question the science of climate change. This is important because those most likely

to be skeptical of climate change science are Republicans. Feldman and Hart (2018) found that Republicans were more likely to support climate change policies when they were framed as a solution to air pollution, a public health issue, instead of climate change. Further experimental evidence also suggests that, on its own, a public health frame is effective at convincing individuals that reducing greenhouse gas emissions is good for public health, although this effect is stronger for liberals than conservatives (McCright et al., 2015). However, climate change messages typically take place in a competitive framing environment. In the face of a climate change denial counter-frame, the significant positive effect of the public health frame is ameliorated, and the authors conclude that a public health frame is unlikely to increase support for climate change action. Importantly for the purpose of my research, the counter-frame offered contained a partisan cue, prompting subjects that "conservative leaders and Republican politicians don't agree." Thus, it is not possible to know if the presence of the counter-frame, or the partisan cue itself, is what lessened the positive effects of the public health frame. The mixed experimental evidence, and the need to find ways to bridge the gap between Republican skeptics and Republican supporters, necessitates further work.

Source Credibility

I believe it is particularly essential to devote more attention to the concept of *source credibility*. For a speaker to obtain a high level of *source credibility*, an audience must accept that the speaker has information about the issue and that the audience can trust the speaker to tell the audience what they need to know about the issue at hand (Druckman, 2001a). Importantly, source credibility is not necessarily about any real qualifications, but rather is based in the audience's perceptions of shared common interests with the speaker (Lupia, 2013). One of the earliest studies on source credibility (Hovland & Weiss, 1951) demonstrated that respondents

were more likely to initially agree with a source who they perceived to be high in credibility. While agreement with the source high in credibility faded over time, the impact on initial attitude formation was strong. In a meta-analysis of studies on source credibility and the sleeper effect (i.e., a delayed response to the credibility of a source), Kumkale and Albarracín (2004) showed that the strength of these initial effects is important, and that if presented early in a message there is less of an effect because individuals are more capable at working through the arguments made by the source. For the purposes of this study, source credibility is important because individuals have been shown to base their judgments about scientific information on the credibility of the messenger (Lupia, 2013). Druckman (2001a) took the idea of source credibility further to demonstrate the limitations it places on the ability for elites to influence the public. In an experiment, he exposed individuals to messages from either a high or low credibility source and one of two different messages. He found that individuals reading a source with high credibility were influenced by the message, whereas those in the low credibility group showed no effects on two important measures, *belief content* and *belief importance*. Belief content measures whether an individual has a positive or negative attitude towards the effect of a proposed policy, whereas belief importance measures the relative considerations that individuals use when making a decision. The available evidence suggests that, in general, the higher the credibility of the source the more likely they are to alter the beliefs of their audience.

Credibility of a source is made up of many factors, but in this study, I choose to focus on partisan identity. Zaller (1992) defines a cueing message as contextual information about the ideological or partisan elements of a message (e.g., a message that identifies the political party of the speaker). Zaller also introduced the concept of "partisan resistance," which occurs when individuals identify an information source as inconsistent with their partisan predispositions.

This type of resistance is likely to take place if the partisan identity of the source is not aligned with the individual receiving the message. The inverse, "partisan acceptance," is also likely to occur when an individual's partisan identity matches the source. Partisan cueing is important because of the increasing polarization in American politics, especially on climate change. Research by Iyengar and Westwood (2015) showed that individuals in an experiment exhibited more negative feelings and actions towards "out-partisans," meaning someone in the opposite party to which one identifies than someone of a different race. They argue that the responses to "out-partisans" were as automatic and even more polarizing than race, suggesting that polarization has reached new heights in American political discourse. These effects extend beyond just political issues and intersect with the increasingly confrontational politics practiced by U.S. elites. Research demonstrates that after individuals choose their party affiliation, they generally follow the direction of their party's leaders even without knowing the issue stances of those politicians.

The strong effect of partisan cueing on individuals is demonstrated in two important experimental studies. Cohen (2015) showed the effects of partisan cueing on attitudes about immigration among Americans. When conservatives were told that President George W. Bush was the leader of the nation, support for his immigration policy remained constant; however, when conservatives were told that Bush was the leader of the Republican Party, support significantly increased. As expected, when Democrats received the same cues, support for immigration reform was much higher when cued to consider the president as the leader of the nation than when they were cued to consider him as the leader of the Republican Party. Partisans have also been shown to form attitudes based on partisan cues, regardless of the position of the speaker. Nicholson's (2011) experiments during the 2008 election demonstrated the impact of in-

group and out-group messages. While in-group leaders did not persuade members of the group to change previously held opinions, the messages of out-group leaders led to more polarization and made it easier for respondents to identify the side of the issue they supported based on the partisan cue. Partisan cues can clarify where undecided individuals should place their support, suggesting that group leaders do have a persuasive effect. For example, Democrats receiving a Democratic partisan cue were more likely to choose a side based on knowing the partisan identity of the messenger rather than answering "Not sure." These studies provide evidence of the importance of source credibility in political messages.

In/out-group and partisan cues, as a result of source credibility, can influence how individuals perceive the increasingly polarized issue of climate change. This is due to the tendency for individuals to engage in identity-protecting behavior. In an attempt to explain why climate change is such a polarized issue, Kahan et al. (2007) argue in their cultural cognition hypothesis that individuals "seek to deflect threats to identities they hold, and roles they occupy, by virtue of contested cultural norms" (p. 467). Thus, when scanning the social landscape, individuals are likely to follow the positions held by other members of the groups to which they belong. Examining Gallup surveys from the 2000s, McCright and Dunlap (2011a) found that conservatives in general, and white males in particular, were the most likely to deny the science of climate change in the U.S. This evidence suggests that there is little support for the deficit model of science communication, which argues that it is only necessary for the public to receive scientific facts for them to accept, in this case, that climate change exists and is caused by humans (Hart & Nisbet, 2011). Instead, Kahan (2010) argues that, "People endorse whichever position reinforces their connection to others with whom they share important commitments" (p.

296). Thus, the cultural cognition hypothesis suggests that Republicans are likely to remain skeptical of climate change unless they can better identify with the source of the message.

There are numerous examples of Republicans engaging in identity-protecting behavior when expressing beliefs about climate change. In an experimental study, Hart and Nisbet (2011) discovered that identification with the victims of climate change interacted with political ideology to moderate climate change attitudes. Those with a strong Democratic affiliation maintained the same amount of support for climate change action regardless of the social distance of the victim (e.g., low: a farmer in Georgia versus high: a farmer in France), whereas those with a strong Republican affiliation were more likely to support climate change action when the victim had low social distance (e.g., a farmer in Georgia). The disidentification of Republicans with the high-distance victim created a "boomerang effect," where attempts to influence Republican respondents backfired, lowering overall support. Researchers found that as numeracy and scientific literacy increased, contrary to expectations, concern about climate change decreased, especially among hierarchical individualists (those most likely to identify as Republicans) (Kahan et al., 2012). Providing further support that individuals engage in identity-protecting cognition, Kahan and Corbin (2016) found that as active open-mindedness increased, again contrary to expectations, belief in climate change decreased, suggesting that individuals are engaging in motivated reasoning, a process through which individuals seek out and interpret information that confirms their previously held beliefs. Thus, it is important for scholars to study the partisan source of climate change messages because this will cue individuals to choose their position based on this information. *Source credibility* measures whether a respondent believes that the source possesses the information about climate change and trusts that person to give them the information. Thus, I offer my second hypothesis:

> H_2: A Republican-governor message will be rated as more credible by Republicans when compared to those exposed to a non-partisan and Democratic-governor message.

Moving to the interactions among partisan identity and discourse frames, research shows that individuals are generally influenced by the partisan cue of a message more so than the frame. For example, regardless of the frame offered, respondents in several experiments approved the side of the issue that was presented by someone who shared their partisan identity, especially on highly polarized issues (Bechtel et al., 2015; Druckman et al., 2013; Hartman & Weber 2009; Slothuus & de Vreese, 2010). This is also the case on the issue of climate change. Unsworth and Fielding (2014) found that the strength of an individual's attachment to his or her partisan identity, especially among conservatives, reduced support for climate change action when presented with an out-partisan cue in an experiment. However, there seems to be an unusual dynamic that occurs when partisan identity is crossed with national security frames. Specifically, research on climate change communication suggests that national security frames reduce support for climate change mitigation (e.g., Myers et al., 2012), even among Republicans when presented by a Republican source (e.g., Zhou, 2016). There are also several studies that provide some counter-evidence to the strength of partisan cues on framing effects (e.g., Aaroe, 2011; Gelpi, 2010; Goren et al., 2009). With this in mind, I offered a general expectation about the effects of the experimental conditions on the dependent variables. I expected that Republicans would respond favorably only when receiving a public health frame presented by a Republican source. This is established in previous experimental work by Myers and colleagues (2012) showing that Republicans responded well to a public health frame, and the speaker is a co-partisan in this condition. However, the other three conditions were expected to produce a "boomerang" effect where attempts to evoke support for climate change action instead reduce overall support. The public health frame presented by a Democratic source was not expected to

evoke a favorable response because the partisan cue would be stronger than the framing effects, and the presence of a Republican source with a national security frame was expected to still produce a boomerang of an unfavorable response from Republicans.

Overall Support

Measuring *overall support* about climate change involves asking individuals to indicate their level of support for reducing greenhouse gas emissions. I offer the following hypotheses regarding overall support:

> H_{3a}: A Republican-governor message with a public health frame will lead Republicans to express higher overall support for reducing greenhouse gas emissions compared to those exposed to a non-partisan message.
>
> H_{3b}: A Republican-governor message with a national security frame, a Democratic-governor message with a national security frame, and a Democratic-governor message with a public health frame will lead Republicans to express lower overall support for reducing greenhouse gas emissions compared to those exposed to a non-partisan message.

Belief Content

Belief content measures whether someone believes that a proposed policy will have a positive, neutral, or negative effect on public health and national security. I offer these hypotheses about belief content:

> H_{4a}: A Republican-governor message with a public health frame will lead Republicans to express stronger beliefs that reducing greenhouse gas emissions will have a positive impact on public health compared to a non-partisan message.
>
> H_{4b}: A Republican-governor message with a national security frame and a Democratic-governor message with a national security frame will lead Republicans to express weaker beliefs that reducing greenhouse gas emissions will have a positive impact on national security compared to a non-partisan message.
>
> H_{4c}: A Democratic-governor message with a public health frame will lead Republicans to express weaker beliefs that reducing greenhouse gas emissions will have a positive impact on public health compared to a non-partisan message.

Belief Importance

Belief importance measures whether someone will rate an assigned frame as an important or unimportant consideration when making a decision about climate change mitigation policies. I propose these hypotheses about belief importance:

> H_{5a}: A Republican-governor message with a public health frame will lead Republicans to express higher ratings of public health as an important consideration when making a decision about reducing greenhouse gas emissions compared to a non-partisan message.
>
> H_{5b}: A Republican-governor message with a national security frame and a Democratic-governor message with a national security frame will lead Republicans to express lower ratings of national security as an important consideration when making a decision about reducing greenhouse gas emissions compared to a non-partisan message.
>
> H_{5c}: A Democratic-governor message with a public health frame will lead Republicans to express lower ratings of public health as an important consideration when making a decision about reducing greenhouse gas emissions compared to a non-partisan message.

Emotional Response

When measuring *emotional response*, individuals are asked to express whether they feel angry, fearful, or hopeful about the issue of reducing greenhouse gas emissions. Below I offer my next hypotheses:

> H_{6a}: A Republican-governor message with a public health frame will lead Republicans to express less anger and fear and more hope about reducing greenhouse gas emissions compared to a non-partisan message.
>
> H_{6b}: A Republican-governor message with a national security frame, a Democratic-governor message with a national security frame, and a Democratic-governor message with a public health frame will lead Republicans to express more anger and fear and less hope about reducing greenhouse gas emissions compared to a non-partisan message.

Behavior

The next logical step when testing for a change in attitudes is to determine if framing and source credibility have an effect on engaging in climate-friendly *behavior*. Below, I offer my final hypotheses:

H_{7a}: A Republican-governor message with a public health frame will lead Republicans to express more willingness to engage in climate-friendly behaviors compared to a non-partisan message.

H_{7b}: A Republican-governor message with a national security frame, a Democratic-governor message with a national security frame, and a Democratic-governor message with a public health frame will lead Republicans to express less willingness to engage in climate-friendly behaviors compared to a non-partisan source.

Outline of Remaining Chapters

This dissertation proceeds with the following chapters in this manner. Chapter 2 details the two methods that I employed to examine the research questions and test the hypotheses. I employed two distinct methods—a content analysis and experiment—to better understand climate change messages. To ascertain the political discourse of American leaders on climate change, I undertook a content analysis of the spoken climate change invocations by American presidents from George H. W. Bush through Donald J. Trump and of American governors who are members of the United States Climate Alliance. Next, a powerful analytical approach is to combine the content analysis method with an experiment that explores the effectiveness of the analyzed discourse (see Gilmore & Rowling, 2017; Gilmore et al., 2016), which is relatively rare in the same body of research. Thus, a second method I employed was an experiment to examine the effect on attitudes of both source credibility (Republican and Democratic) and two frames about climate change (national security and public health), with a focus on a key public constituency: Republican Party-identifying individuals. To recruit participants for the experiment, I engaged Amazon's Mechanical Turk, a platform increasingly used in social sciences because it provides access for researchers to relatively inexpensive, efficient, and high-quality respondents (see Buhrmester et al., 2011; Mason & Suri, 2012). Chapter 3 details the results of the content analysis, which encompasses H_1. Chapter 4 details the results of the

experiment, which encompasses H_2-H_7. Chapter 5 concludes this dissertation with a discussion of the findings, limitations, and lays out a pathway for future research.

Chapter 2: Methods

"Our most valuable resources—creativity, communication, invention and reinvention—are in fact unlimited."

–Dr. David Grinspoon, 2016[4]

I employed two distinct methods to study the climate change messages of American politicians. In this chapter I first discuss the systematic way in which I performed a content analysis of communications by America's presidents and governors that invoke the topic of climate change. Second, I outline an experiment that examined the effects of message frame and source on a sample of individuals. There are a few distinct benefits of combining a content analysis with an experiment. A content analysis can provide a rich description of communications that are studied, but it cannot demonstrate causality. Combining this method with an experiment is complimentary because experiments are undertaken to demonstrate causality (e.g., Shadish et al., 2002). Additionally, performing a content analysis can strengthen the external validity of an experiment because the researcher can draw upon the language political leaders have invoked in the public sphere. For example, Cohen (2015) performed an experiment about immigration policy employing language taken directly from a speech delivered by George W. Bush. Finally, this combination of methods undergirds an expansive research agenda. My plan is ultimately to make the content analysis data publicly available, to support researchers in their own content analyses and allow them to potentially draw upon the content to develop their own experimental conditions with frames of their own choosing (Slater, 2013).

Method One: Content Analysis

I performed a content analysis of the climate change invocations of America's presidents and governors. Neuendorf (2017) defines content analysis as "the systematic, objective,

[4] See Grinspoon (2016).

quantitative analysis of message characteristics" (p. 1). The first step in my content analysis was to determine the concept of interest in the study (Weber, 1990). I was interested in studying the discourse of politicians about *climate change*. As a starting point for this, I drew upon the definition from the Environmental Protection Agency (n.d.-a) that states climate change occurs with major variations in climate over a substantial period of time. To operationalize climate change, researchers who study political and media messages about this issue generally search for variations of "climate change" and "global warming" (Boykoff, 2008; Boykoff & Boykoff, 2007; Calderwood, 2019a; Calderwood, 2019b). For this dissertation, I expanded the dictionary to include other relevant search terms derived from the glossary of climate change terms at the U.S. Global Change Research Program (n.d.). The operational terms I used in this study were: greenhouse*, carbon*, emission*, climat*, and warm*. I included the operational definitions for these terms in the codebook (Appendix A). I decided on these terms because they deal with the issue of climate change from a natural scientific standpoint. Excluded terms include vague words such as "feedback," "forcing," and "aerosol" that are either unlikely to appear in the context of climate change or lack the polarizing nature of phrases like climate change and global warming (Feldman & Hart, 2018; Leiserowitz et al., 2014).

Next, the researcher must identify the texts to study (Neuendorf, 2017). This dissertation focused on both America's presidents and governors. First, I studied all spoken climate change invocations of America's presidents, from the first time the "climate change" or "global warming" phrases were offered by an American president. These invocations began with George H. W. Bush in 1989—a point I ascertained in a previous study (Calderwood, 2019a)—until those made by Donald J. Trump in 2018. The year 1989 also coincides with the formation of the Intergovernmental Panel on Climate Change (Union of Concerned Scientists, 2017) and an

international meeting at which nations agreed for the first time on the necessity of emission reductions (Information Unit on Climate Change, 1993). While there is some debate about what presidential communications scholars should study (e.g., Beasley, 2010; Coe & Neumann, 2011; Hart, 2011), I chose to focus on all spoken presidential communications, which is in line with previous work on the presidency (see Coe, 2013). This included major national addresses such as the State of the Union, interactions with the press, and speeches to specific groups. Second, I examined major speeches (i.e., State of the State and Inaugural Addresses) by American governors who are members of the United States Climate Alliance. I chose members of this organization specifically because they substantially impact climate change politics in the U.S. and its members are committed to meeting the targets set forth by the Paris Agreement (Igusky, 2019). Also, the unique nature of the formation of the Alliance has spurred spin-off organizations on other issues. Following the formation of the Alliance, and in response to the federal government's failure to pass gun control legislation, four governors joined forces to create the "States for Gun Safety" coalition (Dovere, 2018). Gathering these texts provided a strong data set for analyzing the climate change discourse of America's presidents and governors.

The final step in this analytic approach is for the researcher to develop and apply a dictionary of terms (Krippendorff, 2010). I built this dictionary in an iterative process. First, I looked to previous studies that have examined the employment of national security and public health discourse on the issue of climate change (e.g., Bonnefille, 2008; Calderwood, 2019a; Calderwood, 2019b). Second, I looked at several sources, such as the World Health Organization's (2003) report on climate change and human health. Third, I read a selection of the climate change invocations and supplemented the dictionary with any terms that were missing. Finally, I employed human coding techniques to determine whether a national security or public

health frame was present or absent in each climate change invocation. To establish the reliability of this coding, two coders coded approximately 10% of presidential invocations (n = 340) and 10% of gubernatorial invocations (n = 14). Intercoder reliability was acceptable (Krippendorff's α = 0.77 for presidents and Krippendorff's α = 0.86 for governors).

I collected the communications for this study in several steps. First, I collected the spoken climate change invocations of America's presidents from George H. W. Bush until the date of December 31, 2018 in the presidency of Donald J. Trump. To gather these climate change invocations, I accessed the *Public Papers of the President* through the American Presidency Project, a repository of their official communications. I then performed a search for communications containing any of the search terms: greenhouse*, carbon*, emission*, climat*, and warm*. Next, I removed all non-spoken communications (e.g., memoranda, proclamations, and executive orders), because they are less likely to receive media attention in the age of the president "going public." Then, I copied each invocation of the search terms, along with a paragraph of context, into a spreadsheet. To clean the data, I applied the climate change definition listed above to each individual mention of the search terms, removing non-relevant invocations. Two coders read approximately 10% of presidential invocations (n = 673). Intercoder reliability was high (Krippendorff's α = 0.92). After removing non-relevant invocations (e.g., "I offer you a warm welcome," and "The economic climate is strong"), I had all of the spoken climate change invocations offered by these five presidents (n = 3,275). A list of communications is available on the author's website.

Second, I collected the climate change invocations from major speeches of America's governors who are members of the United States Climate Alliance. I defined the major speeches of America's governors as State of the State addresses, State of the Budget addresses, and

Inaugural addresses. Although a central repository of governors' speeches was unavailable, transcripts were generally accessible from the governors' websites or major newspapers within each state. I gathered speeches of governors beginning with the year in which they joined the United States Climate Alliance. For example, Washington state Governor Jay Inslee joined the Alliance in 2017, so I began with his 2017 State of the State address. Likewise, even though Pennsylvania Governor Tom Wolf has held his office since 2015, he did not join the Alliance until 2019, meaning I included only his speeches beginning in 2019. A list of all speeches is available at the author's website. The same method of cleaning the data outlined above was applied to the governors' invocations. Each communication was examined for references to greenhouse*, carbon*, emission*, climat*, and warm*, any non-relevant references were removed, and I retained a paragraph of context for each invocation. Two coders examined approximately 10% of invocations (n = 20) and established a high level of intercoder reliability (Krippendorff's α = 1.00). After removing non-relevant invocations (e.g., "I offer you a warm welcome," and "The economic climate is strong"), I had all of the spoken climate change invocations offered by these governors (n = 138).

Coding Scheme

Each climate change invocation in these communications received a code in the following categories. The codebook is available in Appendix A.

Date. I recorded the date for each climate change invocation.

Speaker. I recorded the name of the speaker and assigned a number to each speaker.

Political Office. I recorded whether the speaker was a president or a governor.

Political Party. I recorded the political party for each president and governor.

General Environmental Focus. A general environmental focus was defined as present when the speaker emphasized the general environmental problems of climate change. Examples of this included invocations of "rising temperatures," "biodiversity," and "renewable energy." George W. Bush, for example, stated, "Addressing global climate change will require a sustained effort over many generations. My approach recognizes that economic growth is the solution, not the problem…" In general, an invocation was coded as a general environmental focus when it did not reference national security or public health.

National Security. A national security frame was defined as present when the speaker emphasized the national security of the country. Examples of this included invocations of "energy independence," "national security," and "military leaders." Bill Clinton, for example, stated, "Climate change, if we don't do something about it, will become a national security concern because more and more land will become unarable, and people will fight more and more over that which is." A complete dictionary is available in the codebook (Appendix A).

Public Health. A public health frame was identified as present when the speaker emphasized the health benefits of acting on climate change. Examples included invocations of "air pollution," "asthma," and "malaria." Barack Obama, for example, stated, "Over the past three decades, nationwide asthma rates have more than doubled, and climate change puts those Americans at greater risk of landing in the hospital." A complete dictionary is available in the codebook (Appendix A).

Both Public Health and National Security. A speaker could employ both public health and national security frames when invoking climate change. If so, the presence of both frames was identified.

Analysis Approach

After coding all climate change invocations using the categories above, I was able to answer my first hypothesis by using a chi-square equality of proportions test from the "stats" package in R (R Core Team, 2020). I compared the proportion of invocations that contained at least one reference to public health, national security, and both public health and national security by the political party of the speaker. For example, I compared the proportion of public health invocations offered by Democrats with those offered by Republicans.

In sum, the content analysis and my accompanying data analysis formed the first part of my research.

Method Two: Experiment

As a second part of this dissertation, I conducted an experiment with a questionnaire employing a post-test-only design. In this design, respondents first answered a series of demographic questions, then were randomly assigned to receive one of four vignettes about climate change or the control group, and finally answered post-condition questions relating to the six dependent variables (Shadish et al., 2002). The post-test only design has two major advantages (Morgan & Renbarger, 2018). First, it is less time-consuming for the respondent and less expensive for the researcher to conduct. Second, a pre-test has the potential to prime respondents to interpret the treatment or answer the post-test questions in particular ways. In this section, I first articulate the value of using vignettes. Next, I discuss how participants were recruited for this study, followed by a detailed look at the questionnaire as well as a description of the vignettes. Then, I discuss some takeaways from the pilot studies, analyze the main study demographics and outcome variables, and assess the quality of the data in the main study sample. Finally, I outline how I analyzed the results.

There are many positive benefits to using vignettes in this type of experiment. First, Wallander (2009) notes that vignettes test decision-making and judgment decisions of respondents through hypothetical scenarios. The clearest benefit of this design is the ease at which a researcher can create multiple conditions. For example, Myers and colleagues (2012) randomly assigned respondents to environmental risk, public health, or national security conditions, allowing them to examine how individuals responded to differing arguments promoting climate change mitigation. Second, these experiments can provide causal evidence of a relationship between two variables (Gaines et al., 2007). The ability to demonstrate causation complimented the content analysis. While a content analysis can provide a rich description of the discourse, an experiment can assess the effect that discourse might have on individual attitudes. Third, online experiments are the best mode for reducing social desirability bias (Persson & Solevid, 2014). While this is likely not a huge risk on an issue like climate change attitudes, my approach nonetheless increased the likelihood of receiving valid responses because the questions were answered privately. Finally, these experiments have been shown to replicate the results found in "natural" experiments. Hainmueller and colleagues (2014) used multiple vignettes in an experiment and demonstrated that attitudes towards immigrants closely mirrored the results of actual circumstances in Switzerland. This experiment provides evidence for the potential external validity of using vignettes in online experiments. While there are drawbacks to vignettes (see Barabas & Jerit, 2010; Gaines et al., 2007), all of the issues raised can be accounted for in the design of the experiment.

My focus was on exploring the potential effects of source credibility and frames on climate change attitudes among Republican individuals. The results of a power analysis, using the "pwr" package in R (Champely, 2020), indicated that I needed to recruit 535 respondents to

reach 80% power and the ability to detect what Cohen (1988) described as a small effect size at an alpha of less than 0.05. I began with three pilot experiments consisting of 80, 86, and 80 respondents in order to evaluate the reliability and validity of the measures and experimental conditions. I recruited participants using Amazon's Mechanical Turk (MTurk). To use MTurk, a requester (the researcher) posts a human intelligence task (the experiment) for workers (respondents) to complete. I hosted the experiment on Qualtrics, and MTurk allows for the researcher to direct workers to the questionnaire that is hosted on another platform (Amazon Mechanical Turk, 2017). Demographically, there are more MTurk workers who identify as liberal than conservative (see Levay et al., 2016). Individuals received 50-cents to complete the first two pilot experiments, $1 to complete the third pilot, and $1.25 to complete the main study.[5]

There are several important benefits for using MTurk as a social science researcher. First, MTurk is an inexpensive way to recruit participants, and the amount of the payment generally does not impact data quality (Buhrmester et al., 2011; Mason & Suri, 2012). Second, respondents can be recruited quickly, although workers respond quicker if they are offered a higher rate of pay and the task length is manageable (Buhrmester et al., 2011; Mason & Suri, 2012). Third, and perhaps the best advantage of MTurk, is that it allows the researcher to recruit only high-reputation workers. Peer and colleagues (2014) demonstrated that high-reputation workers were a sufficient condition for producing high-quality data, even without using attention check questions. These are the three main reasons that I used MTurk for this study: it allowed access to inexpensive, rapid, and high-quality respondents.

MTurk has also been shown to provide researchers with a diverse pool of potential respondents who were then used to replicate several studies. These respondents are similar in

[5] The median time spent on the main study was slightly above 5 minutes 30 seconds. The minimum wage in the state of Washington is $13.69. On average, the median respondent was paid $13.64 per hour.

demographics to the broader population of Internet users in the U.S. and showed no significant difference in their responses to psychometric scales (Mason & Suri, 2012; Paolacci et al., 2010). MTurk samples also were more representative than traditional student samples collected in many social science research experiments (Berinsky et al., 2012; Buhrmester et al., 2011; Paolacci et al., 2010). Importantly, for a study on an issue like climate change that is highly polarized, liberal and conservative workers on MTurk closely resemble those with similar ideologies in the broader public on several psychological variables (Clifford et al., 2015). Researchers using MTurk samples have also replicated studies that used traditional samples. Two separate studies returned comparable results to those found in leading social science journals and nationally representative surveys like the American National Election Study (Berinsky et al., 2012; Clifford et al., 2015; Simons & Chabris, 2012). Decision-making tasks were easily replicated on MTurk, with workers performing similarly to community and student samples on these important studies from the psychology literature (Crump et al., 2013; Goodman et al., 2013). Finally, MTurk respondents demonstrated reliability across several studies (Buhrmester et al., 2011; Paolacci et al., 2010). While there are some potential drawbacks to using MTurk (see Chandler et al., 2013; Paolacci & Chandler, 2014; Stewart et al., 2015), these can be managed when designing the study. Overall, MTurk samples have been used in replication studies, are much more diverse than traditional convenience samples, and provide high quality data.

I received approval from the Institutional Review Board (IRB) at the University of Washington for this project on May 2, 2019 (STUDY00007388). The project received exempt status from IRB, but there are two issues to discuss. First, when using vignettes in an experiment, the researcher is testing whether the vignettes have an effect on the attitudes of an individual. In this case, the vignettes were modeled upon actual political discourse, so there were not any

special risks involved to exposing subjects to this content. Second, MTurk does raise an important privacy concern because the worker ID associated with the respondent is available on a public profile. Thus, it was important both to reassure respondents that their information would not be shared and to keep the data safe (University of Texas, n.d.). This is less of a concern when using an external site to host the survey, like Qualtrics, because Amazon, despite owning MTurk, does not have access to the questionnaire responses. Additionally, Qualtrics did not ask for the respondent's MTurk Worker ID or any other personally identifiable information (Committee for Protection of Human Subjects, 2020). While there is always a risk of data being stolen by a third party when conducting web-based research, the information was stored on Qualtrics servers with the latest security software. Once the required number of questionnaires were completed, the information was downloaded into an Excel spreadsheet. No personally identifying information or MTurk Worker IDs were in this spreadsheet and it was stored on a password protected laptop with only the principal investigator having access.

Measurement and Experimental Conditions

Upon agreeing to perform the Human Intelligence Task, respondents were directed to Qualtrics by clicking a link. At this stage, a respondent was asked to consent to voluntarily participate in this experiment. Upon consent, the experiment began, containing three parts, and I expected it to take approximately 15 minutes to complete.[6] First, I asked the respondents a series of demographic questions. Second, the respondents were randomly assigned to one of four experimental treatments or the control group. Third, the respondents were asked a series of questions relating to the six dependent variables of interest. The complete questionnaire is available in Appendix B. Here are the questions:

[6] As an administrative variable, I also recorded time to completion for each respondent in seconds (M = 714.22, SD = 3,813.35).

Age. I asked respondents to report their age. This specific question is used by the American National Election Studies, an organization that conducts a biennial survey to help social scientists determine why Americans vote the way they do (American National Election Studies, n.d.). The question asked, "What is the year of your birth?"

Income. I asked respondents to report their income. A version of this question is used by the General Social Survey, an organization that helps policymakers, academics, and researchers understand America's changing society (General Social Survey, n.d.). The question asked, "In which of these groups did your total household income, from all sources, fall last year before taxes?" There were five answer choices ranging from "Under $29,999" to "$120,000 or more."

Race. I asked what racial or ethnic group best describes the respondent. This question is used by the ANES. The question asked, "What racial or ethnic group describes you?" with answer choices "White," "Black or African American," "American Indian or Alaskan Native," "Asian," "Native Hawaiian or Pacific Islander," "Hispanic," or "None of the above."

Education. I asked respondents to state the highest level of education they have attained. This question is used by the ANES. The question asked, "What is the highest level of school you have completed or the highest degree you have earned?" The answer choices were, "Did not graduate high school," "High school graduate," "Some college," "Associate's degree," "Bachelor's degree," "Master's Degree," "Professional degree (MD, MBA, JD)," or "Doctoral degree."

Political Ideology. I asked respondents to place themselves on a political ideology scale. This question is used by the ANES. The question asked, "Where would you place yourself on this scale of political ideology?" The answer choices were measured on a seven-point scale ranging from "Extremely liberal" to "Extremely conservative."

Political Party. I asked respondents to state which political party with which they most identify. A version of this question is asked on the ANES. The question asked, "Generally speaking, do you usually think of yourself as a Republican, a Democrat, or an Independent?" This was measured on a seven-point scale ranging from "Strong Democrat" to "Strong Republican."

Gender. I asked respondents to state what gender with which they most identify. Badgett and colleagues (2014) at UCLA law, working with the Gender Identity in U.S. Surveillance group, created best practices for asking questions about gender identity. They suggest a two-step approach, beginning with this question, "What sex were you assigned at birth, on your original birth certificate?" with answer choices "Male" and "Female." The second question asked, "How do you describe yourself?" with answer choices "Male," "Female," "Transgender," and "Do not identify as female, male, or transgender." This approach, according to the Williams Institute, is sensitive to gender identity as well as a valid measure. The organization also suggests that these two questions are asked at the end of the demographic portion of the questionnaire, which is what I did.

Experimental Conditions. The experimental conditions were as follows: (a) *Control (*301 words*, n* = 110*);* (b) *Republican Governor: National Security* (305 words, n = 113*)*; (c) *Republican Governor: Public Health* (309 words, n = 128); (d) *Democratic Governor: National Security* (312 words[7], n = 116); (e) *Democratic Governor: Public Health* (309 words, n = 134).

[7] Upon strengthening the treatments for the main study, a transcription error led the phrase "Many people will die as a result" to be omitted from the *Republican Governor: National Security* message while still appearing in the *Democratic Governor: National Security* message. While this does raise issues of internal validity, the key statistical test carried out was between the *Control* and the *Republican Governor: Public Health* message, which I predicted would have the strongest effect. While it is possible that the findings around the national security messages could be called into question, the risk would likely be an inflated Type II error rate (false negative) because the comparison was with the *Control*. It is possible, although unlikely, that the *Republican Governor: National Security* message could have shown a stronger effect if it included the seven words. This does not mean, though, that the *Democratic Governor: National Security* message was invalid.

The *Control* group focused on general environmental themes. The governor's party in the news story was not identified, and the two non-governmental organizations were also non-partisan (i.e., the U.S. Global Change Program and the Intergovernmental Panel on Climate Change). The news story focused on how unchecked climate change could lead to "drought, sea level rise, and famine, among other problems." The news story stated that many people would die as a result.

The two *National Security* conditions focused on national security themes. The governor's party in the news story was identified as either a Democrat or a Republican. Along with the U.S. Global Change Program, the news story also cited the Pentagon and the Joint Chiefs of Staff. The news story focused on how unchecked climate change could lead to "intensifying conflicts over arable land, declining oil reserves, and rising sea levels harming the military's readiness to defend the country." The Republican-governor message did not mention that many people would die as a result.

The two *Public Health* conditions focused on public health themes. The governor's party in the news story was identified as either a Democrat or a Republican. Along with the U.S. Global Change Program, the news story cited the National Institutes of Health and the Surgeon General. The news story focused on how unchecked climate change could lead to "thousands of deaths from heat waves, asthma, and epidemics like malaria." The news story stated that many people would die as a result.

Following exposure to these conditions, respondents were asked to complete a questionnaire. The questionnaire contained these questions:

Source Credibility. Individuals responded to two statements regarding source credibility. The first statement was, "The governor in the news story has knowledge about

climate change," with response choices on a seven-point scale ranging from "Strongly disagree" to "Strongly agree." The second statement was, "I trust the governor in the news story to tell me the information I need to know about climate change," with the same seven response choices. These statements and response choices were adapted from Druckman (2001a).

Overall Support. Individuals responded to six statements regarding their overall support for reducing greenhouse gas emissions (McCright et al., 2015). The six items in this study formed a reliable scale (Cronbach's $\alpha = 0.79$). The first statement said, "It's prudent to wait for results of more research before we reduce our nation's greenhouse gas emissions." The second statement said, "Overall, trying to reduce our nation's greenhouse gas emissions will be bad for our nation." The third statement said, "We have too many problems to deal with to try to reduce our nation's greenhouse gas emissions." The fourth statement said, "The President and Congress should make reducing our nation's greenhouse gas emissions a top priority in the next 2 years." The fifth statement said, "We should be aggressive in our attempts to reduce our nation's greenhouse gas emissions." The final statement said, "Trying to reduce our nation's greenhouse gas emissions will help us also deal with other important problems." All response choices were on a seven-point scale ranging from "Strongly disagree" to "Strongly agree." The first three items were reverse-coded for analysis.

Belief Content. Individuals responded to two statements to measure their belief content. These statements were employed by McCright and colleagues (2015). The statements said, "Please indicate whether you think that policies to reduce our nation's greenhouse gas emissions will have a negative, neutral, or positive effect on **national security**" and "Please indicate whether you think that policies to reduce our nation's greenhouse gas emissions will have a

negative, neutral, or positive effect on **public health**." These were measured on a seven-point scale ranging from "Extremely negative" to "Extremely positive."

Belief Importance. Individuals responded to two statements to measure belief importance. The statements read, "**National security** was an important consideration when forming my opinion about climate change," and "**Public health** was an important consideration when forming my opinion about climate change." These were measured on a seven-point scale ranging from "Strongly disagree" to "Strongly agree."

Emotional Response. Respondents answered three questions to measure three emotional responses: anger, fear, and hope. These questions were adapted from the Discrete Emotions Questionnaire (Harmon-Jones et al., 2016). The questions asked, "While reading the news story about climate change, to what extent did you experience **anger**," "While reading the news story about climate change, to what extent did you experience **fear**," and "While reading the news story about climate change, to what extent did you experience **hope**?" These were measured on a seven-point scale from "Not at all" to "An extreme amount."

Behavioral Change. Individuals responded to three statements to measure behavioral change. The statements read, "I plan to recycle waste at my home in the future," "I plan to reduce energy consumption in the future," and "I plan to walk, ride a bike, or carpool to work in the future." The items were adapted from Abdel-Monem and colleagues (2014). These were measured on a seven-point scale ranging from "Strongly disagree" to "Strongly agree."

Pilot Results

I conducted three pilot tests to familiarize myself with MTurk, Qualtrics, and to check for potential issues with the experimental design. I made two substantial changes on MTurk during the process of these pilot tests. First, I increased the payment to respondents from $.50 to $1.25

in an attempt to increase the quality of the data. Second, instead of recruiting individuals that were screened by MTurk as conservatives as originally planned, I recruited individuals across the political spectrum. Although I cannot quantify this, the collection time was moving very slowly, many individuals who were screened as conservatives did not respond that way on the questionnaire, and it was an additional 40-cents per respondent to use this feature. I also made two layout changes on Qualtrics during this process. First, in an attempt to assess attentiveness, I added a timer to each page of the questionnaire (not visible to the respondent). Second, I split the post-treatment questions into two different pages. Finally, I made several changes to the experiment itself throughout the pilot tests. First, I strengthened the language offered in the experimental conditions, while attempting to maintain realism. Second, I reordered several of the questions in an attempt to foster more consistent responses. Third, I made some of the question wordings more specific to incorporate language offered in the treatments. Finally, I decided to remove attention check questions because they have been shown to negatively impact the quality of questionnaire responses (Vannette, 2017), and research has shown that warnings given at the beginning of a questionnaire can be just as effective (Clifford & Jerit, 2015). Overall, the most substantial changes were made to how I recruited individuals on MTurk, while the experimental design itself remained largely the same.

Description of the Main Study Sample

I recruited individuals (n = 601) on MTurk from November 20-22, 2020. They were located in the U.S., had a HIT[8] (Human Intelligence Task) completion percentage of greater than 99%, and had not participated in the pilot studies. Individuals were paid $1.25 if they completed

[8] A HIT is a task that is posted for a worker to complete on the MTurk platform. Upon completion of the HIT, a worker receives approval or disapproval based on the quality of the work. In order to participate in my experiment, a worker must have received a 99% approval rating on all previous HITs completed.

the questionnaire on Qualtrics and provided the code that was randomly generated when they completed the experiment. After the pilot studies, I made two analytical decisions about what variables to include in the analysis and how they should be coded. First, I decided on the following demographic variables: *Age*, *Income*, *Race*, *Education*, *Party*, and *Sex*. Second, except for *Age*, I collapsed all other demographic variables into binary variables in an attempt to increase power. *Age* was measured as a continuous variable (M = 34.54, Mdn = 32.00, SD = 10.92). *Income* was measured as a binary variable, with "0" being less than $60,000 and "1" being greater than $60,000. 52.84% earned less than $60,000, while 47.16% earned greater than $60,000. *Education* was measured as a binary variable, with "0" being an associate degree or less and "1" being a college graduate or higher. 31.22% earned an AA degree or less, while 68.78% were at least college graduates. *Race* was measured as a binary variable, with "0" being not white and "1" being white. 28.69% were not white, while 71.31% were white. *Sex* was measured as a binary variable, with "0" being female and "1" being male. 44.50% were females, while 55.50% were males. *Party* was measured as a binary variable, with "0" being not a Republican and "1" being a Republican. 64.83% were either Democrats or Independents, while 35.17% were Republicans. Table 2.1 shows the descriptive statistics for the demographic variables. The means of the binary variables show the percentage of individuals that were in the category labeled "1."

Table 2.1. Descriptive Statistics for Demographic Variables

Statistic	N	Mean or % in Category 1	St. Dev.	Median
Age	599	34.54	10.92	32.00
Income (0 = Less than $60k, 1 = Greater than $60k)	598	47.16%	0.4996	0
Education (0 = AA or less, 1 = College graduate)	599	68.78%	0.4638	1

Race (0 = Not white, 1 = White)	596	71.31%	0.4527	1
Sex (0 = Female, 1 = Male)	600	55.50%	0.4974	1
Party (0 = Not Republican, 1 = Republican)	600	35.17%	0.4779	0

Individuals were randomly assigned to one of five groups: one control and four treatments. The results of a chi-square test of independence show that the randomization was successful (χ^2 (4, N = 601) = 3.53, p > 0.05). The null hypothesis was that the groups were not significantly different from one another. The p-value was 0.47, meaning I accepted the null hypothesis. Randomization was successful; the groups were statistically similar to one another. Table 2.2 shows the results of the randomization.

Table 2.2. Frequency Counts and Percentage of Individuals Assigned to Conditions

	Random Group Assignment	
Group	*n*	Percentage
Control	110	18.31%
Republican Governor: National Security	113	18.80%
Republican Governor: Public Health	128	21.96%
Democratic Governor: National Security	116	19.30%
Democratic Governor: Public Health	134	22.96%

χ^2 (4) = 3.53, p > 0.05

I offered six hypotheses that were tested across thirteen dependent variables. After the pilot studies, I decided to create binary variables for all outcomes, except for the *Overall Support* variable, which was still measured on a seven-point scale consisting of six items. I made this decision for two reasons. First, ordered probit models, which is the approach I abandoned,

requires a good degree of variation in factor levels to make an accurate prediction. This variation was not present in the pilot studies. Second, logistic regression models are much easier to interpret and communicate than ordered probit models. I collected data with an ordered probit approach in mind because it is possible to collapse categories after data collection is completed; it is not possible to expand categories ex post facto. I maintained the *Overall Support* variable as a six-item scale because reliability was acceptable (Cronbach's $\alpha = 0.79$).

The source credibility hypothesis was assessed on the *Knowledge* and *Trust* variables. *Knowledge* was measured as a binary variable, with "0" being not agree and "1" being agree. 89.35% of individuals said they agreed that the governor was knowledgeable about climate change while 10.65% did not agree. *Trust* was measured as a binary variable, with "0" being not agree and "1" being agree. 74.75% of individuals said they agreed that the governor could be trusted to provide them with information about climate change, while 25.25% did not agree.

The overall support hypothesis was assessed by a six-question item measured on seven-point scales called *Overall Support* ($M = 5.02$, $Mdn = 4.50$, $SD = 1.30$). The reliability of *Overall Support was* acceptable (Cronbach's $\alpha = 0.79$). Higher scores indicated more willingness to support reducing greenhouse gas emissions.

The belief content hypothesis was assessed on the *Positive Impact on Public Health* and *Positive Impact on National Security* variables. *Positive Impact on Public Health* was measured as a binary variable, with "0" being not agree and "1" being agree. 89.82% of individuals said that reducing greenhouse emissions would have a positive impact on public health, while 10.18% did not agree. *Positive Impact on National Security* was measured as a binary variable, with "0" being not agree and "1" being agree. 70.62% of individuals said that reducing greenhouse gas

emissions would have a positive impact on national security, while 29.38% of individuals did not agree.

The belief importance hypothesis was assessed on the *Public Health Considerations* and *National Security Considerations* variables. *Public Health Considerations* was measured as a binary variable, with "0" being not agree and "1" being agree. 91.85% of individuals said they considered public health when making a decision about climate change, while 8.15% of individuals did not agree. *National Security Considerations* was measured as a binary variable, with "0" being not agree and "1" being agree. 59.46% of individuals said they considered national security when making a decision about climate change, while 40.53% of individuals did not agree.

The emotion hypothesis was assessed on the *Anger*, *Fear*, and *Hope* variables. *Anger* was measured as a binary variable, with "0" being no emotional response and "1" being an emotional response. 41.93% of individuals said they experienced anger, while 58.07% said they did not. *Fear* was measured as a binary variable, with "0" being no emotional response and "1" being an emotional response. 47.83% of individuals said they experienced fear, while 52.17% said they did not. *Hope* was measured as a binary variable, with "0" being no emotional response and "1" being an emotional response. 43.41% of individuals said they experienced hope, while 56.59% said they did not.

The behavior hypothesis was assessed on the *Recycle*, *Energy*, and *Carpool* variables. *Recycle* was measured as a binary variable, with "0" being not agree and "1" being agree. 89.18% of individuals said they would recycle, while 10.82% of individuals said they would not. *Energy* was measured as a binary variable, with "0" being not agree and "1" being agree. 87.85% of individuals said they would reduce energy, while 12.15% said they would not. *Carpool* was

measured as a binary variable, with "0" being not agree and "1" being agree. 69.88% of individuals said they would carpool, while 30.12% said they would not. Table 2.3 shows the descriptive statistics for the outcome variables. The means of the binary variables show the percentage of individuals that were in the category labeled "1."

Table 2.3. Descriptive Statistics for Outcome Variables

Statistic	N	Mean or % in Category 1	St. Dev.	Median
Knowledge (0=Not agree, 1=Agree)	601	89.35%	0.31	1
Trust (0=Not agree, 1=Agree)	598	74.75%	0.43	1
Overall Support (1=Strongly disagree to 7=Strongly agree)	586	5.02	1.30	4.50
Positive Impact Public Health (0=Not agree, 1=Agree)	599	89.82%	0.30	1
Positive Impact National Security (0=Not agree, 1=Agree)	599	70.62%	0.46	1
Public Health Considerations (0=Not agree, 1=Agree)	601	91.85%	0.27	1
National Security Considerations (0=Not agree, 1=Agree)	597	59.46%	0.49	1
Anger (0=No emotion, 1=Emotion)	601	41.93%	0.49	0
Fear (0=No emotion, 1=Emotion)	598	47.83%	0.50	0
Hope (0=No emotion, 1=Emotion)	599	43.41%	0.50	0
Recycle (0=Not agree, 1=Agree)	601	89.18%	0.31	1
Energy (0=Not agree, 1=Agree)	601	87.85%	0.33	1
Carpool (0=Not agree, 1=Agree)	601	69.88%	0.46	1

Quality of the Data in the Sample

Before testing the hypotheses, I performed several checks on the quality of the data. While MTurk has been shown to provide quality data from respondents (see Buhrmester et al., 2011), there was the possibility for a lot of noise in this sample. I created a three-prong test (adapted from Buchanan & Scofield, 2018) to determine if a respondent was paying sufficient attention during the experiment. If an individual failed two of the categories, they were considered to be inattentive. First, I created a variable called *Page Submit Time* to determine how long an individual spent on each page. On average, individuals can read 987 characters per minute (Buchanan & Scofield, 2018). To account for fast readers, I added 1.96 standard deviations to the mean character limit for a total of 1,223 characters. On the page I tested, there were 1,955 characters, which means an average individual within 1.96 standard deviations of the mean should spend at least 95.91 seconds on the page. The average time spent on the page in my sample was 78.84 seconds. If an individual spent greater than 95 seconds, they passed this prong of the test. 458 individuals (76.21%) spent less than 95 seconds on the page and thus failed, while 143 (23.79%) spent more than 95 seconds on the page and thus passed. Second, I created a variable called *Click Count* to determine how many times an individual clicked on the page. There were 10 items on the page, so an individual passed this portion of the test if they clicked at least 10 times. If an individual did not answer every question, I determined if the number of clicks was equal to or greater than the number of questions they answered. 17 individuals (2.83%) clicked fewer times than the number of questions they answered and thus failed, while 584 individuals (97.17%) clicked as many times as the number of questions they answered and thus passed. Finally, I created a variable called *Options Used* to determine how many unique answer choices on the scale an individual selected. If an individual selected more than four

unique answer choices, they failed this portion of the test. 347 individuals (57.74%) used more than four answer choices and thus failed, while 254 individuals (42.26%) used less than four answer choices and thus passed. Overall, 252 (41.93%) did not pass at least two of the attention checks, while 349 (58.07%) passed at least two. Based on this test alone, it appears nearly half of the sample was inattentive.

I then determined that while this inattentiveness likely produced a noisy sample, it was unlikely to introduce systematic bias into the results. The questions I used to determine attentiveness were drawn from the page that included the *Overall Support* variable. I examined if there was a significant difference in the mean scores on the *Overall Support* variable for inattentive and attentive respondents. The 252 individuals who failed the attention checks (M = 5.29, Mdn = 5.42, SD = 1.35) compared to the 349 individuals who passed the attention checks (M = 4.82, Mdn = 4.17, SD = 1.22) were significantly more likely to support climate friendly policies (t (493.64) = 4.31, $p < .05$). However, as noted previously, randomization was successful, thus systematic bias was unlikely to be introduced into the study, as the noisy individuals were statistically evenly distributed throughout the groups. All 601 respondents remained in the study.

Analysis Approach

I analyzed H_2, H_4, H_5, H_6, and H_7 using logistic regression models. To use a logistic regression model three assumptions must be met: linear relationship between the predictor and the outcome variable, independence of the outcomes, and an outcome variable that is binary (Diez et al., 2015). A logistic regression model shows the change in the log-odds of the outcome variable for every one-unit increase of the independent variable, holding all other variables constant. I estimated the logistic regression models using the “stats” package in R (R Core Team,

2020). To test the hypotheses, I created four logistic regression models: an intercept-only model, a model with only the experimental conditions, a model with the experimental conditions and control variables, and a model with an interaction between the party of the respondent and the experimental conditions as well as control variables.

I analyzed H_3, the *Overall Support* variable, using Ordinary Least Squares (OLS) models. To use an OLS model four assumptions must be met: normality of residuals, constant variability of residuals, independence of residuals, and a linear relationship between the predictor and the outcome variable (Diez et al., 2015). An OLS model shows the effect of a one-unit increase of the independent variable on the dependent variable, holding all other variables constant. I estimated the OLS models using the "stats" package in R (R Core Team, 2020). To test this hypothesis, I created four OLS models: an intercept-only model, a model with only the experimental conditions, a model with the experimental conditions and control variables, and a model with an interaction between the party of the respondent and the experimental conditions as well as control variables.

Chapter 3: Content Analysis Results

"The art of communication is the language of leadership."
–James Humes, former presidential speechwriter[9]

Climate change is inherently a political problem, making it important to study the language employed by America's leaders who have discussed the issue. This is especially vital on this issue because of its increasingly polarized nature (Brenan & Saad, 2018). Scholars have long studied the content of American public discourse about environmental issues (e.g., Peterson, 2004). While some studies have attempted to analyze presidential discourse for national security arguments (e.g., Bricker, 2012), only a few studies systematically examined American political discourse about climate change and national security (e.g., Calderwood 2019a; Calderwood 2019b). Those studies revealed that the presence of national security discourse increased over time, which is troubling given the experimental evidence that indicates the ineffectiveness of those arguments to persuade Americans about climate change (e.g., Myers et al., 2012). No studies to date have systematically examined American political discourse for public health messages about climate change, although one of the driving forces for this content analysis was an experimental study testing the effects of public health versus national security emphases in environmental discourse with a nationally representative sample of participants (Myers et al., 2012). The results of that study demonstrated public health emphases might unlock American support for pro-climate change policies. In this dissertation, I expanded upon my previous work to include more presidents, governors, and supplemented the dictionary of terms utilized to gather the messages.

[9] See Paymar (2012).

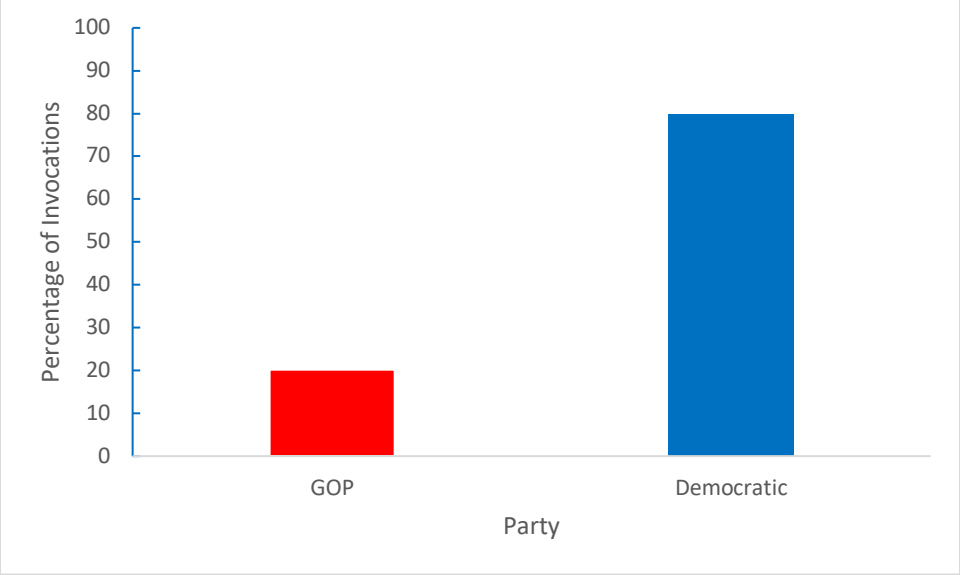
I examined the climate change discourse of political leaders for evidence of national security and public health arguments in an attempt to fill this gap in our knowledge. I accomplished this task by collecting every spoken mention of climate change by American presidents from when George H. W. Bush took office in 1989 through Donald J. Trump's second year in office in 2018 and from American governors in their major speeches (e.g., State of the State) since they joined the United States Climate Alliance through the end of 2019. I gathered the communications, excluded non-relevant mentions, and applied the dictionary of public health and national security terms to the mentions (n = 3,413). At the beginning of this process, I proposed one hypothesis and two research questions. In H_{1a}, I predicted that Republican politicians would be more likely to employ national security discourse than Democratic politicians, and in H_{1b}, I predicted that Democratic politicians would be more likely to utilize public health discourse than Republican politicians. Due to the paucity of previous work on American governors and environmental discourse, I also posed two research questions to compare the discourse between different levels of office as well as partisan affiliation. This chapter presents the results of this content analysis of the climate change discourse of America's governors and presidents.

Describing the Dataset

In this section, I present details about the dataset. The individual mention of climate change—what I call an *invocation*—served as the unit of analysis for this project. In total, I collected 3,413 invocations of climate change from 1,546 presidential and gubernatorial spoken communications between January 20, 1989 and December 31, 2018 for presidents and January 1, 2017 and December 31, 2019 for governors. Of those invocations, 20.19% were by Republican leaders (n = 689) and 79.81% were by Democratic leaders (n = 2,274). Figure 3.1 shows the

distribution of climate change invocations by political party. Overall, Democrats dominated presidential and gubernatorial discourse about climate change, which was in line with scholarship about issue ownership (Egan, 2013) and replicated findings from previous work (Calderwood, 2019a). To determine if this difference occurred by chance, I conducted a post-hoc chi-square equality of proportions test. I tested whether the Republican proportion was less than the Democratic proportion. The result of the test was significant (χ^2 (1, N = 3,413) = 2,424.4, p < 0.05). I can state with confidence that the Republican proportion was significantly less than the Democratic proportion within these collections of presidential and gubernatorial public communications.

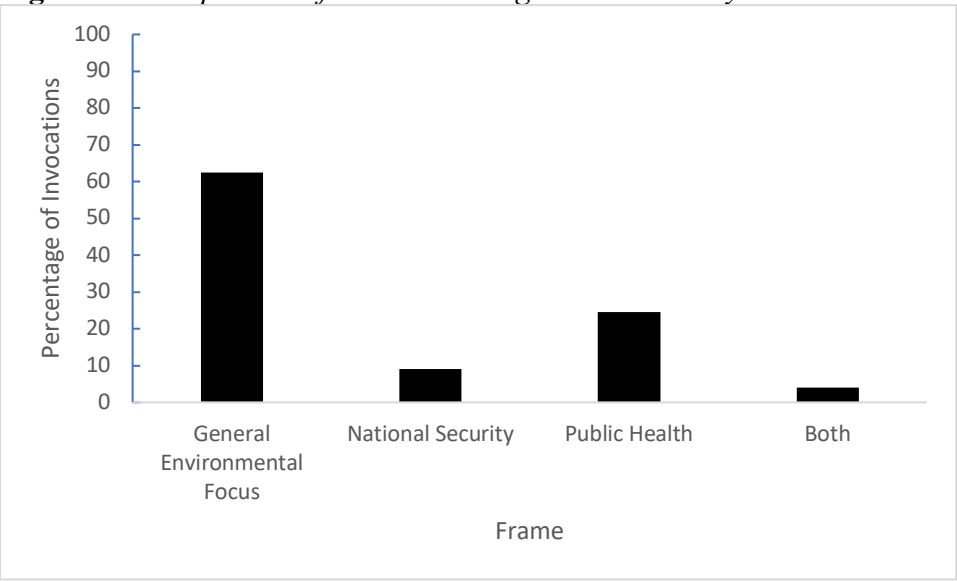
Figure 3.1. *Proportion of Presidential and Gubernatorial Climate Change Invocations by Party*



Additionally, I coded each climate change invocation for one of four frames: general environmental focus, national security, public health, or both national security and public health. The general environmental focus led the discourse, comprising 62.38% of all invocations (n = 2,129). A national security frame was present in 9.05% of invocations (n = 309). A public health

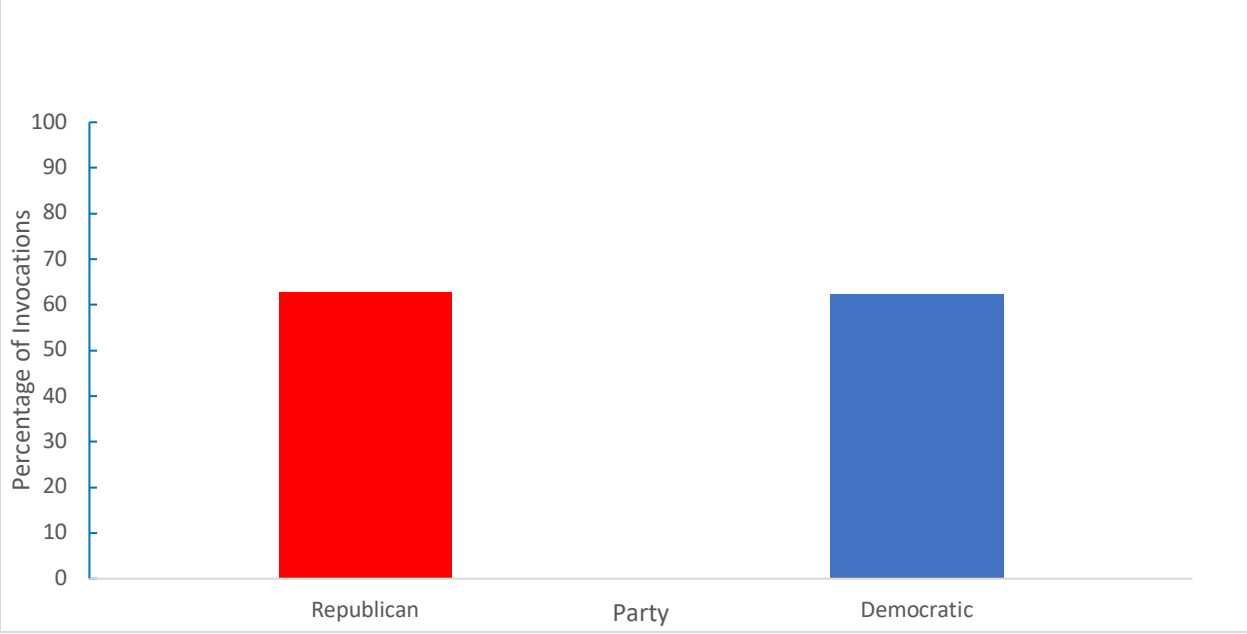
frame was present in 24.58% of invocations (n = 839). A president or governor invoked both national security and public health in the same invocation 3.98% (n = 136) of the time. A general environmental focus heavily led the discourse, followed by public health, then national security, and finally both an invocation of national security and public health. It should be noted that while this study did not take up economic arguments, previous work showed that presidents heavily relied on this framing device (Bricker, 2012; Calderwood, 2019a). It seems probable that much of the environmental focus discourse contained economic arguments. Overall, presidents and governors employed the general environmental focus at a frequency 2.54 times more than public health and 6.89 times more than national security. Figure 3.2 shows the distribution of climate change invocations by frame. For all future analyses, I collapsed the category containing both national security and public health categories into their singular categories so only direct comparisons within hypotheses could be made. Comparisons across the hypotheses would produce inaccurate conclusions.

Figure 3.2. *Proportion of Climate Change Invocations by Frame*



Having assessed the discourse by frame, I moved to my first hypothesis, which examined potential partisan differences in this discourse. Before answering the first hypothesis, which dealt with the national security and public health mentions, I also tested whether there were partisan differences in the utilization of the general environmental focus. Republicans invoked a general environmental focus 62.70% (n = 432) of the time, while Democrats did so 62.30% (n = 1,697) of the time. The difference between these proportions was less than .5%. Figure 3.3 displays these findings. The result of a post-hoc chi square equality of proportions test, testing whether the Republican proportion was greater than the Democratic proportion was not significant, so I accepted the null hypothesis (χ^2 (1, N = 3,413) = 0.02, p > 0.05). These two proportions were not significantly different from one another.

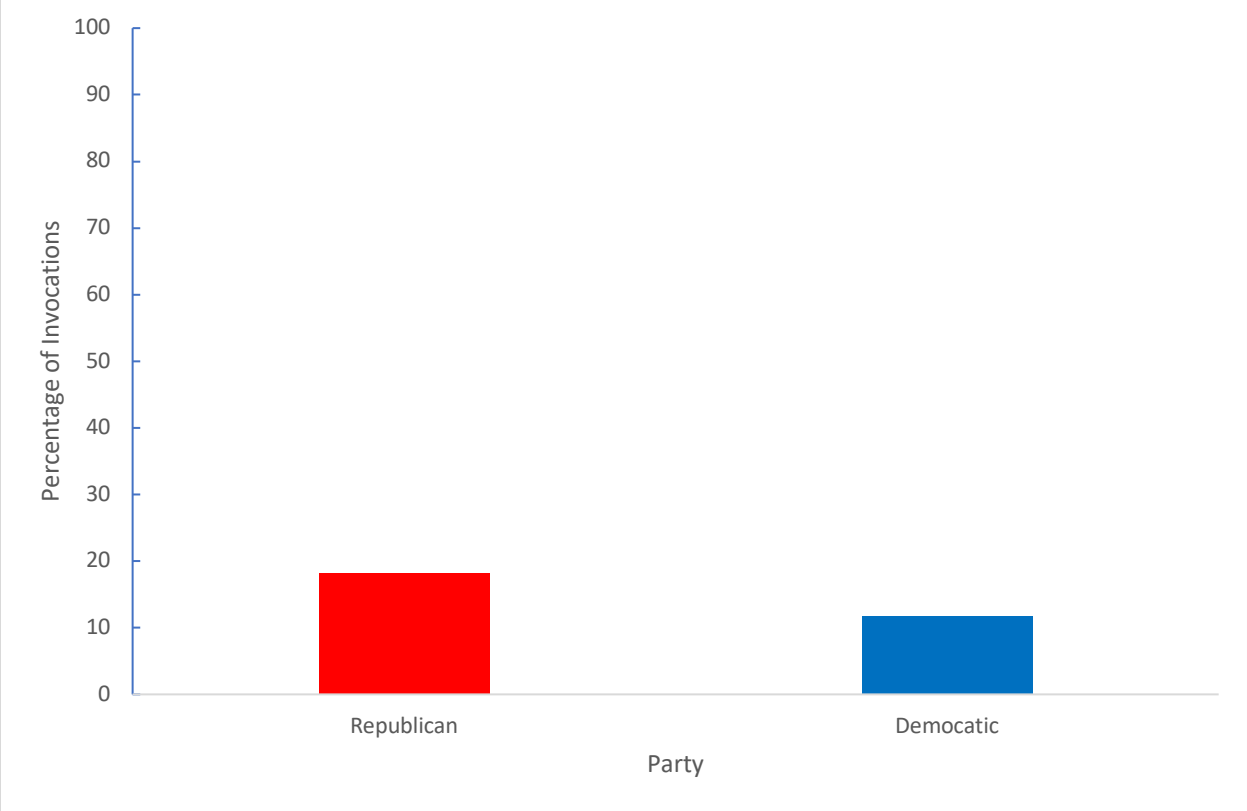
Figure 3.3. *Proportion of Climate Change Invocations with a General Environmental Focus by Party*



H_{1a}: Partisan Differences and the National Security Frame

In H_{1a}, I predicted that Republican presidents and governors would be more likely to employ national security frames than Democratic presidents and governors when they invoked climate change. To test this hypothesis, I recoded the "national security" and "both national security and public health" categories as a "1" and all other mentions as a "0." This allowed me to test the relative proportions, which was a superior method than raw frequencies because Republicans and Democrats invoked climate change at different rates. The raw frequencies would have told us very little because we knew that Democrats likely invoked national security more times than Republicans simply because Democrats invoked climate change more frequently overall. Republicans invoked national security in 18.14% (n = 125) of their climate change mentions, while Democrats did so in 11.75% (n = 320) of their climate change mentions. Figure 3.4 shows that these proportions are in the same direction as previous work (Calderwood, 2019a). I conducted a chi square equality of proportions test, testing the alternative hypothesis that the Republican proportion of national security mentions was greater than the Democratic proportion of national security mentions. The result of the test was significant (χ^2 (1, N = 3,413) = 19.27, $p < 0.05$). I rejected the null hypothesis and accepted the alternative hypothesis that the Republican proportion was greater than the Democratic proportion. Republicans invoked national security arguments 1.54 times more frequently than Democrats. I found support for H_{1a}.

Figure 3.4. *Proportion of Climate Change Invocations with a National Security Frame by Party*



The national security frame was present across a variety of arguments. To provide insight into this discourse, I offer examples below of national security arguments from a range of American leaders and parties relating to dependence on foreign oil, wars over resources, energy security, the Pentagon declaring climate change a national security threat, protecting the sovereignty of the United States, and lastly a general reference to Colorado's security. George H. W. Bush, in remarks at a luncheon hosted by the Forum Club in Houston, Texas on March 16, 1989, emphasized the dangers of dependence on foreign oil:

> And some of it is environmental, and much of it is that people now realize we are becoming more and more dependent on foreign oil -- it's getting close to 50 percent now. And most people, even if they don't come from an oil-producing State or a hydrocarbon-producing State, understand that that is not in the national interest of the United States. So, I'm optimistic about it.

Bill Clinton, in remarks at a Democratic National Committee Luncheon in Palo Alto on September 23, 2000, emphasized potential wars over resources:

> Climate change, if we don't do something about it, will become a national security concern because more and more land will become unarable, and people will fight more and more over that which is. More and more countries will have water supply problems.

George W. Bush, in remarks on signing the Energy Independence and Security Act of 2007 on December 19, 2007, emphasized the importance of freeing the United States of its dependence on foreign sources of energy:

> Today we make a major step with the Energy Independence and Security Act. We make a major step toward reducing our dependence on oil, confronting global climate change, expanding the production of renewable fuels, and giving future generations of our country a nation that is stronger, cleaner, and more secure.

Barack Obama, in his news conference with member of Parliament and leader of the National League for Democracy Party Aung San Suu Kyi of Burma in Rangoon, Burma on November 14, 2014, emphasized that the Pentagon recognizes climate change as a national security threat:

> And the release of carbon gases—carbon dioxide and greenhouse gases—into the atmosphere can have a potentially devastating effect that will cost our country, could devastate communities, could increase the impact of natural disasters, and will have an impact worldwide that is destabilizing and could affect our national security. That's not my opinion, by the way, that is the opinion of our Joint Chiefs of Staff: that climate change is a direct national security threat.

Donald J. Trump, in remarks at the Faith and Freedom Coalition's Road to Majority Conference on June 8, 2017, emphasized the importance of American sovereignty:

> To protect those jobs and the sovereignty and freedom of the United States, I followed through on my promise to withdraw from the Paris climate accord. [Applause] Thank you. You understand it. You understand how bad it was for our country. It's going to strip us of our jobs, our wealth, our companies. And they keep saying, oh, it's nonbinding—so innocent. I figure between that deal, the Iran deal, NAFTA—we've got some beauties, don't we? [Laughter] Don't worry, you're going to see some real good ones coming about very soon. You're going to see some great ones coming about very soon.

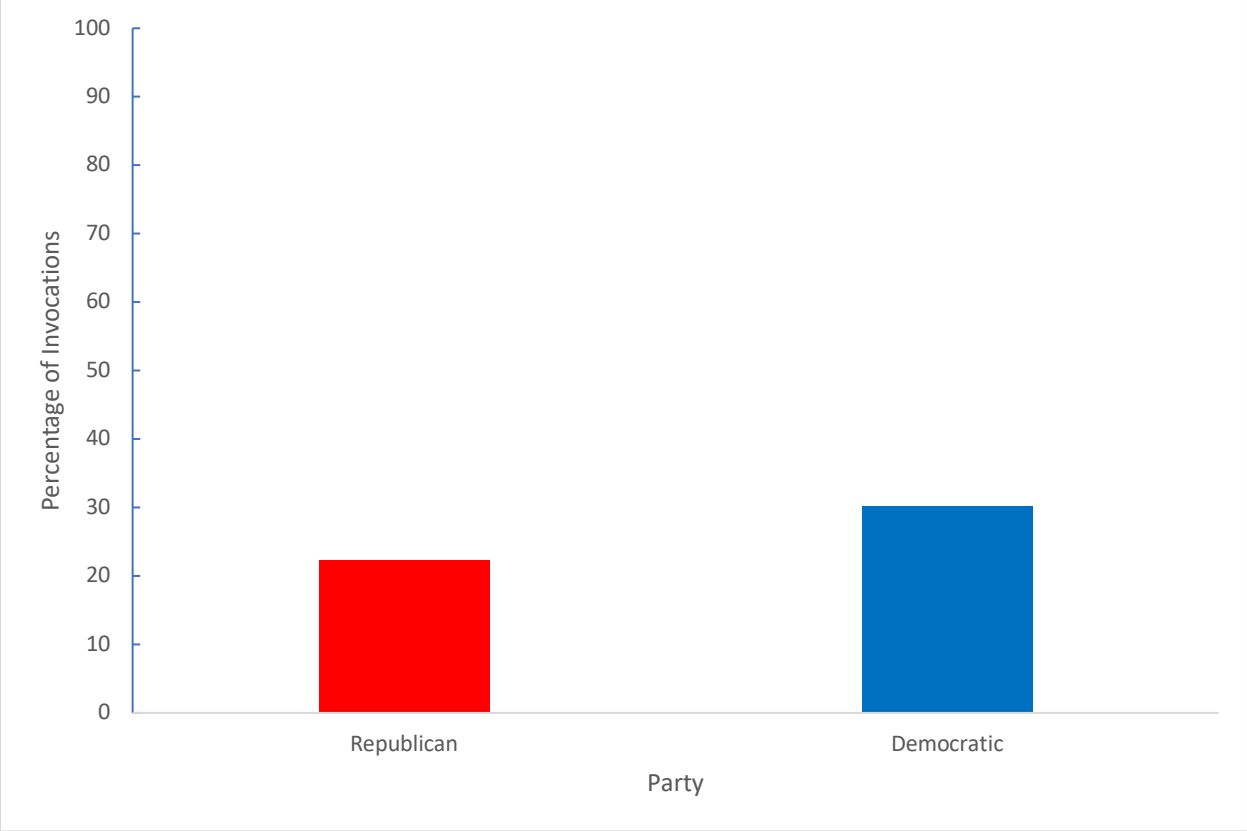
Finally, Governor Jared Polis of Colorado, in his State of the State Address on January 10, 2019, emphasized the security threat of climate change: "As Governor, my goal is to lead the statewide transition to a clean, sustainable, and growing economy. It is imperative for our climate, our security, our health, and our economic growth for all Coloradans." Every president and several governors emphasized the national security implications of climate change, and these examples provide insight into the diversity of arguments across party and level of office.

H_{1b}: Partisan Differences and the Public Health Frame

In H_{1b}, I predicted that Democratic presidents and governors would be more likely to employ public health frames than Republican presidents and governors when they invoked climate change. To test this hypothesis, I recoded the "public health" and "both national security and public health" categories as a "1" and all other mentions as a "0." This allowed me to test the relative proportions, which was a superior method than raw frequencies because Republicans and Democrats invoked climate change at different rates. The raw frequencies would have told us very little because we knew that Democrats likely invoked public health more times than Republicans simply because Democrats invoked climate change more frequently overall. Republicans invoked public health in 22.21% (n = 153) of their climate change invocations, while Democrats did so in 30.18% (n = 822) of their climate change invocations. Figure 3.5 shows these proportions. I conducted a chi square equality of proportions test, testing the alternative hypothesis that the Republican proportion of public health invocations was less than the Democratic proportion of public health invocations. This was the same as if I had tested the Democratic proportion being greater than the Republican proportion. I did this to maintain consistency because Republicans were coded "0" and Democrats were coded "1." The result of the test was significant (χ^2 (1, N = 975) = 16.73, $p < 0.05$). I rejected the null hypothesis and

accepted the alternative hypothesis that the Republican proportion was less than the Democratic proportion. Democrats invoked public health arguments 1.36 times more frequently than Republicans. Although a direct comparison of rates was not made across hypotheses because the collapsed categories would inflate the denominator, the raw data showed that both parties relied on public health alone in more invocations (Democratic $n = 707$; Republican $n = 132$) than national security alone (Democratic $n = 205$; Republican $n = 104$). I found support for H_{1b}.

Figure 3.5. *Proportion of Climate Change Invocations with a Public Health Frame by Party*



The public health frame was present in one of six of the following categories: air quality, food, health complications, emissions, extreme weather events, and water quality. The following examples demonstrate each of these elements. George H. W. Bush, in remarks to Goddard Space

Flight Center employees in Greenbelt, Maryland on June 1, 1992, emphasized the importance of preventing air pollution:

> The 1990 Clean Air Act, which I proposed and signed into law, is the most ambitious air pollution legislation anywhere on Earth. It will cut acid rain, smog, toxic chemical emissions. And yet it will do so with innovations the whole world is watching. We have a trading system for sulfur dioxide reductions, have a new generation of cleaner fuels and cleaner cars, a massive -- and to date successful -- voluntary air toxics reduction program.

Bill Clinton, in remarks to African Environmentalists in Gaborone, Botswana on March 31, 1998, emphasized the importance of preventing famine:

> But we must do more. And today, very briefly, I'd like to focus on three concerns we Americans share with Africans: spreading deserts, threats to species, and global warming. First, with regard to deserts, 27 percent of the African continent is desert—45 percent more, dry land, still arable but with limited water. The dry regions are rapidly succumbing to the desert, becoming wasteland, increasing the chances of famine and poverty. While climate change as a whole plays a role, agricultural practices—too much grazing, poor irrigation practices, too much tree clearing, failure to rotate crops—all these things play a pivotal role.

Clinton, in remarks to the National Association of Attorneys General on March 12, 1998, emphasized the importance of preventing the spread of malaria caused by climate change:

> We spend a lot of time in our administration trying to make sure that the National Institutes of Health and the CDC has the investment they need both to do the research and then to set up the mechanisms to deal with the spread of disease. And as more and more of us travel to faraway places and more and more people from faraway places travel to us and we meet strangers in the airport, one of the great challenges of the 21st century will be the spread of disease. One of the things that global warming has done is to raise mosquitoes bearing malaria virus to higher and higher altitudes now, so more and more people are exposed to it. Then they travel, and more and more people come in contact with it. There is now an actual public health phenomenon called airport malaria.

George W. Bush, in remarks on Earth Day in Wilmington, New York on April 22, 2002, emphasized the importance of preventing the release of toxic emissions:

> Limits on toxic emissions have greatly improved the quality of the air we breathe. The Clean Air Act has helped reduce acid rain and urban air pollution. We've done all this at a time when our economy and population grew dramatically. We have shown that we can expand our economy for the good of all of us, while also being good and conscientious

> stewards of the environment. And that's an important lesson. Americans can be proud of these achievements.

Barack Obama, in remarks at Georgetown University on June 25, 2013, emphasized the threat of extreme weather events exacerbated by climate change:

> Now, we know that no single weather event is caused solely by climate change. Droughts and fires and floods, they go back to ancient times. But we also know that in a world that's warmer than it used to be, all weather events are affected by a warming planet. The fact that sea levels in New York—in New York Harbor—are now a foot higher than a century ago, that didn't cause Hurricane Sandy, but it certainly contributed to the destruction that left large parts of our mightiest city dark and underwater.

Obama, in remarks during a hurricane preparedness briefing at the National Hurricane Center in Miami, Florida on May 28, 2015, emphasized the threat to the nation's water supply:

> Miami, for example, already has to spend hundreds of millions of dollars just to adapt its water system to the more frequent flooding that it's already experiencing from rising seas. That's why I put forward America's first climate action plan 2 years ago. I called for a climate resilience toolkit to help families and business owners in communities plan for the impacts of a changing climate, and that toolkit is now online at toolkit.climate.gov.

Donald J. Trump, in remarks announcing the United States withdrawal from the United Nations Framework Convention on Climate Change Paris Agreement on June 1, 2017, emphasized that the United States would still have the world's cleanest air:

> As the Wall Street Journal wrote this morning: "The reality is that withdrawing is in America's economic interest and won't matter much to the climate." The United States, under the Trump administration, will continue to be the cleanest and most environmentally friendly country on Earth. We'll be the cleanest. We're going to have the cleanest air. We're going to have the cleanest water. We will be environmentally friendly, but we're not going to put our businesses out of work, and we're not going to lose our jobs. We're going to grow; we're going to grow rapidly.

Finally, Governor Kate Brown of Oregon, in her January 14, 2019 Inaugural Address, emphasized the threat posed by wildfires to Oregon:

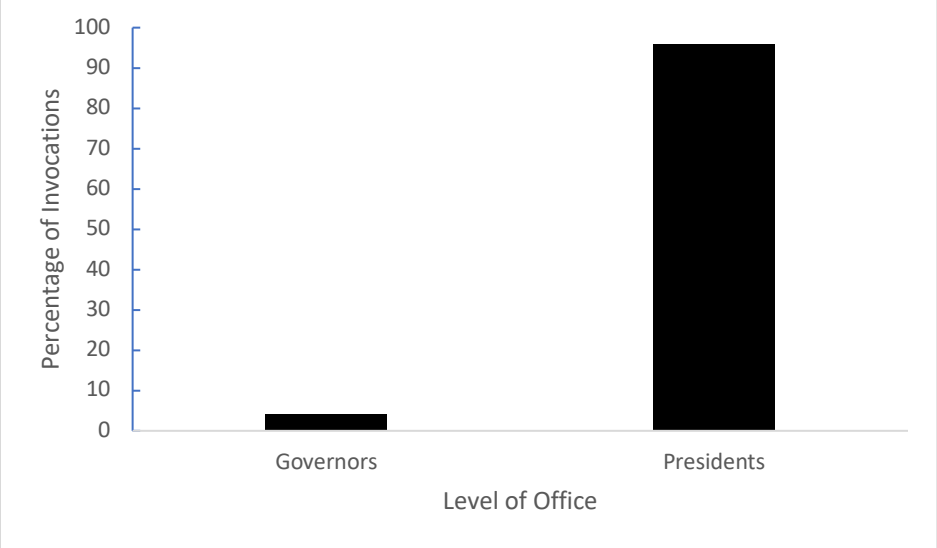
> Wildfires have increased in intensity and severity in the past decade, threatening our culture, our communities, and our economy. Oregon must continue to pursue solutions that will reduce harmful emissions while creating good jobs and building a clean energy economy.

The preceding examples represented the diverse array of public health arguments offered across presidents, governors, and political parties.

Describing the Differences Between Presidents and Governors

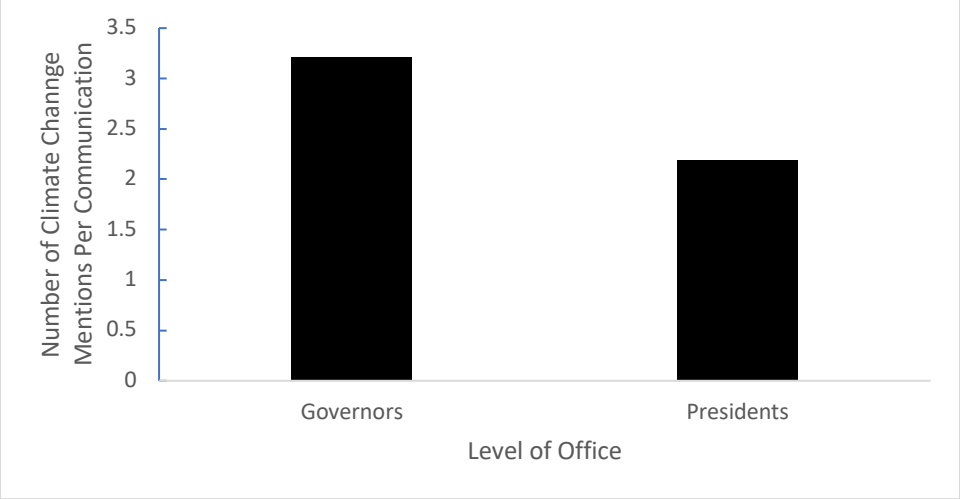
I now turn my attention to my research questions, in which I inquired about any differences in the discourse between governors and presidents. This was a valuable investigation because of the lack of previous scholarship on American governors, as well as their increased importance in the fight against climate change (Igusky, 2019). To begin, the dataset contained far more mentions by presidents (95.96%, *n* = 3,275) than governors (4.04%, *n* = 138). Figure 3.6 shows these proportions. The primary reason for this was that the census of presidential communications I drew upon was all spoken communications from 1989 to 2018, while I only drew upon major speeches of American governors from 2017 to 2019 who were members of the United States Climate Alliance.

Figure 3.6. *Proportion of Climate Change Invocations by Level of* **Office**



In an attempt to control for the difference in overall communications, I calculated the number of invocations per speech for presidents and governors. Presidents invoked climate change 3,275 times in 1,503 communications, a rate of 2.19 invocations per speech. Governors invoked climate change 138 times in 43 communications, a rate of 3.21 invocations per speech. Figure 3.7 displays these means. In communications where climate change was mentioned, governors offered 1.47 times as many invocations as presidents. To test whether these differences occurred by chance, I performed a post-hoc Wilcoxon rank sum test, which is a non-parametric comparison of means used when two independent samples are not normally distributed. I tested the alternative hypothesis that the presidential invocations per speech (M = 2.18, Mdn = 1, SD = 2.83) were less than the gubernatorial invocations per speech (M = 3.21, Mdn = 2, SD = 3.76). The result of the test was significant (W = 22,283, $p < 0.05$). I rejected the null hypothesis that the two samples were identical and accepted the alternative hypothesis that the presidential mentions per communication were less than the gubernatorial mentions per communication. There were several potential reasons for this. First, I worked only with speeches by governors who were members of the U.S. Climate Alliance. Their commitment to the issue might have been stronger than recent presidents. Second, I also worked only with major speeches of governors, which means the day-to-day mentions per communication for a governor might have differed from their major speeches. All this points to the need for increased research into the discourse of American governors in general and climate change discourse in particular.

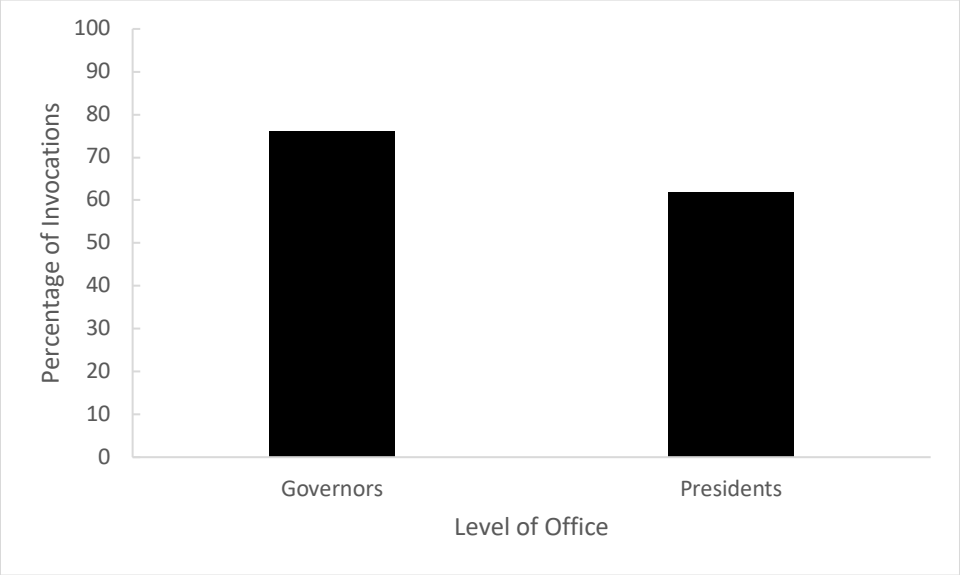
Figure 3.7. *Average Number of Climate Change Mentions Per Communication*



RQ_{1a}: Level of Office and the General Environmental Focus

Now that I have presented a general comparison between the two datasets, I will now answer the research questions I proposed. In RQ_{1a}, I inquired if there were any differences between presidents and governors in how frequently they employed a general environmental focus, controlling for party affiliation. To understand this comparison, I will first present the differences between level of office. For all research question analyses, I conducted post-hoc tests based on the observed proportions. Governors employed a general environmental focus in 76.09% (n = 105) of their mentions, while presidents employed a general environmental focus in 61.80% (n = 2,024) of theirs. Figure 3.8 shows these proportions. I conducted a chi square equality of proportions test, testing the alternative hypothesis that the governor's general environmental focus mentions were greater than the president's mentions. The result of the test was significant (χ^2 (1, N = 3,413) = 10.92, $p < 0.05$). I rejected the null hypothesis and accepted the alternative hypothesis that the gubernatorial proportions were greater than the presidential proportions. Governors invoked a general environmental focus 1.23 times more frequently than presidents.

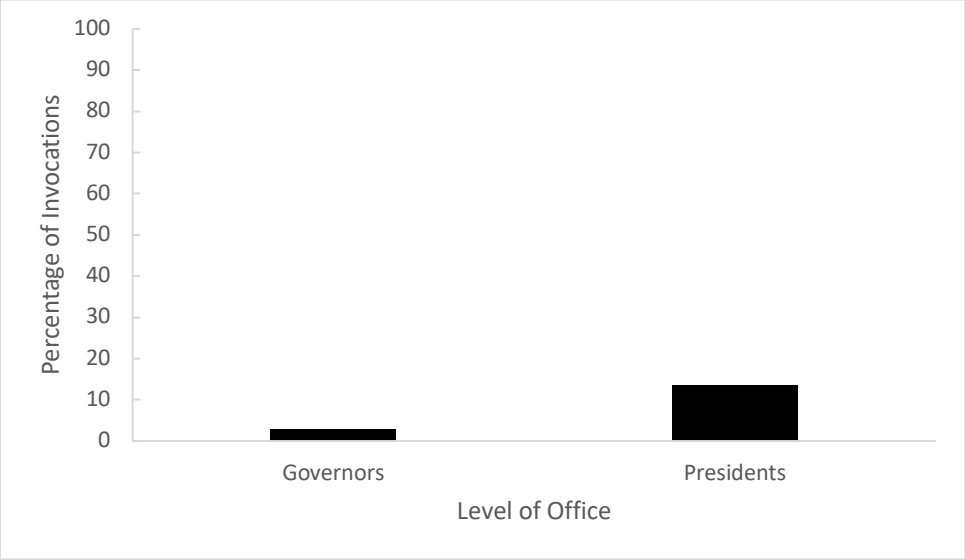
Figure 3.8. *Proportion of Climate Change Invocations with a General Environmental Focus by Level of Office*



RQ_{1b}: Level of office and the National Security Frame

In RQ_{1b}, I inquired if there were any differences between presidents and governors in how frequently they employed a national security frame, controlling for party affiliation. To understand this comparison, I will first present the differences between level of office. Consistent with the previous analysis, I recoded the "national security" and "both national security and public health" categories as a "1" and all other categories as a "0." Governors employed a national security frame in only 2.90% (n = 4) of their mentions, while presidents employed a national security frame in 13.47% (n = 441) of theirs. Figure 3.9 shows these proportions. Given that the national security mentions by governors were less than five, I compared the proportions using Fisher's exact test. I tested the alternative hypothesis that the gubernatorial proportion of national security mentions was less than the presidential mentions. The result of the test was significant (OR = 0.22, $p < 0.05$). I rejected the null hypothesis and accepted the alternative hypothesis that the gubernatorial proportions were less than the presidential proportions. Presidents invoked a national security frame 4.64 times more frequently than governors.

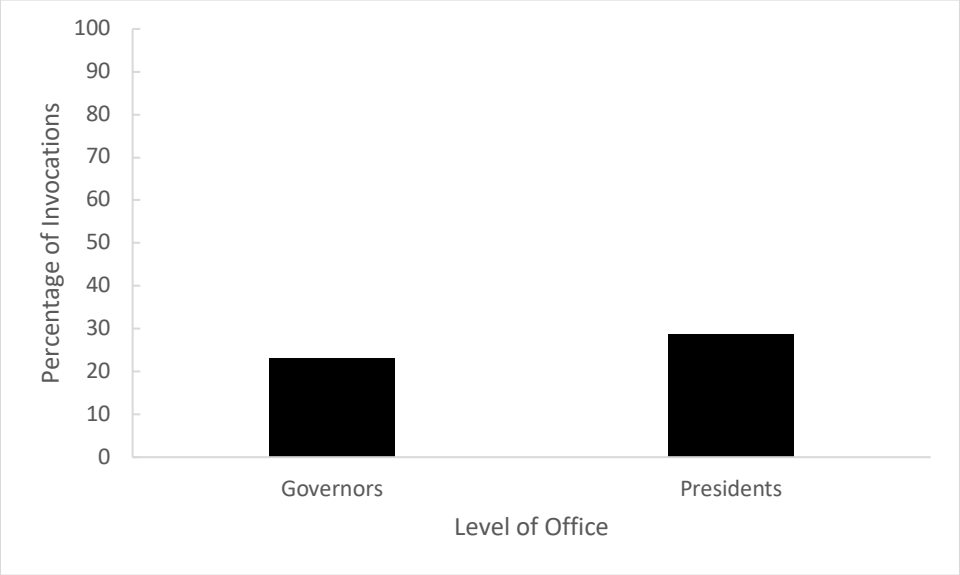
Figure 3.9. *Proportion of Climate Change Invocations with a National Security Frame by Level of Office*



RQ_{1c}: Level of Office and the Public Health Frame

In RQ_{1c}, I inquired if there were any differences between presidents and governors in how frequently they employed a public health frame, controlling for party affiliation. To understand this comparison, I will first present the differences between level of office. Consistent with the previous analysis, I recoded the "public health" and "both national security and public health" categories as a "1" and all other categories as a "0." Governors employed a public health frame in 23.19% (n = 32) of their mentions, while presidents employed a public health frame in 28.79% (n = 943) of their mentions. Figure 3.10 shows these proportions. I conducted a chi square equality of proportions test, testing the alternative hypothesis that the gubernatorial public health mentions were less than the presidential mentions. The result of the test was not significant (χ^2 (1, N = 3,413) = 1.77, p > 0.05). I failed to reject the null hypothesis. Governors and presidents invoked public health in statistically the same proportion of their invocations.

Figure 3.10. *Proportion of Climate Change Invocations with a Public Health Frame by Level of Office*

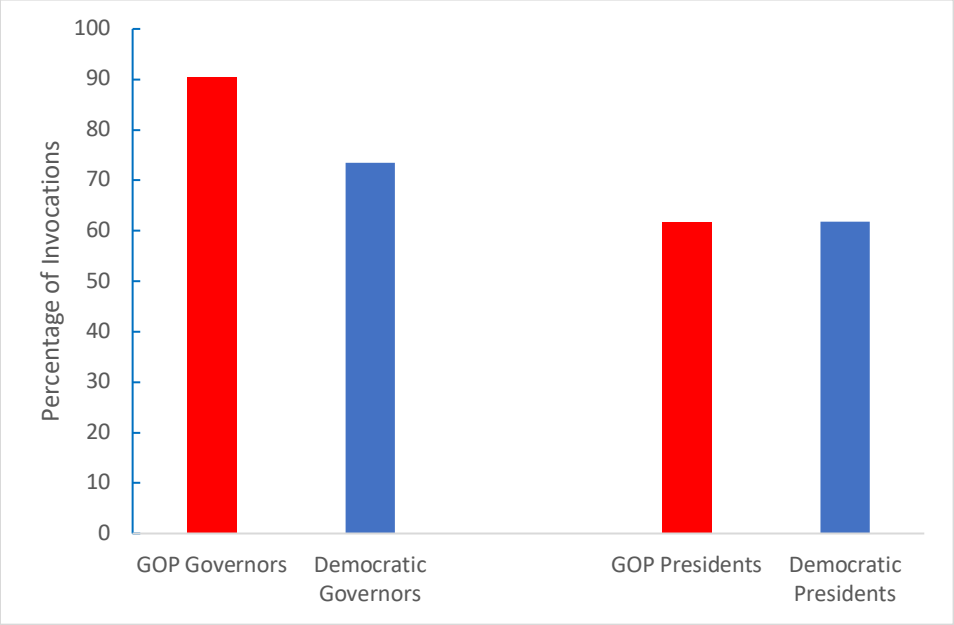


RQ_{2A}: Level of Office, Party Affiliation, and the General Environmental Focus

Now that we have an understanding of whether differences between level of office exist, I now turn my attention to the role of party affiliation and level of office. I examined the general environmental focus and national security frame in more detail, adding in party affiliation as a control. I did not examine the public health frame (RQ_{2c}) any further because I established that party affiliation was significantly associated with choice of the public health frame but found no evidence of level of office being associated with the public health frame. Theoretically, the general environmental focus and national security frames were the most interesting. Governors were presumably less likely than presidents to discuss national security because they had less of a responsibility on that front, but I thought exploring why a general environmental focus, instead of public health, filled the void was intriguing. At the governor level of office, Republicans employed a general environmental focus in 90.48% (n = 19) of their mentions and Democrats did so in 73.50% (n = 86) of their mentions. At the presidential level of office, Republicans employed a general environmental focus in 61.83% (n = 413) of their mentions and Democrats

did so in 61.80% (n = 1,611) of their mentions. These proportions are displayed in Figure 3.11. I found that governors and presidents differed in how often they invoked a general environmental focus. This led me to ask two additional questions. First, were there differences within party between level of office? I conducted a chi square equality of proportions test, testing the alternative hypothesis that the proportion of Republican governor general environmental focus mentions were greater than Republican presidential mentions. The result of the test was significant (χ^2 (1, N = 689) = 5.97, df = 1, $p < 0.05$). I rejected the null hypothesis and accepted the alternative hypothesis that Republican governors were more likely than Republican presidents to focus on the environment generally. Next, I conducted a chi square equality of proportions test, testing the alternative hypothesis that Democratic governor general environmental focus mentions were greater than Democratic presidential mentions. The result of the test was significant (χ^2 (1, N = 2,724) = 6.05, df = 1, $p < 0.05$). I rejected the null hypothesis and accepted the alternative hypothesis that Democratic governors were more likely than Democratic presidents to focus on the environment generally.

Figure 3.11. *Proportion of Climate Change Invocations with a General Environmental Focus by Level of Office and Party*



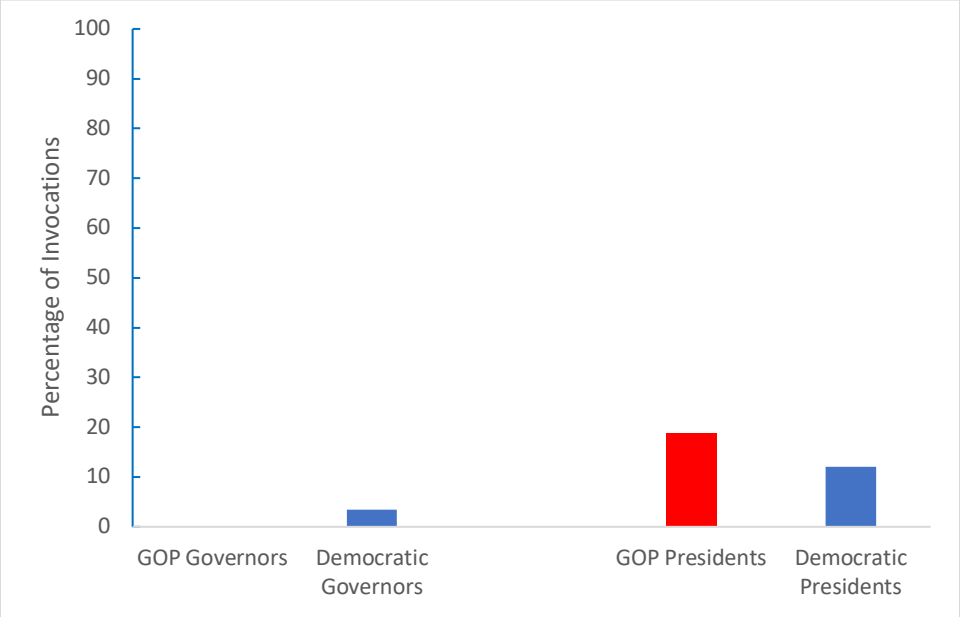
The second question I answered was whether there were differences between parties within the same level of office. I conducted a chi square equality of proportions test, testing the alternative hypothesis that the Republican governor general environmental focus mentions were greater than the Democratic governor mentions. The result of the test was insignificant (χ^2 (1, N = 138) = 1.96, $p > 0.05$). There was insufficient evidence to reject the null hypothesis. Statistically, Republican and Democratic governors invoked a general environmental focus in the same proportion of their climate change mentions. Next, I conducted a chi square equality of proportions test, testing the alternative hypothesis that Republican presidential general environmental focus mentions were greater than Democratic presidential mentions. The result of the test was insignificant (χ^2 (1, N = 3,275) = 0.00, $p > 0.05$). There was insufficient evidence to reject the null hypothesis. Statistically, Republican and Democratic presidents invoked a general environmental focus in the same proportion of their climate change mentions. Based on the findings offered in the last two paragraphs, I concluded that the earlier difference identified

between level of office was upheld, controlling for party. The first set of tests showed that Republican and Democratic governors were both more likely than their presidential counterparts to focus generally on the environment. The second set of tests showed that there were no partisan differences within the same level of office. Thus, I concluded that level of office was a stronger indicator of focusing generally on the environment than party.

RQ_{2b}: Level of Office, Party Affiliation, and the National Security Frame

I now turn my attention to the differences in the utilization of national security frames based on party affiliation and level of office. Republican governors never invoked national security in any of their climate change mentions ($n = 0$), while Democratic governors invoked national security in 3.42% ($n = 4$) of their mentions. Republican presidents mentioned national security 18.71% ($n = 125$) of the time, while Democratic presidents did so 12.12% ($n = 316$) of the time. These proportions are shown in Figure 3.12. I answered the same two questions as I did previously, beginning with whether there were differences within party between level of office. I conducted a Fisher's exact test, testing the alternative hypothesis that Republican governors were less likely than Republican presidents to invoke national security. The result of the test was significant ($OR = 0$, $p < 0.05$). I rejected the null hypothesis and accepted the alternative hypothesis that Republican governors were less likely than Republican presidents to invoke national security. Next, I conducted a chi square equality of proportions test, testing the alternative hypothesis that Democratic governors were less likely than Democratic presidents to invoke national security. The result of the test was significant (χ^2 (1, $N = 2{,}724$) = 7.36, $p < 0.05$). I rejected the null hypothesis and accepted the alternative hypothesis that Democratic governors were less likely than Democratic presidents to invoke national security.

Figure 3.12. *Proportion of Climate Change Invocations Containing a National Security Frame by Level of Office and Party*



The second question I answered was if there were differences in the employment of national security frames between parties at the same level of office. Given that the national security mentions by Republican and Democratic governors were both less than five, I compared the proportions using Fisher's exact test. I tested the alternative hypothesis that the Republican governor's proportion of national security mentions were less than the Democratic governor's mentions. The result of the test was insignificant ($OR = 0$, $p > 0.05$). I found insufficient evidence to reject the null hypothesis. There was no statistical evidence to support the claim that Republican and Democratic governors invoked a national security frame in different proportions. Next, I conducted a chi square equality of proportions test, testing the alternative hypothesis that Republican presidential national security mentions were greater than Democratic presidential mentions. The result of the test was significant (χ^2 (1, N = 3,275) = 19.27, $p < 0.05$). I rejected the null hypothesis and accepted the alternative hypothesis that Republican presidents were more likely than Democratic presidents to invoke national security. Governors, regardless of party,

invoked national security less than presidents. However, Republican presidents were significantly more likely to invoke national security than Democratic presidents. Level of office appeared to be associated with national security invocations, while party was associated at the presidential level of office.

Climate Change Framing Over Time

As a final point of analysis, I looked at how the frames were employed by presidents and governors over time, marking key climate change events and presidential administrations. I did this in two ways. First, I looked at the raw number of presidential mentions over time, which are shown in Figure 3.13. I excluded gubernatorial invocations because they would bias the numbers in the later years. In general, the number of invocations and utilization of each frame increased as time passed, until the Trump administration. As expected, I also identified peaks in the discourse during Democratic presidencies. During the Obama administration, we witnessed two major spikes in the discourse, once in 2009 (his first year in office and the Copenhagen conference) and then again in 2015 (the year of the Paris agreement). The high point of emphasis for a general environmental focus occurred in 2016, which corresponded with the implementation of the Paris Agreement as well as the American presidential election, while the low point of emphasis occurred in 2003, a year during the Bush administration where the only invocations contained references to public health. The high point of emphasis for a national security frame occurred in 2009, the first year of the Obama administration. There were eight different years in which presidents did not invoke a national security frame. The high point of emphasis for public health occurred in 2015, which again was during the Obama administration and the year of the Paris Agreement. Finally, the low point of emphasis for a public health frame occurred in 2018, a year that only contained a general environmental focus, and mostly were Trump references about

withdrawing from the Paris Agreement. Overall, this analysis provided further evidence that this discourse was led by both the general environmental focus and Democratic presidents.

Figure 3.13. *Frequency of Climate Change Invocations by Frame Over Time*

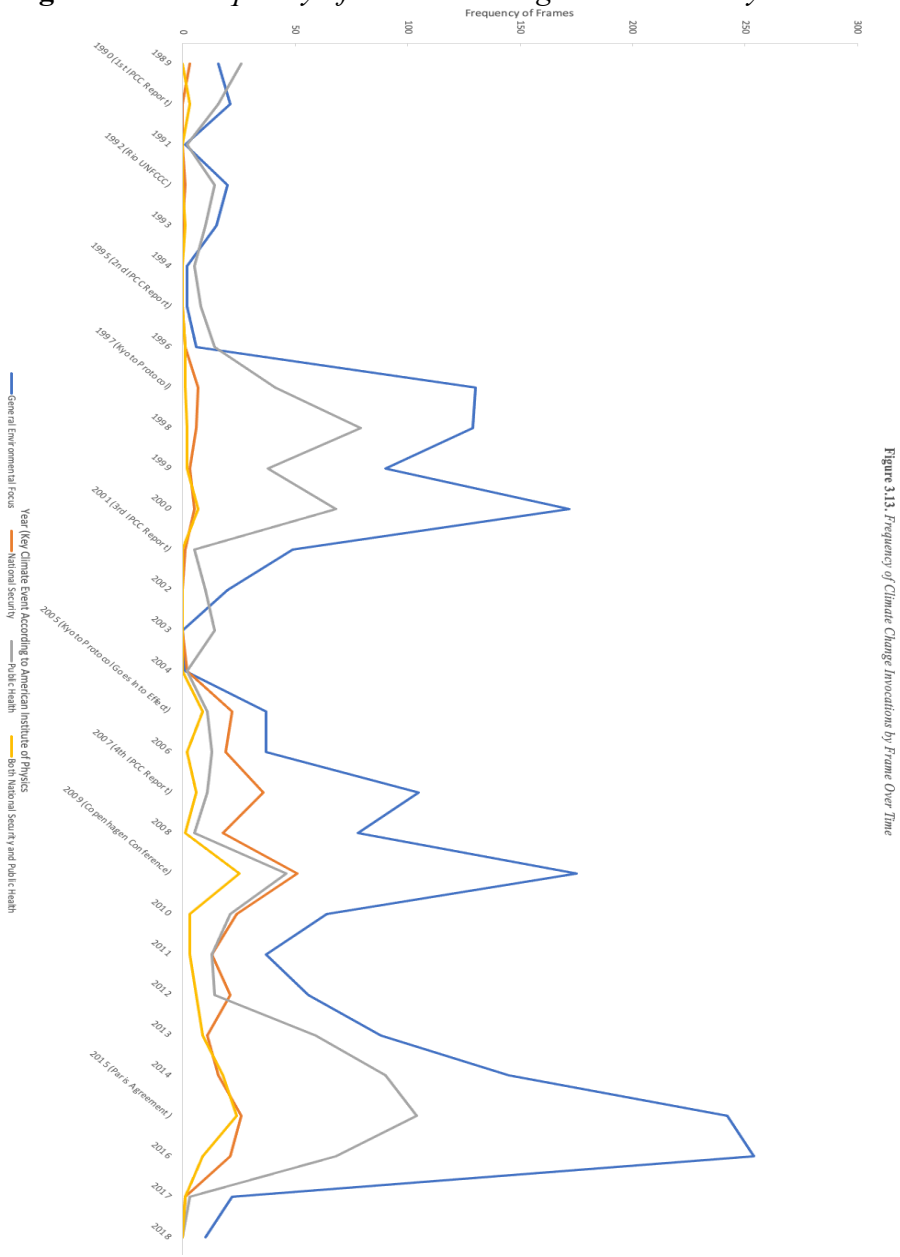
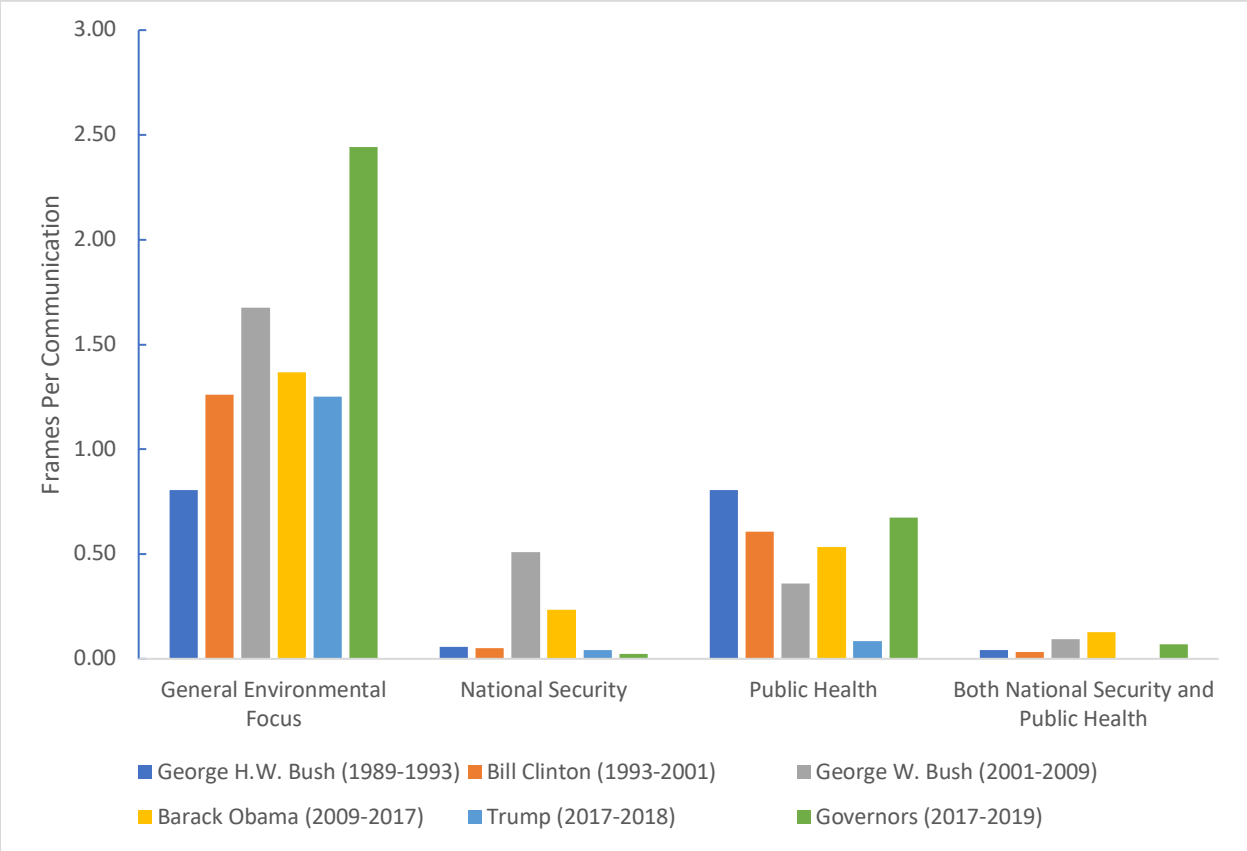


Figure 3.13 *Frequency of Climate Change Invocations by Frame Over Time*

Second, in order to control for the number of invocations offered by each president and governor, I calculated the number of frames offered per communication. This accounted, for

example, for the reality that Obama offered 1,757 climate change invocations, while Trump offered 33. These rates are displayed in Figure 3.14. I identified some interesting trends in this analysis. First, there was a steady increase in the utilization of the general environmental focus per communication, from George H. W. Bush to peaking under George W. Bush, then steadily declining during the Obama and Trump eras. The outlier here was governors whose discourse came at the end of the period of analysis and invoked a general environmental focus at a higher rate than all of the presidential administrations. Second, national security frames were relatively stable over time, except for a large spike during the George W. Bush administration. Although Obama did not invoke national security at the same rate as George W. Bush, he still did so much more than the other presidents and governors in the dataset. The 9/11 terrorist attacks and the subsequent focus on national security and oil independence from the Middle East could explain this spike in the discourse. Third, public health showed a slow decrease in the discourse from George H. W. Bush until George W. Bush, before increasing again under Obama and the governors. Interestingly, Obama offered public health less than both George H. W. Bush and Bill Clinton, but still more than George W. Bush. This could be explained by Obama employing both a national security and public health frame at a higher rate than all others in the dataset. Finally, there appeared to be an increase in both the national security and public health frames over time, before plummeting during the Trump administration and among governors. Overall, this analysis provided a more detailed examination of each frame over time by controlling for the number of communications containing at least one climate change invocation.

Figure 3.14. *Number of Climate Change Frames Per Communication*



Discussion

Conducting a systematic, quantitative analysis of American political discourse about climate change allowed me to draw out some interesting points of discussion. To begin, my analysis provided a rich description of the different approaches employed by American presidents and governors when discussing climate change. In this project, I focused on three approaches: a general environmental focus, a national security frame, and a public health frame. I chose the national security and public health frames because they were intriguing from an argumentation standpoint as well as based on previous experimental evidence on this topic. This also built on previous work I have conducted on presidential communication about climate change, by including the discourse of governors as well as the public health frame. It was necessary to expand the project to include American governors because of the increasingly

important role they play in climate change politics. Specifically, member states of the United States Climate Alliance make up $10 trillion in U.S. economic activity and 49% of the U.S. population (Igusky, 2019), making their contributions to climate change policies a bulwark against anti-environmental actions by the Trump administration. I chose to expand the project to include public health arguments because of the promising experimental evidence on how those arguments could increase pro-environmental attitudes (Myers et al., 2012). Overall, I discovered some key takeaways from each of the three frames and I will discuss those in detail now, beginning with the general environmental focus, moving to the national security frame, and concluding with a section on public health arguments.

General Environmental Focus

To begin, I will briefly provide a description of the discourse about the general environmental focus, which heavily dominated at all levels of analysis. Overall, when presidents and governors were combined, they invoked a general environmental focus in over 60% of their mentions. When evaluating the discourse by level of office (i.e., presidents versus governors), I found a significant difference, with governors emphasizing the environment in a greater proportion of their climate change mentions than their presidential counterparts. However, there were no significant differences between Republicans and Democrats in their general environmental focus, even after I examined the discourse in more detail by level of office (i.e., GOP presidents versus Democratic presidents and GOP governors versus Democratic governors). It should be noted that, despite the significant difference between governors and presidents, the general environmental discourse was employed in at least 60% of all mentions, regardless of party affiliation or level office, meaning that this focus led the discourse.

I compared the findings from the current project to prior work I conducted on the utilization of a general environmental focus. Previously, I discovered that Democratic presidents were significantly more likely than Republican presidents to invoke a general environmental focus in their climate change mentions (Calderwood, 2019a). Interestingly, in the current study the partisan differences disappeared, both within and between level of office. The proportions were also much less in the previous study, with Democrats having utilized a general environmental focus only 34% of the time compared to Republicans at 22%. There are a few explanations for this difference. First, the previous study included an economic frame category, instead of a public health frame category. Economic arguments were the largest form of discourse among presidents in that study, and since those were not coded in this project, I could likely consider many of the general environmental focus mentions as containing economic arguments. I chose not to include economic frames in this study because the previous work was substantial (see e.g., Bricker, 2012; Calderwood, 2019a; Calderwood, 2019b), and the experimental evidence was inconclusive at best (see Zhou, 2016). One way I could ameliorate this issue in future work is to adopt a "counting" approach as opposed to simply marking whether a frame was present or absent. This would allow for a more detailed coding protocol. The second explanation is that the previous work employed a more limited operational definition of climate change, focusing on only variations of "climate" and "warming." It is conceivable that when using terms like emissions, greenhouse gases, or carbon dioxide that presidents were less likely to talk about public health or national security. This potential discrepancy between the two studies highlights the need for more theorizing about environmental frames as well as a comprehensive analysis that encompasses all potential environmental frames. Despite this discrepancy, the current study still provided interesting insights into how American leaders

invoked a general environmental focus, specifically relating to the lack of partisan affiliation connected to the frame.

One valuable contribution of this study pertains to our understanding of the discourse of America's governors. I discovered that governors were significantly more likely than presidents to employ a general environmental focus. As noted previously, there were no partisan differences between or within the level of office for the general environmental focus. This means that there was a strong association between level of office and the general environmental focus. Although America's presidents relied on the general environmental focus in more than a majority of their mentions, America's governors overwhelmingly relied on the general environmental focus, appearing in more than three-fourths of their mentions. One possible explanation for this difference was because of the types of gubernatorial speeches I included, which were inaugurals and State of the State addresses. Future research should include additional contextual and message content variables such as type of speech (e.g., Inaugural versus State of the State versus other speeches), type of audience (e.g., narrow versus broadly cast), and other types of arguments. Given that one of the other frames under investigation was national security, it was not entirely surprising that governors would rely so heavily on a general environmental focus.

Lastly, the potential efficacy of a general environmental focus merits considerations. One of the foundations of this project, and all framing studies, is the notion that language can influence attitudes (see Edelman, 1977). While a general environmental focus is unlikely to be controversial on its face, it also is unlikely to appeal to a broad swath of the American electorate. Liberals generally support environmental causes because they adopt a nurturing morality, while conservatives often find themselves supporting an individualist morality, which is often in conflict with environmental causes (Lakoff, 1996). By simply offering an environmental focus,

then, American leaders were likely only appealing to those who already agreed with them and were not doing anything to bring along conservatives. Due to this, additional lines of argument were potentially opened against environmental causes. An opponent probably would not argue that the environment should be ignored outright, instead balancing the economic costs of environmental action against preservation of the environment. Thus, the general environmental focus would be unlikely to be effective in building the coalition necessary to enact pro-environmental policies. For example, Feldman and Hart (2018) conducted an experiment in which they compared the efficacy of a climate change frame versus an air pollution frame. They found that respondents, especially Republicans, were less likely to support climate change policies when encountering the climate change frame compared to the air pollution frame. Overall, presidents and governors, Democrats and Republicans, all relied heavily on a general environmental focus, which might have actually reduced support among those who politicians needed to target the most.

National Security

The next set of takeaways relates to national security frames. Overall, national security frames were the third most prevalent in the discourse, only ahead of invocations that referenced both public health and national security. In the aggregate, national security was present in roughly 13% of all mentions, meaning presidents and governors mentioned national security in greater than one in eight mentions. Although 13% was relatively low, it was still a major element of the discourse. Republicans were also significantly more likely than Democrats to invoke national security, which provided support for H_{1a}. After examining the discourse in more detail between the level of office, I discovered presidents were significantly more likely than governors to invoke national security. However, this overall partisan difference disappeared at the

gubernatorial level of office, suggesting that level of office was significantly associated with national security invocations, while party affiliation was only significant at the presidential level of office. Unlike differences across studies for the general environmental focus, the national security dictionary employed in this project was similar to those applied in my previous work (Calderwood, 2019a; Calderwood, 2019b), and thus has been refined over time. I will discuss in more detail the partisan differences in the discourse, the differences between levels of office, and some potential drawbacks to employing a national security frame.

As noted, there were partisan differences in the employment of the national security frame overall, between Republicans and Democrats. I predicted that Republicans would be more likely than Democrats to utilize this frame because Republican voters, in general, rated national security issues like terrorism and the military as more important than Democrats (Pew Research Center, 2021). Broda-Bahm (1999) identified the securitization of environmental issues beginning in the Clinton administration, so it was not that Democrats never utilized these frames. However, in previous work I discovered that Republican presidents were significantly more likely than Democratic presidents to invoke a national security frame and utilization increased over time (Calderwood, 2019a). This partisan difference was somewhat surprising because those most skeptical of climate change (generally conservatives) were likely to have negative reactions to national security discourse connected to climate change (e.g., Myers et al., 2012). Perhaps it was the type of discourse that was upsetting to conservatives. For example, I considered “energy independence” and wars over resources as national security frames. A more refined coding dictionary, or an experiment that tested separate national security arguments, might be necessary to get at the heart of this question.

I also discovered differences between governors and presidents in their employment of the national security frame. Presidents were significantly more likely than governors to utilize this framing, by a wide margin. Of course, this makes sense because presidents were more likely than governors to think about and have a plan for national security threats. Even in large states like California, state governments do not have much authority over national security issues. Additionally, even governors of states who were leaders in clean energy that wanted to make an argument of energy independence were likely to run into credibility issues. This is because fossil fuels are traded on international markets and one state (except, perhaps, for very large ones like California) are unlikely to make a dent in American energy dependence. While I noted previously that partisan differences existed between the parties in the aggregate, this partisan difference disappeared at the gubernatorial level of office. There was no significant difference in the utilization of the national security frame between Republican and Democratic governors. However, this is potentially a sample size issue since there were zero mentions by Republican governors and only four by Democrats. Although this difference was not significant, it is interesting that the Democratic proportion was greater than the Republican proportion, which is the inverse of the aggregate proportions. Future research could expand the number of gubernatorial communications to increase the sample size.

Lastly, I wish to discuss the potential issues with invoking a national security frame. Arguments that rely on national security claims are debatable in value from a theoretical standpoint because they open up additional lines of argument against taking action against climate change (Bricker, 2012). For example, if a speaker raises a national security argument about the potential conflicts over resources, the opposition speaker could easily raise concerns about energy security and access to fossil fuels for the military. Beyond the theoretical reasoning,

the experimental evidence suggested that national security arguments could produce a "boomerang effect," effectively reducing support for climate change action, especially among conservatives who were most skeptical about climate change. This was seen most clearly in the Myers et al. (2012) study that showed that a national security frame significantly reduced support for climate change action among skeptics. More recent experimental evidence also suggested that national security frames were ineffective, even when offered by an in-party source (Zhou, 2016). The most promising study for proponents of invoking national security suggested that if this frame was effective, it was heavily moderated by political party, with Democrats, those more likely to have already supported climate change action, being affected positively (McCright et al., 2015). Finally, evidence from recent case studies also suggested that securitization discourse could backfire. According to Warner and Boas (2019), the United Kingdom and the Netherlands both failed in securitizing the issue of climate change because those they were trying to convince viewed the tactic as fear mongering, especially if the threat was not an imminent one. For those hoping to increase support for climate change action, it is perhaps a good thing that these arguments appeared in only 13% of overall mentions.

Public Health

The last topic to discuss is the public health frame employed by America's governors and presidents. To my knowledge, this was the first systematic attempt to analyze public health arguments in the discourse of American political leaders about climate change. The dictionary I created was developed from the Centers for Disease Control and encompassed six distinct themes. Given the broad nature of some of the themes, I ensured that the public health mentions were connected to impacts on human health. For example, if a president mentioned sea level rise as an impact of climate change, it was only coded as public health if the speaker made a

connection between sea level rise and an impact on human health. Overall, public health frames outpaced national security arguments, appearing in just under 25% of all mentions in the dataset. Even after I evaluated the invocations in more detail by examining party affiliation and level of office, public health frames remained in a greater proportion of mentions than national security arguments. Although in far fewer mentions than a general environmental focus, public health arguments made up the next largest bucket of mentions.

There were partisan differences in the utilization of the public health frame. In the aggregate, Democratic leaders were significantly more likely than Republican leaders to invoke a public health frame, which provided support for H_{1b}. I predicted this would happen because Democrats were the first presidents to emphasize the association between environmental problems and public health during the Clinton and Obama administrations (Bunyavanich & Walkup, 2001; Hess et al., 2014). Public opinion data also showed that Democrats were more likely to support spending money on public health initiatives than Republicans (Pew Research Center, 2019). Although this finding was in line with my predictions, it was somewhat surprising because if public health arguments were the least politically dangerous to make because it could be difficult to argue against clean water and air, we might have expected Republicans to lean on these arguments. For example, in one of the very few mentions offered by President Trump, he exclaimed, “We're going to have the cleanest air. We're going to have the cleanest water,” even though he made these remarks while advocating for a withdrawal from the Paris Agreement. This was perhaps why the public health frame was employed more than the national security frame even among Republicans. Public health arguments presumably would have less obstacles than national security arguments because public health would be considered more proximal (e.g., you could have seen air pollution and its immediate effects on people) and no one would argue

directly against clean water (e.g., no one could have credibly said people should not have access to clean water). However, national security arguments contained additional lines of argumentation one could make against them (e.g., reducing oil consumption could have harmed the military). Finally, a majority of Americans considered climate change a public health concern (Maibach et al., 2015), which made establishing a link between the two issues easier for politicians to make. Although Democrats invoked public health frames more so than Republicans, it was not surprising that Republicans invoked public health frames more than national security ones.

When examining the utilization of public health frames between governors and presidents, there were no significant differences. My analysis revealed that governors and presidents employed the public health frame in statistically the same proportion of their mentions. This was somewhat surprising because we might have expected governors to invoke public health more because governors were more proximal to both their constituents and the impacts of climate change. One reason we might not have seen significant differences between presidents and governors is the homage that pollution knows no borders. Governors and presidents were both likely to talk about national issues in relation to public health because a hurricane usually impacted more than one state, pollution spreads across the country, and pandemics potentially caused by climate change were not bound to one state. Thus, while governors were more proximal, many public health issues become national ones, which drew in American presidents. This result demonstrates the importance of more theorizing and empirical studies about both the public health frame in particular and gubernatorial discourse more generally.

The theoretical and experimental evidence suggests that a public health approach is the most effective at increasing support for climate change action. Relying on a public health frame in just under 25% of total mentions could be a promising sign for climate change activism, although incorporating an even higher percentage could potentially increase support for climate change action further. I already explained the potential theoretical benefit of adopting a public health frame in climate change mentions, specifically that it is far more difficult to argue against a public health frame than others (see Bricker, 2012). The experimental evidence also suggests that public health is perhaps the best frame to employ when discussing climate change. Myers and colleagues (2012) showed that a public health frame was significantly more likely to produce positive emotions of hope among skeptics of climate change. Additionally, Feldman and Hart (2018) demonstrated that a frame about air pollution, a public health issue, was more effective than a general environmental focus. Finally, recent research studying four European countries revealed that a focus on direct public health benefits that were not conditioned on the actions of other people significantly increased the likelihood of adopting mitigation strategies (Amelung, 2019). It seems prudent then for American political leaders to increase their focus on public health frames. The next chapter explores the effects of national security and public health frames.

Chapter 4: Online Experiment Results

"Change happens by listening and then starting a dialogue with the people who are doing something you don't believe is right."

–Dr. Jane Goodall[10]

The President of the United States and America's governors occupy vital communication roles in the fight to address the problem of climate change. The U.S. is the world's largest economy and second largest carbon emitter (Environmental Protection Agency, n.d.-c; The World Bank, n.d.); a policy change in the U.S. can have a major impact on the policies of other countries leading to a substantial reduction in global greenhouse gas emissions (Stern, 2020). In the U.S., public opinion about climate change is heavily split along partisan lines, with Democrats more likely to support action than Republicans (Brenan & Saad, 2018). Thus, I focused this project on the attitudes of Republican-identifying individuals in the U.S. American presidents can also influence the public rhetorically (Druckman & Holmes, 2004; Entman, 2004) and they aim to do so by "going public," directly speaking with the American people (Kernell, 2007). America's governors, particularly those who are members of the United States Climate Alliance, took an increasingly important role in combatting climate change during the Trump era (Igusky, 2019). Identifying the potential effects of communications offered by political actors is a piece of the puzzle missing from our current scholarship on climate change communication, which largely focuses on news media coverage (e.g., McCright et al., 2015; Hart & Nisbet, 2011). To date, only a few studies have examined the credibility of climate change advocates (e.g., Sparkman & Attari, 2020) or co-partisanship between speaker and audience on the issue of climate change (e.g., Zhou, 2016). In this dissertation, I expanded upon this previous scholarship,

[10] See Gerber (2014).

as well as the results of the content analysis performed in Chapter 3, to test the effects of climate change messages offered by American politicians.

I conducted an online experiment with the hope of providing insights on the effects of climate change discourse on attitudes, with particular interest in the credibility of the speaker and impact of the communication frame. I recruited individuals (n = 601) to partake in this online experiment through Amazon's Mechanical Turk (MTurk), a platform increasingly utilized by social scientists (see Buhrmester et al., 2011). I hosted the experiment on Qualtrics, where each individual was randomly assigned to one of five conditions. After answering a brief series of demographic questions, individuals were presented with a message that had two manipulated dimensions: the partisanship of the governor speaking (i.e., Republican, Democratic, or non-partisan) and frame (i.e., national security, public health, or general environmental focus). The messages were based on previous experiments (see McCright et al., 2015) and the actual discourse of American political leaders that I discovered in Chapter 3.

For this experiment, I proposed six hypotheses about potential effects caused by the message treatments. Due to the deeply ideological divide on the issue of climate change, I focused my predictions and analysis on Republican-identifying individuals. In H_2, my source credibility hypothesis, I predicted that Republican-governor messages would be rated by Republican subjects as more credible than Democratic-governor and non-partisan messages. In H_3, my overall support hypothesis, I predicted that a Republican governor offering a public health message would lead to an increase in support for reducing greenhouse gas emissions among Republican subjects. In H_4, my belief content hypothesis, I predicted that only a Republican governor offering a public health message would evoke Republicans to think reducing greenhouse gas emissions would have a positive impact on public health. In H_5, my

belief consideration hypothesis, I predicted that only a Republican governor with a public health message would evoke Republicans to think that public health was an important consideration when forming their opinion about climate change. In H_6, my emotional response hypothesis, I predicted that only a Republican governor with a public health message would spur reduced anger and fear and increased hope among Republicans. Finally, in H_7, my pro-climate behaviors hypothesis, I predicted that a Republican governor with a public health frame would evoke more pro-climate friendly behaviors from Republicans. I present the results of the experiment in this chapter.

H_2: Source Credibility

In H_2, I predicted that Republican-governor messages would be rated by Republican subjects as more credible than Democratic-governor and non-partisan messages. The theory is based on the notion of co-partisanship, which states that a speaker will be viewed as more credible by audience members who share the same political affiliation (e.g., Cohen, 2015). I tested this hypothesis with two outcome variables: *Knowledge* and *Trust*. For *Knowledge*, I asked respondents if the governor in the news story they read had the knowledge they needed to know about climate change. Since this hypothesis only dealt with the partisan affiliation of the speaker, I collapsed the experimental conditions to either a non-Republican (Democratic or non-partisan) governor or Republican governor for analysis purposes. The cross tabulation of the political party of the speaker with the outcome variable is shown in Table 4.1 for Democrats and Independents and Table 4.2 for Republicans.

Table 4.1. Frequency Counts and Percentage for Knowledge of Governor Among Subjects Identifying with Democrats or as Independents

	Random Group Assignment	
Governor has knowledge?	Not Republican Governor	Republican Governor
No	7.86% (18)	11.88% (19)
Yes	92.14% (211)	88.12% (141)

χ^2 (1) = 1.33, $p > 0.05$

Table 4.2. Frequency Counts and Percentage for Knowledge of Governor Among Subjects Identifying with Republicans

	Random Group Assignment	
Governor has knowledge?	Not Republican Governor	Republican Governor
No	12.21% (16)	13.75% (11)
Yes	87.79% (115)	86.25% (69)

χ^2 (1) = 0.01, p > 0.05

First, I will note that the outcome variable is heavily skewed towards agreeing that the governor has knowledge, regardless of the party of the speaker or of the individual respondent. This lack of variation shows that most governors in this experiment were viewed as knowledgeable, with the lowest percentage being 86.25% for Republican governors among Republican respondents. Second, Table 4.1 and Table 4.2 show that the partisanship of the governor was not significantly associated with a respondent's decision about the governor's knowledge, for either non-Republican or Republican individuals. While non-Republican governors were seen as slightly more knowledgeable by Democrats and Independents, this difference was not significant (χ^2 (1, N = 389) = 1.33, p > 0.05). Interestingly, Republican governors were seen as slightly less knowledgeable by Republican individuals, but this difference was also not significant (χ^2 (1, N = 211) = 0.01, p > 0.05). Overall, the cross

tabulations for the *Knowledge* variable do not reveal support for the source credibility hypothesis.

I created several logistic regression models to further test for the potential of this association on perception of knowledge between the party of the speaker and the party of the respondent. The variable *Knowledge* was coded as "0" for not agreeing with the statement and "1" for agreeing with the statement that the governor had knowledge about climate change. Model 2 in Table 4.3 shows the results of the logistic regression model with only the experimental conditions as a predictor variable. The experimental condition was not significant ($\beta = -0.31$, $SE = 0.27$, $p > 0.05$), meaning that the party of the speaker did not influence an individual's attitudes on whether the governor was knowledgeable or not about climate change. Further, Model 4 in Table 4.3 shows the results of the logistic regression model with control variables and the interaction between the experimental condition and the political party of the respondent. If this interaction was significant, then there would be potential evidence of the co-partisanship hypothesis. However, this interaction was not significant ($\beta = 0.43$, $SE = 0.57$, $p > 0.05$). Thus, there is no evidence to support H_2 based on the *Knowledge* model. However, there were some interesting main effect results based on demographics that I will discuss next.

Table 4.3. Regression Results for Knowledge

	Dependent variable:			
	Knowledge			
	(1)	(2)	(3)	(4)
Age			-0.003	-0.002
			(0.01)	(0.01)
Income			0.03	0.02
			(0.28)	(0.28)
Education			1.34***	1.35***

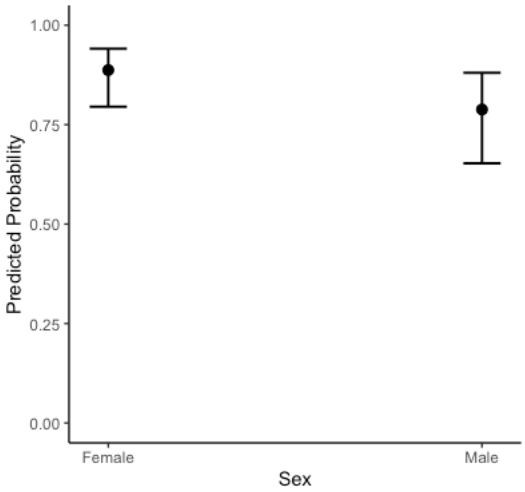
			(0.29)	(0.29)
Race			0.05	0.05
			(0.30)	(0.30)
Sex			-0.75**	-0.77***
			(0.29)	(0.30)
Party			-0.47*	-0.66*
			(0.28)	(0.38)
Condition		-0.31	-0.36	-0.53
		(0.27)	(0.28)	(0.36)
Party x Condition				0.43
				(0.57)
Constant	2.13***	2.26***	2.15***	2.25***
	(0.13)	(0.18)	(0.50)	(0.52)
Observations	601	601	588	588
Log Likelihood	-203.81	-203.13	-187.06	-186.77
Akaike Inf. Crit.	409.61	410.26	390.12	391.53
Note:			*p<0.1; **p<0.05; ***p<0.01	

For the purposes of analyzing the main effect results, I selected Model 3 because it had the lowest Akaike Information Criteria[11] (AIC) and the interaction between political party and the condition was not significant in Model 4. To begin with, I wanted to know if the perceived knowledge of the governor was influenced by the political party of the respondent. Interestingly, an individual's *Party* was not significant (β = -0.47, SE = 0.28, $p > 0.05$), meaning that governors were viewed across the political spectrum as having the same amount of knowledge by Republicans and non-Republicans alike. Next, I tested for an association between perceived knowledge of the governor and a respondent's sex. The variable *Sex* was significant and negative (β = -0.75, SE = 0.29, $p < 0.05$), meaning that governors were perceived to have *less* knowledge

[11] Akaike Information Criteria, or AIC, is a measure of the accuracy of a model. In general, the model with the lowest
AIC is preferable.

by males than by females. To visually demonstrate this result, I created a marginal effect plot[12] that shows the difference in predicted probability between females and males. The predicted probability that the governor was found knowledgeable about climate change was 88.71% for females, compared to 78.80% for males. Perceived levels of knowledge were greater than 75% across the sexes, but females were almost 10-percentage points higher than males. This marginal effect is shown in Figure 4.1.

Figure 4.1. *Predicted Probability of Knowledge Based on Sex*

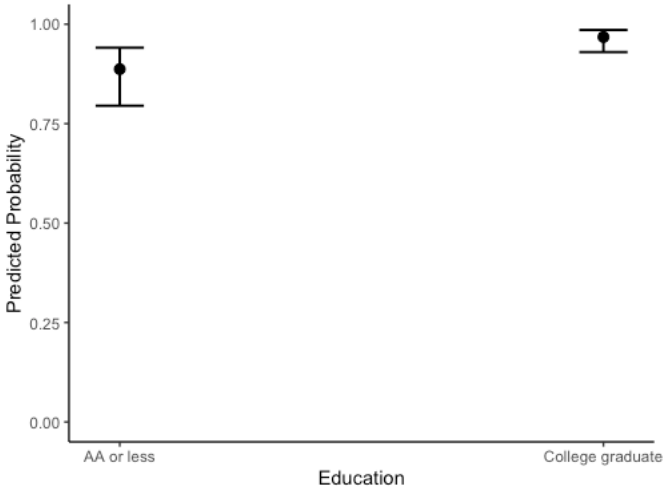


The variable *Education* was significant and positive ($\beta = 1.34$, $SE = 0.29$, $p < 0.05$), meaning that governors were seen as being more knowledgeable by college graduates than by non-college graduates. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between having an AA degree or less and having a college degree or more. The predicted probability that a governor was found knowledgeable

[12] For all marginal effect plots, categorical variables were held constant at their reference level, while age was held at its mean of 34.54. Predicted probabilities were assessed with all categorical variables held constant at their reference level, while age was held at its rounded mean of 35. Given the small effect size of age, any discrepancies between the marginal effect plots and the predicted probabilities will be minimal.

about climate change by an individual with an AA or less was 88.71%, compared to 96.78% for someone with at least a college degree. Perceived levels of knowledge were high across levels of education, but those with an AA or less were roughly eight-percentage points lower than those with at least a college degree. This marginal effect is shown in Figure 4.2.

Figure 4.2. *Predicted Probability of Knowledge Based on Education*



To further investigate the source credibility hypothesis, governors were rated based on their trustworthiness by respondents. For *Trust*, I asked respondents if the governor in the news story could be trusted to give them necessary information about climate change. Individuals in the experiment were randomly assigned to one of two groups: non-Republican (Democratic or non-partisan) governor and Republican governor. The cross tabulation of the political party of the speaker with the outcome variable of *Trust* is shown in Table 4.4 for Democrats and Independents and Table 4.5 for Republicans.

Table 4.4. Frequency Counts and Percentage for Trust of Governor Among Subjects Identifying with Democrats or as Independents

	Random Group Assignment	
Governor can be trusted?	Not Republican Governor	Republican Governor
No	18.34% (42)	31.01% (49)
Yes	81.66% (187)	68.99% (109)

χ^2 (1) = 7.66, $p < 0.05$

Table 4.5. Frequency Counts and Percentage for Trust of Governor Among Subjects Identifying with Republicans

	Random Group Assignment	
Governor can be trusted?	Not Republican Governor	Republican Governor
No	23.66% (31)	36.71% (29)
Yes	76.34% (100)	63.29% (50)

χ^2 (1) = 3.49, p > 0.05

First, levels of *Trust* were lower across the board than perceived knowledge. In and of itself, this is interesting because even though governors were found overall to be knowledgeable, they were less likely to be found trustworthy. For example, even though Republican governors were perceived by 86.25% of Republican respondents as having knowledge, Republican governors were only trusted by 63.29% of Republican respondents. This gap raises interesting questions about the roles that knowledge and trust play in source credibility. It is particularly troubling to see individuals find their civic leaders knowledgeable but less willing to find them trustworthy. This disconnect could have important implications for the ability of America's political leaders to convince their constituents about the necessity of acting on climate change.

Second, Table 4.4 and Table 4.5 show that the potential association between the partisanship of the governor and a respondent's decision about the governor's trustworthiness, for both non-Republican and Republican individuals, approached statistical significance. Non-

Republican governors were seen as much more trustworthy by Democrats and Independents, and this difference was significant (χ^2 (1, N = 387) = 7.66, p < 0.05). Interestingly, Republican governors were also seen as less trustworthy by Republican individuals, but this result was slightly higher than the traditional 0.05 significance level (χ^2 (1, N = 210) = 3.49, p > 0.05). While we should take this finding with caution, it is noteworthy that non-Republican governors were seen as more trustworthy (76.34%) than Republican governors (63.29%) among Republican respondents. Overall, the cross tabulations for the *Trust* variable reveal support for a co-partisanship hypothesis among Democrats and Independents but not among Republican individuals.

Like with the previous variable, I created several logistic regression models to further test for the potential association of *Trust* between the party of the speaker and the party of the respondent. The dependent variable *Trust* was measured as a binary variable, with "0" being not agree and "1" being agreement with the statement that the governor could be trusted to provide respondents with necessary information about climate change. Model 2 in Table 4.6 shows the results of the logistic regression model with only the experimental conditions as a predictor variable. The experimental condition was significant and negative (β = -0.65, SE = 0.19, p < 0.05), meaning Republican governors were seen as significantly less trustworthy than their non-Republican governor counterparts by the sample as a whole. This is a main effect, and this model did not account for the party of the respondent. Next, I tested to see if there was an interaction between the party of the speaker and the party of the respondent. Model 4 in Table 4.6 shows the results of the logistic regression model with control variables and the interaction between the experimental condition and the political party of the respondent. If this interaction were to be significant, then there would be potential evidence of the co-partisanship hypothesis. However,

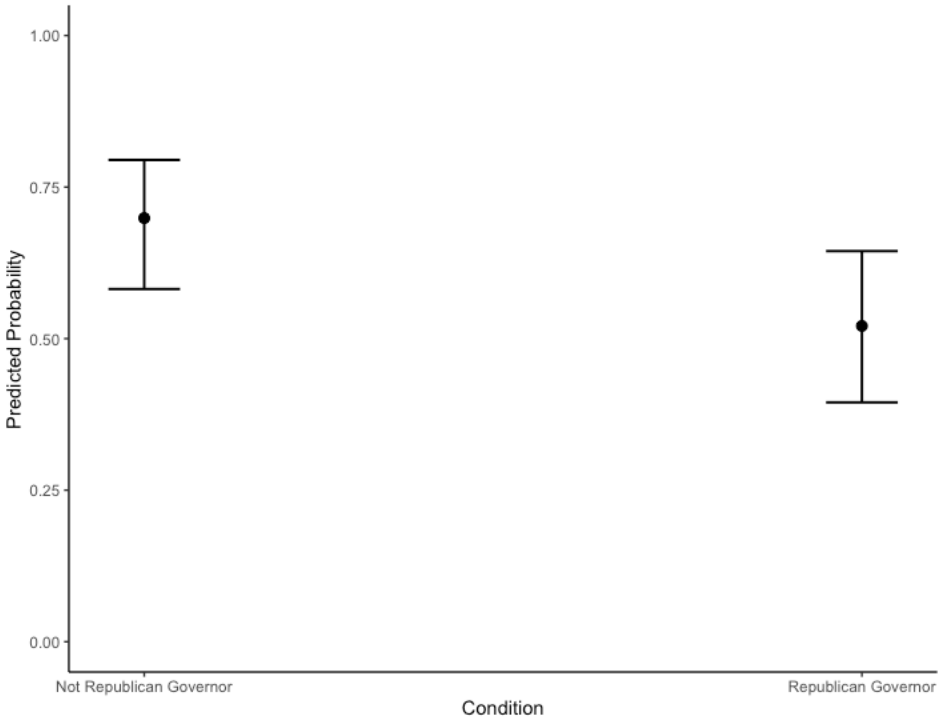
this interaction was not significant ($\beta = 0.10$, $SE = 0.42$, $p > 0.05$), meaning that the party of the speaker did not interact with the party of the respondent to influence attitudes on trustworthiness. Thus, there is no evidence to support H_2 based on the *Trust* model. However, there were some interesting main effect results that I will discuss next.

Table 4.6. Regression Results for Trust

	Dependent variable:			
	Trust			
	(1)	(2)	(3)	(4)
Age			0.01	0.01
			(0.01)	(0.01)
Income			-0.07	-0.07
			(0.21)	(0.21)
Education			1.34***	1.34***
			(0.22)	(0.22)
Race			0.15	0.15
			(0.22)	(0.22)
Sex			-0.28	-0.28
			(0.21)	(0.21)
Party			-0.52**	-0.57**
			(0.21)	(0.28)
Condition		-0.65***	-0.76***	-0.80***
		(0.19)	(0.20)	(0.26)
Party x Condition				0.10
				(0.42)
Constant	1.09***	1.37***	0.54	0.56
	(0.09)	(0.13)	(0.37)	(0.38)
Observations	598	598	586	586
Log Likelihood	-337.91	-332.07	-302.52	-302.49
Akaike Inf. Crit.	677.83	668.14	621.03	622.97
Note:				*p<0.1; **p<0.05; ***p<0.01

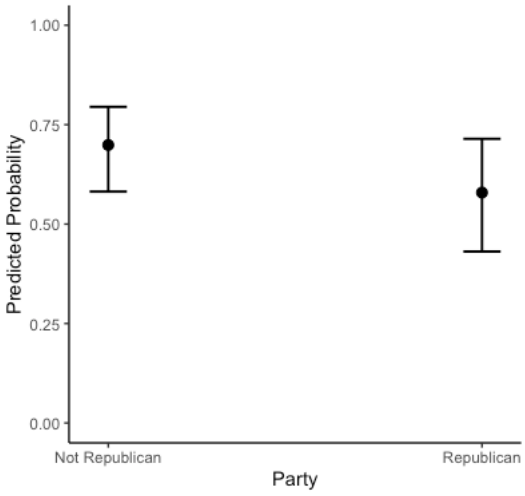
For the purposes of analyzing the main effect results, I selected Model 3 because it had the lowest AIC and the interaction between political party and the condition was not significant in Model 4. To begin with, I wanted to know if the perceived trustworthiness of the governor was influenced by the experimental condition of the respondent. Just like in Model 2, the main effect of the experimental *Condition* in Model 3 was significant and negative (β = -0.76, SE = 0.20, $p < 0.05$), meaning that Republican governors were viewed as less trustworthy across the sample. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between the non-Republican governor condition and the Republican governor condition. The predicted probability that a non-Republican governor was found trustworthy was 69.97%, compared to 52.18% for Republican governors. Perceived levels of trust were above 50%, but the level of trust for non-Republican governors was more than 17-percentage points higher than Republican governors. This marginal effect is shown in Figure 4.3.

Figure 4.3. *Predicted Probability of Trust Based on Condition*



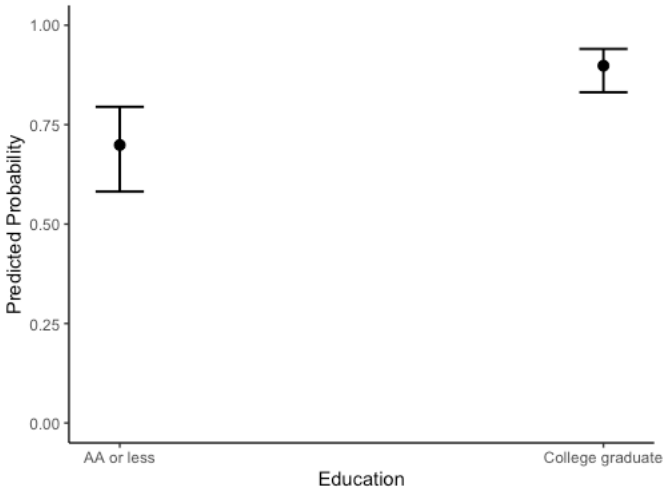
The variable *Party* was also significant and negative (β = -0.52, *SE* = 0.21, $p < 0.05$), meaning that perceived trustworthiness of the governor was lower among Republicans than non-Republicans. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between non-Republicans and Republicans. The predicted probability that a governor was found trustworthy by non-Republicans was 69.97%, compared to 58.01% for Republicans. Perceived levels of trust were above 50%, but the level of trust for non-Republicans was nearly 12-percentage points higher than Republicans. This marginal effect is shown in Figure 4.4.

Figure 4.4. *Predicted Probability of Trust Based on Party*



The *Education* variable was also significant and positive ($\beta = 1.34$, $SE = 0.22$, $p < 0.05$), meaning that perceived trustworthiness of the governor was higher among those with at least a college degree than among those with an AA degree or less. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between having an AA degree or less and having a college degree or more. The predicted probability that a governor was found trustworthy by those with an AA or less was 69.97%, compared to 89.85% for college graduates. Perceived levels of trust were above 50%, but levels of trust for those with an AA or less was nearly 20-percentage points lower than more educated individuals. This marginal effect is shown in Figure 4.5.

Figure 4.5. *Predicted Probability of Trust Based on Education*



H_3: Overall Support

In H_3, I made four predictions about how governor-messages would impact Republican-identifying individuals in their overall opinions towards taking action on climate change. I predicted that Republican-governor messages with a public health frame would produce higher levels of overall support than the control condition; I predicted that all other conditions would lower support for taking action on climate change. The theory behind this hypothesis is based on the idea of co-partisanship, as well as empirical findings that Republican-identifying individuals in previous studies responded positively to public health messages and negatively to national security messages (see Myers et al., 2012). I tested this hypothesis with an item consisting of six questions called *Overall Support*. A higher score indicated greater support for reducing greenhouse gas emissions. Unlike the previous hypothesis, all five conditions were included in the analysis. The means of the *Overall Support* variable for each condition are shown in Figure 4.6 for Democrats and Independents and Figure 4.7 for Republicans.

Figure 4.6. *Mean Score for Overall Support Among Subjects Identifying with Democrats or as Independents Grouped by Condition*

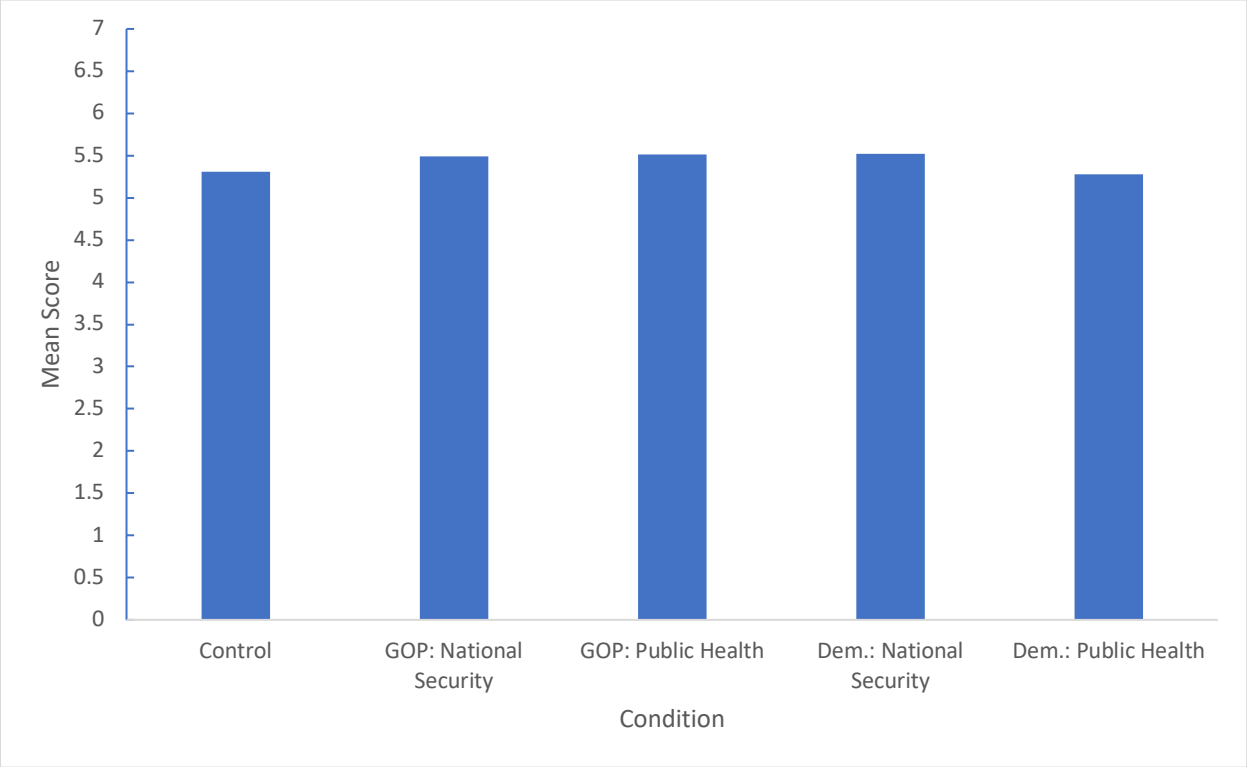
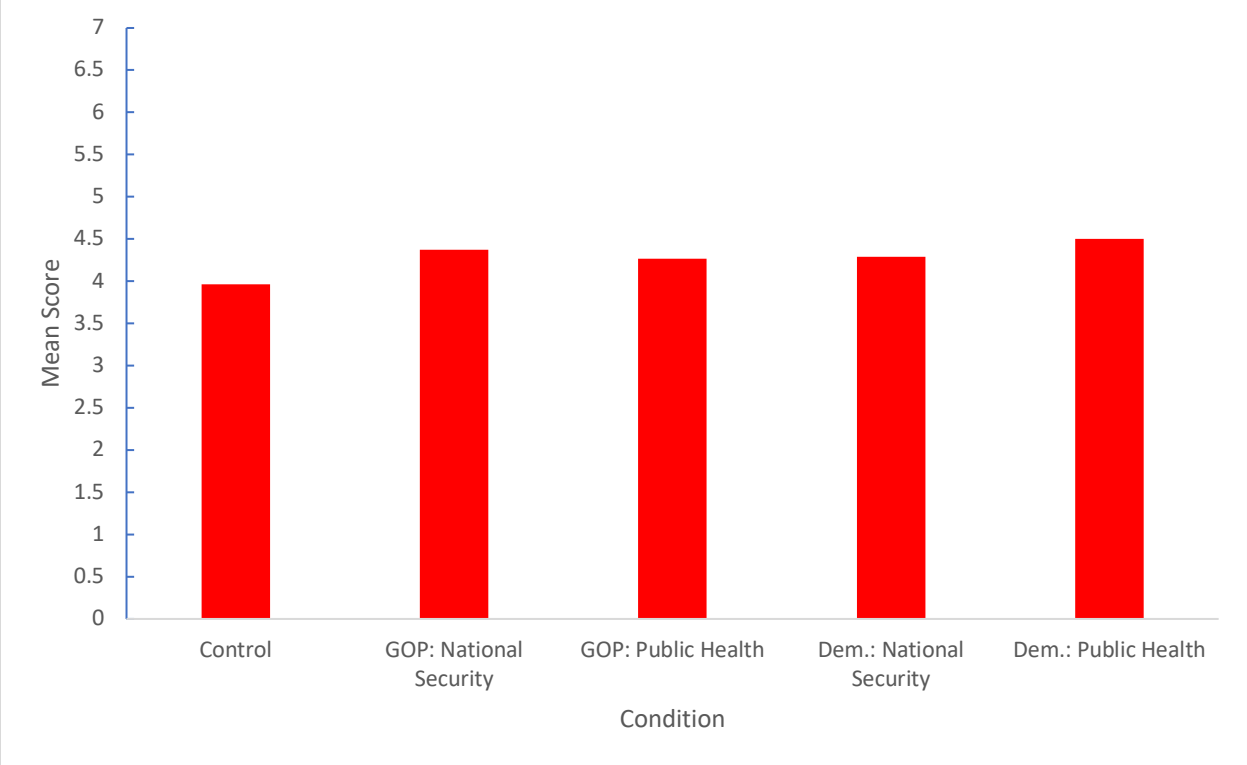


Figure 4.7. *Mean Score for Overall Support Among Subjects Identifying with Republicans Grouped by Condition*



First, I will note that the outcome variable is skewed towards overall support for reducing greenhouse gas emissions. For all respondents, the data was skewed this way ($M = 5.02$, $Mdn = 4.5$, $SD = 1.30$). Democrats and Independents were particularly skewed thusly ($M = 5.43$, $Mdn = 5.67$, $SD = 1.29$). Outcomes for Republican-identifying individuals were more normally distributed, but the left and right tails of the histogram were quite long ($M = 4.28$, $Mdn = 4.08$, $SD = 0.93$). The immediate takeaway is that support among Republican subjects seems higher than expected, given that recent public opinion data found that only 42% of Republicans believe a consensus exists on the science of climate change (Brenan & Saad, 2018).

Second, I conducted one-way ANOVAs[13] between the independent variable *Condition* and the dependent variable *Overall Support*. For Democratic and Independent-identifying individuals, there was no statistically significant effect ($F(4, 373) = 0.61$, $p > 0.05$). For Republican-identifying individuals, there also was no statistically significant effect ($F(4, 203) = 2.03$, $p > 0.05$). These results demonstrate that the governors' messages in the experimental conditions did not have an effect on support for reducing greenhouse gas emissions. The ANOVAs do not reveal support for the hypotheses.

In addition to the ANOVA tests, I conducted several Ordinary Least Squares (OLS) regressions to test for a potential association between *Condition* and *Overall Support*. The dependent variable *Overall Support* was a six-item scale with "1" representing strong disagreement and "7" indicating strong agreement with support for reducing greenhouse gas emissions. Model 2 in Table 4.7 shows the results of the OLS model with only the experimental condition as a predictor variable. The four partisan treatment groups were individually compared to the control group. A p-value of less than 0.05 suggests that there is a statistically significant

[13] Since the data were not normally distributed, I also conducted Kruskal-Wallis rank sum tests and the results were not statistically significant at the $p < 0.05$ level.

difference between the control and the treatment group. Three of the four groups were significant and positive, meaning that the experimental conditions did influence a respondent's overall opinion about reducing greenhouse gas emissions. These results are main effects and Model 2 did not account for the party of the respondent. The *Republican Governor: National Security* condition was significant and positive ($\beta = 0.37$, $SE = 0.18$, $p < 0.05$). Receiving this message led to an increase in support for reducing greenhouse gas emissions. The *Republican Governor: Public Health* condition was significant and positive ($\beta = 0.35$, $SE = 0.17$, $p < 0.05$). Receiving this message led to an increase in support for reducing greenhouse gas emissions. The *Democratic Governor: National Security* condition was significant and positive ($\beta = 0.36$, $SE = 0.18$, $p < 0.05$). Receiving this message led to an increase in support for reducing greenhouse gas emissions. The *Democratic Governor: Public Health* condition was not significant ($\beta = 0.28$, $SE = 0.17$, $p > 0.05$).

Table 4.7. Regression Results for Overall Support

	Dependent variable:			
	Overall Support			
	(1)	(2)	(3)	(4)
Age			-0.01*	-0.01**
			(0.004)	(0.004)
Income			0.15	0.16*
			(0.10)	(0.10)
Education			-0.48***	-0.49***
			(0.11)	(0.11)
Race			-0.13	-0.13
			(0.11)	(0.11)
Sex			-0.19**	-0.19*

			(0.10)	(0.10)
Party			-1.04***	-1.28***
			(0.10)	(0.23)
GOP Governor: NS		0.37**	0.30*	0.16
		(0.18)	(0.16)	(0.20)
GOP Governor: PH		0.35**	0.24	0.19
		(0.17)	(0.15)	(0.19)
Dem. Governor: NS		0.36**	0.33**	0.30
		(0.18)	(0.16)	(0.20)
Dem. Governor: PH		0.28	0.21	-0.02
		(0.17)	(0.15)	(0.19)
Party x GOP Governor: NS				0.39
				(0.33)
Party x GOP Governor: PH				0.10
				(0.32)
Party x Dem. Governor: NS				0.04
				(0.32)
Party x Dem. Governor: PH				0.62**
				(0.31)
Constant	5.02***	4.74***	5.92***	6.05***
	(0.05)	(0.13)	(0.20)	(0.22)
Observations	586	586	575	575
R^2	0.00	0.01	0.24	0.24
Adjusted R^2	0.00	0.004	0.22	0.22
Residual Std. Error	1.30 (df = 585)	1.29 (df = 581)	1.15 (df = 564)	1.14 (df = 560)
F Statistic		1.56 (df = 4; 581)	17.38*** (df = 10; 564)	12.87*** (df = 14; 560)

Note: *p<0.1; **p<0.05; ***p<0.01

Next, I tested to see if there was an interaction between the experimental condition and the party of the individual subject. Model 4 in Table 4.7 shows the results of the OLS regression model with control variables and the interaction between these two variables. If these interactions were to be significant, then there would be evidence for the overall support hypothesis. The only significant interaction was between the *Democratic Governor: Public Health* condition and *Party* ($\beta = 0.62$, $SE = 0.31$, $p < 0.05$). The effect of this message on the predicted outcome for Democrats and Independents was actually a decline of 0.03 points (the difference between the predicted outcome of the experimental condition and the control group). However, the effect of this message for Republicans was, surprisingly, an increase of 0.61 points (the difference between the predicted outcome of the experimental condition and the control group). Based on my predictions, the *Democratic Governor: Public Health* condition should have reduced support for a reduction in greenhouse gas emissions among Republicans. Thus, there is no evidence to support H_3 based on these results. However, there were some interesting main effect results that I will discuss next.

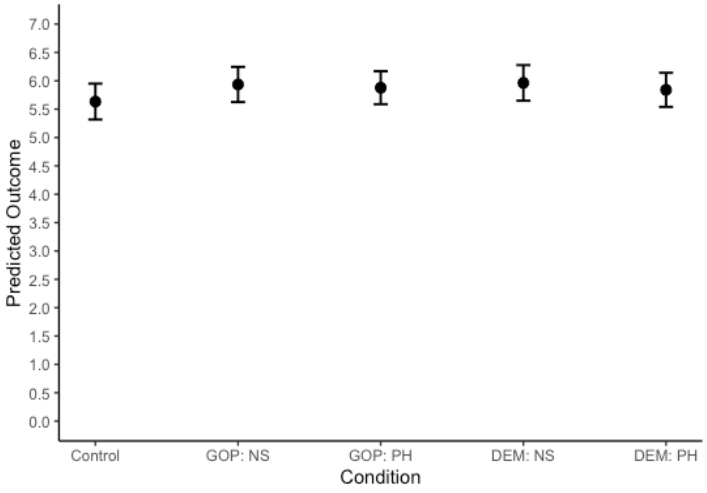
For the purposes of analyzing the main effect results, I selected Model 3 for several reasons. I added two additional model fit checks because the interaction for one experimental condition was significant in Model 4. First, the AIC and Bayesian Information Criterion[14] (BIC) were both lowest in Model 3, suggesting that the amount of prediction error was lower in Model 3 than Model 4. Additionally, I performed an ANOVA between Model 3 and Model 4 to determine if they were significantly different from one another. The results of the ANOVA were not significant, suggesting that Model 4 is not a significantly better model than Model 3 (F (564,

[14] Bayesian Information Criterion, or BIC, is a measure of the accuracy of a model. However, unlike AIC, BIC adds a penalty term for each additional variable in the model to prevent against overfitting.

560) = 1.47, $p > 0.05$). Lastly, the R^2 is identical for both models. The preponderance of evidence suggests that Model 3 is preferable to Model 4.

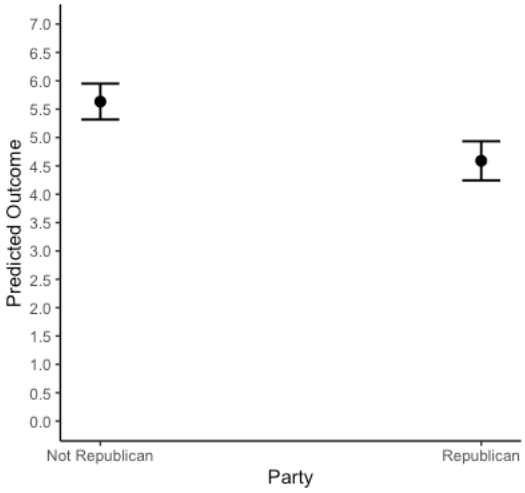
To begin with, I wanted to know if the governors' message was associated with the *Overall Support* of the respondent. The main effect of the *Democratic Governor: National Security* condition was significant and positive ($\beta = 0.33$, $SE = 0.16$, $p < 0.05$), meaning that this message significantly increased support for reducing greenhouse gas emissions in the overall sample. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted outcomes between the control and the condition with a Democratic-governor message with a national security frame. The predicted outcome of a Democratic governor's national security message was 5.96, compared to 5.63 for the control. This is a difference of 0.33, representing just over a one-third of a point increase in the predicted outcome for being in the treated group. This marginal effect is shown in Figure 4.8.

Figure 4.8. *Predicted Outcomes for Overall Opinion Based on Condition*



The *Party* variable was also significant and negative (β = -1.04, *SE* = 0.10, $p < 0.05$), meaning that support for reducing greenhouse gas emissions was lower among Republicans than Democrats and Independents. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted outcome between non-Republicans and Republicans. The predicted outcome of support for reducing greenhouse gas emissions was 5.63 for Democrats and Independents, compared to 4.59 for Republicans. This is a difference of 1.04, representing over a one-point decrease in the predicted outcome for Republicans. This marginal effect is shown in Figure 4.9.

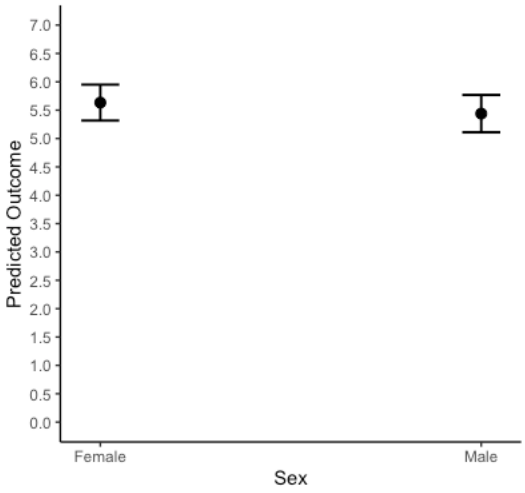
Figure 4.9. *Predicted Outcomes for Overall Opinion Based on Party*



The *Sex* variable was also significant and negative (β = -0.19, *SE* = 0.10, $p < 0.05$), meaning that support for reducing greenhouse gas emissions was lower among males than females. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted outcome between females and males. The predicted outcome of support for reducing greenhouse gas emissions was 5.63 for females, compared to 5.44 for males. This is

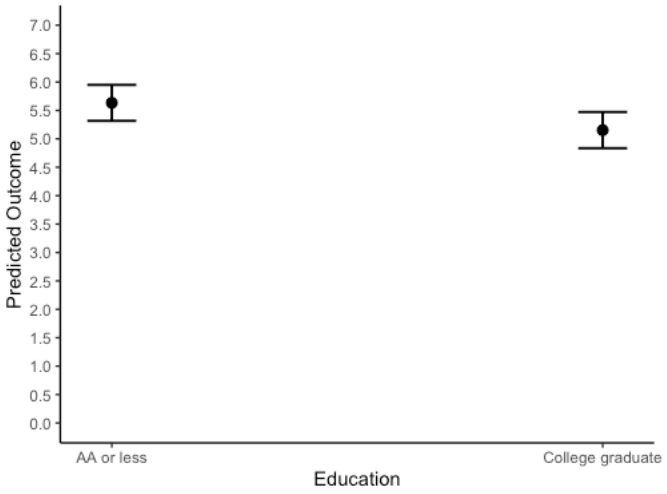
a difference of 0.19, representing just under a one-fifth of one-point decrease in the predicted outcome for males. This marginal effect is shown in Figure 4.10.

Figure 4.10. *Predicted Outcomes for Overall Opinion Based on Sex*



Lastly, the *Education* variable was significant and negative (β = -0.48, SE = 0.11, $p <$ 0.05), meaning that support for reducing greenhouse gas emissions was lower among individuals with at least a college degree compared to those with an AA degree or less. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted outcome between having an AA or less and having a college degree or more. The predicted outcome of support for reducing greenhouse gas emissions was 5.63 for those with an AA or less, compared to 5.15 for college graduates. This is a difference of 0.48, representing just under a one-half of one-point decrease in the predicted outcome for college graduates. This marginal effect is shown in Figure 4.11.

Figure 4.11. *Predicted Outcomes for Overall Opinion Based on Education*



H_4: Belief Content

In H_4, I made four predictions about how governor-messages would impact Republican-identifying individuals in their belief that taking action on climate change would have a positive or negative effect on public health and national security. I predicted that Republican-governor messages with a public health frame would evoke a positive response from Republican-identifying individuals; I predicted that all other conditions would evoke negativity about the impact climate change policies have on public health and national security. The theory behind this hypothesis is based on the idea of co-partisanship, as well as empirical findings that Republican-identifying individuals in previous studies responded positively to public health messages and negatively to national security messages (see Myers et al., 2012). I tested this hypothesis with two outcome variables: *Impact on Public Health* and *Impact on National Security*. For *Impact on Public Health*, I asked respondents if they believed acting on climate change would have a negative, neutral, or positive effect on public health. All five conditions were included in the analysis. The cross tabulations of the experimental condition with the

outcome variable are shown in Table 4.8 for Democrats and Independents and Table 4.9 for Republicans.

Table 4.8. Frequency Counts and Percentage for Impact on Public Health Among Subjects Identifying with Democrats or as Independents

	Random Group Assignment				
Positive impact PH?	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	7.69% (5)	4.05% (3)	9.41% (8)	4.00% (3)	7.95% (7)
Yes	92.31% (60)	95.95% (71)	90.59% (77)	96.00% (72)	92.05% (81)

χ^2 (4) = 3.02, $p > 0.05$

Table 4.9. Frequency Counts and Percentage for Impact on Public Health Among Subjects Identifying with Republicans

	Random Group Assignment				
Positive impact PH?	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	15.56% (7)	13.51% (5)	13.95% (6)	31.71% (13)	8.89% (4)
Yes	84.44% (38)	86.49% (32)	86.05% (37)	68.29% (28)	91.11% (41)

χ^2 (4) = 9.20, $p > 0.05$

First, I will note that the outcome variable is heavily skewed towards the belief that reducing greenhouse gases would have a positive impact on public health, regardless of the party of the speaker or of the individual respondent. The lowest percentage of this view is among those in the *Democratic Governor: National Security* condition who identify as Republicans; still over two-thirds agree that reducing greenhouse gases would improve public health. Second, Table 4.8 and Table 4.9 show that the experimental conditions were not significantly associated with a respondent's view about the impact of reducing emissions on public health, for either non-Republican or Republican individuals. There were very clearly no differences between the conditions among Democrats and Independents (χ^2 (4, N = 387) = 3.02, p > 0.05). Although the

association among Republicans also did not reach statistical significance (χ^2 (4, N = 211) = 9.20, p > 0.05), the *Democratic Governor: National Security* condition and the *Democratic Governor: Public Health* conditions among Republicans do stand out. Those in the former group were least likely to view a reduction in emissions as having a positive impact on public health, which is in line with the co-partisanship and boomerang-effect hypotheses. The latter group had the highest level of support, which goes against the co-partisanship hypothesis, but is in line with the theory that public health messages are more agreeable to Republicans. Overall, the cross tabulations for the *Impact on Public Health* variable do not reveal support for the hypothesis.

I created several logistic regression models to further test for the potential of this association between the experimental condition and respondents' attitudes on the impact reducing greenhouse gases may have on public health. The variable *Impact on Public Health* was coded as "0" for thinking that reducing greenhouse gas emissions would not have a positive impact on public health and "1" for thinking that reducing greenhouse gas emissions would have a positive impact on public health. Model 2 in Table 4.10 shows the results of the logistic regression model with only the experimental conditions as a predictor variable. The experimental conditions were not significant (all four $p > 0.05$), meaning that the party of the governor and the frame employed did not significantly impact the views of the respondent. Further, Model 4 in Table 4.10 shows the results of the logistic regression model with control variables and the interaction between the experimental condition and the political party of the respondent. If these interactions were to be significant, then there would be potential evidence of the hypothesis. However, these interactions were not significant (all four $p > 0.05$). Thus, there is no evidence to support H_4 based on the *Impact on Public Health* model. However, there was an interesting main effect result based on demographics that I will discuss next.

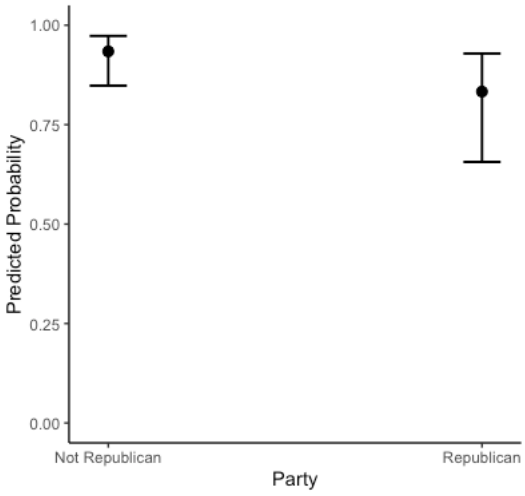
Table 4.10. Regression Results for Impact on Public Health

	Dependent variable:			
	Impact on Public Health			
	(1)	(2)	(3)	(4)
Age			0.01	0.01
			(0.01)	(0.01)
Income			0.16	0.17
			(0.28)	(0.29)
Education			0.36	0.34
			(0.30)	(0.31)
Race			-0.10	-0.06
			(0.31)	(0.32)
Sex			-0.50*	-0.47
			(0.30)	(0.30)
Party			-1.04***	-0.80
			(0.28)	(0.63)
GOP Governor: NS		0.46	0.37	0.64
		(0.48)	(0.49)	(0.75)
GOP Governor: PH		-0.003	-0.07	-0.17
		(0.42)	(0.43)	(0.60)
Dem. Governor: NS		-0.27	-0.28	0.74
		(0.41)	(0.42)	(0.75)
Dem. Governor: PH		0.31	0.28	0.06
		(0.44)	(0.45)	(0.61)
Party x GOP Governor: NS				-0.47
				(0.99)
Party x GOP Governor: PH				0.29
				(0.85)
Party x Dem. Governor: NS				-1.60*
				(0.93)
Party x Dem. Governor: PH				0.57
				(0.91)
Constant	2.18***	2.10***	2.18***	2.09***
	(0.14)	(0.31)	(0.62)	(0.69)

Observations	599	599	587	587
Log Likelihood	-197.13	-195.40	-184.15	-180.45
Akaike Inf. Crit.	396.26	400.80	390.29	390.90
Note:				*p<0.1; **p<0.05; ***p<0.01

For the purposes of analyzing this main effect result, I selected Model 3 because it had the lowest AIC, a lower BIC than Model 4, and the interactions between political party and experimental conditions were not significant in Model 4. I wanted to know if the view that reducing greenhouse gas emissions would have a positive impact on public health was influenced by the political party of the respondent. An individual's *Party* was significant and negative (β = -1.04, SE = 0.28, $p < 0.05$), meaning that Republicans were less likely to think that reducing greenhouse gas emissions would have a positive impact on public health than non-Republicans. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between non-Republicans and Republicans. The predicted probability of holding the view that reducing greenhouse gas emissions would have a positive impact on public health was 93.46% for non-Republican individuals, compared to 83.40% for Republicans. Levels of positivity were high across the political spectrum, but positivity among non-Republicans was roughly 10-percentage points higher than Republicans. This marginal effect is shown in Figure 4.12.

Figure 4.12. *Predicted Probability of Impact on Public Health Based on Party*



To further investigate the belief content hypothesis, I assessed beliefs about what impact the reduction of greenhouse gas emissions would have on national security among respondents. For *Impact on National Security*, I asked respondents if they viewed the reduction of greenhouse gas emissions as having a negative, neutral, or positive impact on national security. All five conditions were included in the analysis. The cross tabulation of the experimental conditions with the outcome variable are shown in Table 4.11 for Democrats and Independents and Table 4.12 for Republicans.

Table 4.11. Frequency Counts and Percentage for Impact on National Security Among Subjects Identifying with Democrats or as Independents

	Random Group Assignment				
Positive impact PH?	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	35.38% (23)	13.33% (10)	38.82% (33)	13.33% (10)	36.36% (32)
Yes	64.62% (42)	86.67% (65)	61.18% (52)	86.67% (65)	63.64% (56)

χ^2 (4) = 25.84, $p < 0.05$

Table 4.12. Frequency Counts and Percentage for Impact on National Security Among Subjects Identifying with Republicans

Positive impact PH?	Random Group Assignment				
	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	33.33% (15)	32.43% (12)	42.86% (18)	19.51% (8)	33.33% (15)
Yes	66.67% (30)	67.57% (25)	57.14% (24)	80.49% (33)	66.67% (30)

χ^2 (4) = 5.24, $p > 0.05$

First, I will note that the outcome variable is less skewed towards positivity than the previous variable, but the view that reducing greenhouse gases would have a positive impact on national security remained high across the political spectrum. The percentage of those having this view peaked at 86.67% in both national security conditions among non-Republicans. The lowest level of agreement was 57.14% among Republicans in the *Republican Governor: Public Health* condition. Overall, levels of positivity were lower for national security than for the previous variable about public health. Second, Table 4.11 and Table 4.12 show that the experimental conditions were significantly associated with a non-Republican respondent's view about the impact of reducing emissions on national security (χ^2 (4, N = 388) = 25.84, p < 0.05), unlike for Republicans (χ^2 (4, N = 210) = 5.42, $p > 0.05$). The *Republican Governor: National Security* condition and the *Democratic Governor: National Security* conditions stand out. Non-Republicans in these two groups had much more positive views than those in the other groups (differences of more than 20-percentage points). While this evidence does not directly provide support for the co-partisanship hypothesis, it does show that a national security message, regardless of the source of the speaker, might influence non-Republican identifying individuals' attitudes about the positive benefit that reducing greenhouse gas emissions could have on national security. Overall, the cross tabulations for the *Impact on National Security* variable do not reveal support for the hypothesis.

I created several logistic regression models to further test for the potential of this association between the experimental condition and respondents' attitudes on the impact reducing greenhouse gases may have on national security. The variable *Impact on National Security* was coded as "0" for thinking that reducing greenhouse gas emissions would not have a positive impact on national security and "1" for thinking that reducing greenhouse gas emissions would have a positive impact on national security. Model 2 in Table 4.13 shows the results of the logistic regression model with only the experimental conditions as a predictor variable. The *Republican Governor: National Security* ($\beta = 0.78$, $SE = 0.31$, $p < 0.05$) and the *Democratic Governor: National Security* ($\beta = 1.06$, $SE = 0.33$, $p < 0.05$) conditions were both significant and positive, meaning that these two experimental conditions influenced a respondent's view on whether reducing greenhouse gas emissions would have a positive impact on national security. The other two conditions were not significant. This is a main effect, and this model did not account for the party of the respondent. Further, Model 4 in Table 4.13 shows the results of the logistic regression model with control variables and the interactions between the experimental conditions and the political party of the respondent. If these interactions were to be significant, then there would be potential evidence of the hypothesis. However, the interactions were not significant (all four $p > 0.05$). Thus, there is no evidence to support H_4 based on the *Impact on National Security* model. However, there were interesting main effect results that I will discuss next.

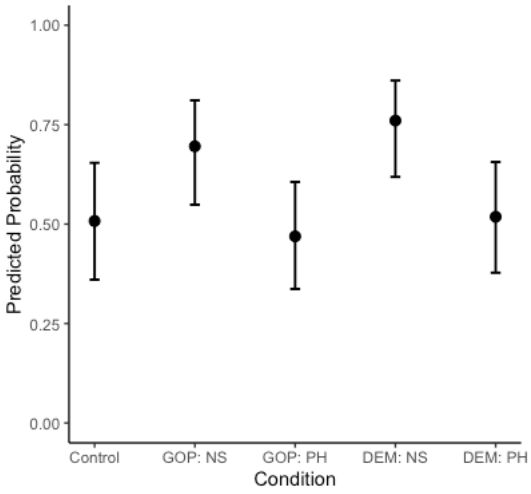
Table 4.13. Regression Results for Impact on National Security

	Dependent variable:			
	Impact on National Security			
	(1)	(2)	(3)	(4)
Age			-0.001	-0.001
			(0.01)	(0.01)
Income			-0.11	-0.11
			(0.20)	(0.20)
Education			1.26***	1.27***
			(0.21)	(0.21)
Race			-0.09	-0.07
			(0.21)	(0.22)
Sex			-0.001	0.05
			(0.20)	(0.20)
Party			-0.42**	-0.03
			(0.20)	(0.43)
GOP Governor: NS		0.78**	0.80**	1.39***
		(0.31)	(0.33)	(0.44)
GOP Governor: PH		-0.24	-0.15	-0.02
		(0.27)	(0.29)	(0.36)
Dem. Governor: NS		1.06***	1.12***	1.34***
		(0.33)	(0.34)	(0.44)
Dem. Governor: PH		-0.03	0.04	0.10
		(0.27)	(0.28)	(0.36)
Party x GOP Governor: NS				-1.44**
				(0.67)
Party x GOP Governor: PH				-0.30
				(0.59)
Party x Dem. Governor: NS				-0.53
				(0.69)
Party x Dem. Governor: PH				-0.10
				(0.59)
Constant	0.88***	0.64***	0.05	-0.14
	(0.09)	(0.20)	(0.39)	(0.43)

Observations	599	599	586	586
Log Likelihood	-362.72	-348.61	-323.81	-320.97
Akaike Inf. Crit.	727.44	707.22	669.62	671.93
Note:				*p<0.1; **p<0.05; ***p<0.01

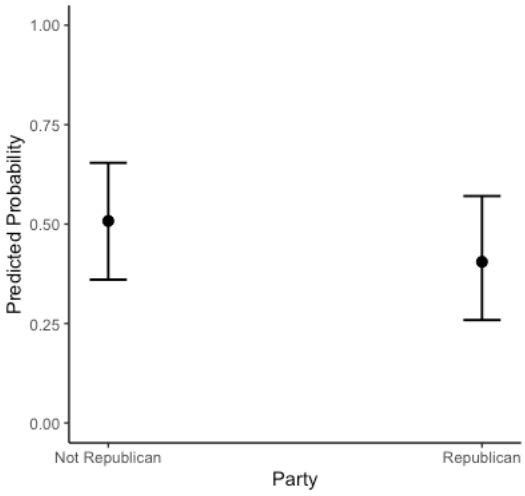
For the purposes of analyzing the main effect results, I selected Model 3 because it had the lowest AIC and BIC, and the interactions between political party and experimental conditions were not significant in Model 4. To start, there were two main effects from the experimental conditions that are worth mentioning. First, the *Republican Governor: National Security* condition was significant and positive ($\beta = 0.80$, $SE = 0.33$, $p < 0.05$), meaning that receiving this message increased positivity compared to the control group. Second, the *Democratic Governor: National Security* condition was significant and positive ($\beta = 1.12$, $SE = 0.34$, $p < 0.05$), meaning that receiving this message increased positivity compared to the control group. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between the experimental conditions. The predicted probability of holding the view that reducing greenhouse gas emissions would have a positive impact on national security for those in the control was 50.77%, compared to 69.56% for those receiving the Republican-governor national security message. This is nearly a 19-percentage point difference between the control and the experimental treatment. The predicted probability of someone holding a positive view for those receiving the Democratic-governor national security message was 76.01%. This is over a 25-percentage point increase. The key takeaway here is that receiving a national security message significantly increased the holding of the view that reducing greenhouse gas emissions would have a positive impact on national security. This marginal effect is shown in Figure 4.13.

Figure 4.13. *Predicted Probability of Impact on National Security Based on Condition*



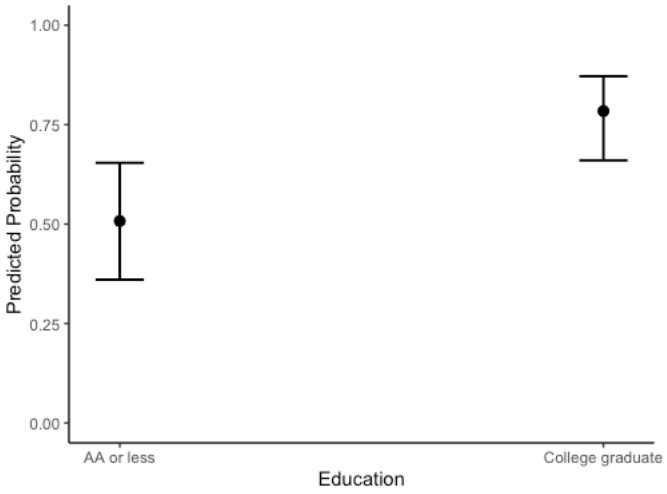
The variable *Party* was also significant and negative (β = -0.42, *SE* = 0.20, $p < 0.05$), meaning that Republicans were significantly less likely than non-Republicans to hold the view that reducing greenhouse gases would have a positive impact on national security. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between non-Republicans and Republicans. The predicted probability of holding the view that reducing greenhouse gas emissions would have a positive impact on national security was 50.77% for non-Republicans, compared to 40.50% for Republicans. Positivity among non-Republicans was more than ten-percentage points higher than for Republicans. This marginal effect plot is shown in Figure 4.14.

Figure 4.14. *Predicted Probability of Impact on National Security Based on Party*



Finally, the Education variable was also significant and positive ($\beta = 1.26$, $SE = 0.21$, $p < 0.05$), meaning that those with a college degree or higher were more likely than those with only an AA or less to believe that reducing greenhouse gas emissions would have a positive impact on national security. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between having an AA or less and having a college degree or more. The predicted probability of believing that reducing greenhouse gas emissions would have a positive impact on national security was 50.77% for those with an AA or less, compared to 78.41% for college graduates. Positivity among those with an AA or less was nearly 28-percentage points lower than among college graduates. This marginal effect plot is shown in Figure 4.15.

Figure 4.15. *Predicted Probability of Impact on National Security Based on Education*



H_5: Belief Considerations

In H_5, I made four predictions about how governor-messages would impact Republican-identifying individuals in their considerations about public health and national security when forming an opinion about climate change. I predicted that Republican-governor messages with a public health frame would lead to consideration of public health issues by Republican-identifying individuals; I predicted that all other conditions would lower considerations of both public health and national security. The theory behind this hypothesis is based on co-partisanship, as well as empirical findings that Republican-identifying individuals in previous studies responded positively to public health messages and negatively to national security messages (see Myers et al., 2012). I tested this hypothesis with two outcome variables: *Public Health Considerations* and *National Security Considerations*. For *Public Health Considerations*, I asked respondents if they considered public health when forming an opinion about climate change. All five conditions were included in the analysis. The cross tabulations of the experimental condition with the outcome variable are shown in Table 4.14 for Democrats and Independents and Table 4.15 for Republicans.

Table 4.14. Frequency Counts and Percentage for Public Health Considerations Among Subjects Identifying with Democrats or as Independents

Considered PH?	Random Group Assignment				
	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	4.62% (3)	6.67% (5)	4.71% (4)	1.33% (1)	11.24% (10)
Yes	95.38% (62)	93.33% (70)	95.29% (81)	98.67% (74)	88.76% (79)

χ^2 (4) = 7.86, $p > 0.05$

Table 4.15. Frequency Counts and Percentage for Public Health Considerations Among Subjects Identifying with Republicans

Considered PH?	Random Group Assignment				
	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	6.67 % (3)	16.22% (6)	9.30% (4)	17.07% (7)	13.33% (6)
Yes	93.33% (42)	83.78% (31)	90.70% (39)	82.93% (34)	86.67% (39)

χ^2 (4) = 3.11, $p > 0.05$

First, I will note that the outcome variable is heavily skewed towards considering public health, regardless of the experimental condition or of the party of the respondent. The lowest percentage of this view is among those in the *Democratic Governor: National Security* condition who identify as Republicans; still nearly 83% considered public health when making a decision about climate change. Second, Table 4.14 and Table 4.15 show that the experimental conditions were not significantly associated with a respondent's consideration of public health, for either non-Republican or Republican individuals. There were no statistical differences between the conditions among Democrats and Independents (χ^2 (4, N = 389) = 7.86, p > 0.05), or among Republicans (χ^2 (4, N = 211) = 3.11, p > 0.05). Although it is not statistically significant, Republican agreement was lower in the two national security conditions, which is in line with the boomerang effect hypothesis, which states that Republicans will respond negatively to national

security messages about climate change (Myers et al., 2012). Overall, the cross tabulations for the *Public Health Considerations* variable do not reveal support for the hypothesis.

I created several logistic regression models to further test for the potential of this association between the experimental condition and respondents' considerations when forming an opinion about climate change. The variable *Public Health Considerations* was coded as "0" for not agreeing with the statement and "1" for agreeing with the statement that a respondent considered public health when forming an opinion about climate change. Model 2 in Table 4.16 shows the results of the logistic regression model with only the experimental conditions as a predictor variable. The experimental conditions were not significant (all four $p > 0.05$), meaning that the party of the governor and the frame employed did not significantly impact whether a respondent agreed with the statement. Further, Model 4 in Table 4.16 shows the results of the logistic regression model with control variables and the interaction between the experimental condition and the political party of the respondent. If these interactions were to be significant, then there would be potential evidence of the hypothesis. However, these interactions were not significant (all four $p > 0.05$). Thus, there is no evidence to support H_5 based on the *Public Health Considerations* model. However, there was an interesting main effect result based on demographics that I will discuss next.

Table 4.16. Regression Results for Public Health Considerations

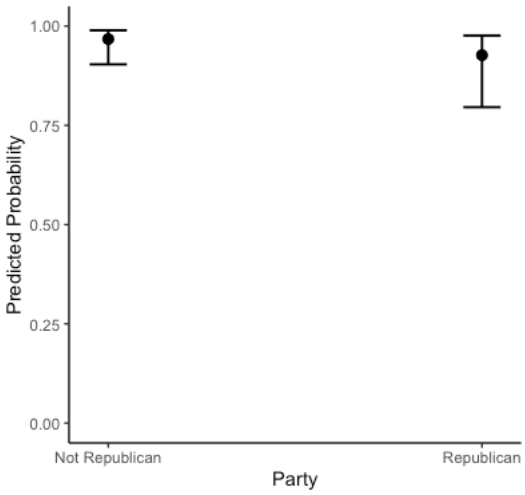
	Dependent variable:			
	Public Health Considerations			
	(1)	(2)	(3)	(4)
Age			-0.002	-0.004
			(0.01)	(0.01)
Income			0.10	0.12
			(0.31)	(0.31)

Education			0.48	0.45
			(0.34)	(0.34)
Race			-0.36	-0.33
			(0.36)	(0.37)
Sex			-0.42	-0.38
			(0.32)	(0.33)
Party			-0.85***	-0.39
			(0.31)	(0.84)
GOP Governor: NS		-0.63	-0.72	-0.43
		(0.53)	(0.54)	(0.76)
GOP Governor: PH		-0.14	-0.16	0.06
		(0.56)	(0.56)	(0.79)
Dem. Governor: NS		-0.25	-0.27	1.29
		(0.56)	(0.56)	(1.17)
Dem. Governor: PH		-0.85*	-0.89*	-0.90
		(0.50)	(0.50)	(0.68)
Party x GOP Governor: NS				-0.53
				(1.07)
Party x GOP Governor: PH				-0.40
				(1.12)
Party x Dem. Governor: NS				-2.32*
				(1.38)
Party x Dem. Governor: PH				0.15
				(1.01)
Constant	2.42***	2.85***	3.44***	3.26***
	(0.15)	(0.42)	(0.71)	(0.81)
Observations	601	601	588	588
Log Likelihood	-169.78	-167.40	-160.17	-157.31
Akaike Inf. Crit.	341.56	344.80	342.34	344.62
Note:			*p<0.1; **p<0.05; ***p<0.01	

For the purposes of analyzing the main effect result, I selected Model 3 because it had a lower AIC and BIC than Model 4, and the interactions between political party and experimental

conditions were not significant in Model 4. Statistically, Model 1 is preferable based on BIC and AIC, but because *Party* was significant and a key theoretical driver of the research, I analyzed that main effect result. I wanted to know if considering public health when making a decision about climate change was influenced by the political party of the respondent. An individual's *Party* was significant and negative (β = -0.85, SE = 0.31, $p < 0.05$), meaning that considerations of public health were lower among Republicans than non-Republicans. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between non-Republicans and Republicans. The predicted probability of considering public health by non-Republican individuals was 96.74%, compared to 92.68% for Republicans. Levels of agreement were high across the political spectrum, but agreement among non-Republicans was roughly four-percentage points higher than Republicans. This marginal effect is shown in Figure 4.16.

Figure 4.16. *Predicted Probability of Public Health Considerations Based on Party*



To further investigate the belief considerations hypothesis, I assessed considerations of national security when forming an opinion about climate change among respondents. For *National Security Considerations*, I asked respondents if they considered national security when forming an opinion about climate change. All five conditions were included in the analysis. The cross tabulation of the experimental conditions with the outcome variable are shown in Table 4.17 for Democrats and Independents and Table 4.18 for Republicans.

Table 4.17. Frequency Counts and Percentage for National Security Considerations Among Subjects Identifying with Democrats or as Independents

	Random Group Assignment				
Considered NS?	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	43.75% (28)	41.33% (31)	57.65% (49)	33.33% (25)	55.17% (48)
Yes	56.25% (36)	58.67% (44)	42.35% (36)	66.67% (50)	44.83% (39)

χ^2 (4) = 13.06, $p < 0.05$

Table 4.18. Frequency Counts and Percentage for National Security Considerations Among Subjects Identifying with Republicans

	Random Group Assignment				
Considered NS?	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	33.33% (15)	32.43% (12)	30.23% (13)	24.39% (10)	25.00% (11)
Yes	66.67% (30)	67.57% (25)	69.77% (30)	75.61% (31)	75.00% (33)

χ^2 (4) = 1.42, $p > 0.05$

First, I will note that the outcome variable was more uniformly distributed between the two choices than other variables, but more than two-thirds of all Republicans and at least 42% of all non-Republicans considered national security when making a decision about climate change. The percentage of those having this view peaked at 75.61% in the *Democratic Governor: National Security* condition among Republicans. The lowest level of agreement was 42.35%

among Democrats in the *Republican Governor: Public Health* condition. Overall, Republicans were more likely than Democrats to consider national security, which is in line with prior public opinion research about how Republicans tend to place a higher priority on national security issues like terrorism than Democrats (Pew Research Center, 2021). Second, Table 4.17 and Table 4.18 show that the experimental conditions were significantly associated with a non-Republican respondent's consideration of national security (χ^2 (4, N = 386) = 13.06, p < 0.05). The highest percentage of non-Republican individuals considering national security was in the *Democratic Governor: National Security* group. Although I did not make hypotheses about non-Republicans, this does provide some support for the notion of co-partisanship; consideration of national security by Democrats and Independents in the *Democratic Governor: National Security* condition was 10-percentage points higher than those in the *Control*. For Republicans, however, the experimental conditions were not significantly associated with considering national security (χ^2 (4, N = 210) = 1.42, p > 0.05). Overall, the cross tabulations for the *National Security Considerations* variable do not reveal support for the hypothesis.

I created several logistic regression models to further test for the potential of this association between the experimental condition and respondents' attitudes on whether they considered national security when making a decision about climate change. The variable *National Security Considerations* was coded as "0" for not agreeing with the statement and "1" for agreeing with the statement that a respondent considered national security when forming an opinion about climate change. Model 2 in Table 4.19 shows the results of the logistic regression model with only the experimental conditions as a predictor variable. None of the experimental conditions were significant (all four $p > 0.05$). Further, Model 4 in Table 4.19 shows the results of the logistic regression model with control variables and the interactions between the

experimental conditions and the political party of the respondent. If these interactions were to be significant, then there would be potential evidence of the hypothesis. However, the interactions were not significant (all four $p > 0.05$). Thus, there is no evidence to support H_5 based on the *National Security Considerations* model. However, there were interesting main effect results that I will discuss next.

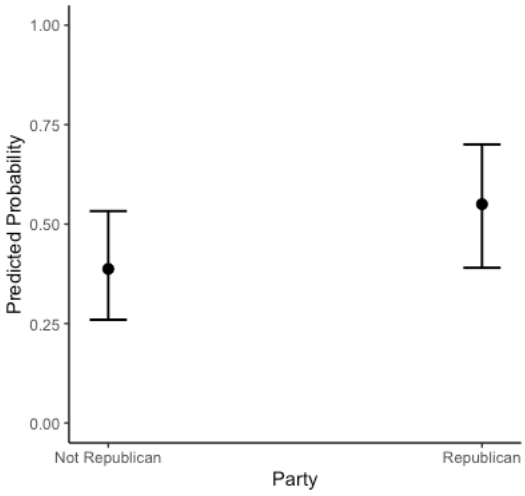
Table 4.19. Regression Results for National Security Considerations

	Dependent variable:			
	National Security Considerations			
	(1)	(2)	(3)	(4)
Age			0.01	0.01
			(0.01)	(0.01)
Income			0.05	0.04
			(0.19)	(0.19)
Education			1.27***	1.27***
			(0.20)	(0.20)
Race			-0.50**	-0.49**
			(0.21)	(0.21)
Sex			0.12	0.17
			(0.18)	(0.19)
Party			0.66***	0.31
			(0.20)	(0.43)
GOP Governor: NS		0.06	0.07	0.09
		(0.28)	(0.30)	(0.36)
GOP Governor: PH		-0.37	-0.23	-0.49
		(0.26)	(0.28)	(0.35)
Dem. Governor: NS		0.41	0.50*	0.46
		(0.28)	(0.30)	(0.37)
Dem. Governor: PH		-0.23	-0.14	-0.42
		(0.26)	(0.28)	(0.35)
Party x GOP Governor: NS				-0.14
				(0.62)

Party x GOP Governor: PH				0.78
				(0.60)
Party x Dem. Governor: NS				0.05
				(0.63)
Party x Dem. Governor: PH				0.86
				(0.61)
Constant	0.38***	0.43**	-0.74*	-0.60
	(0.08)	(0.20)	(0.38)	(0.41)
Observations	597	597	585	585
Log Likelihood	-403.05	-398.02	-356.97	-354.60
Akaike Inf. Crit.	808.10	806.04	735.93	739.20
Note:				*p<0.1; **p<0.05; ***p<0.01

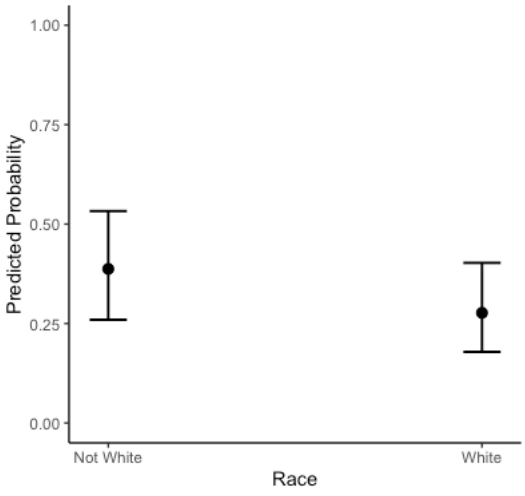
For the purposes of analyzing the main effect results, I selected Model 3 because it had the lowest AIC and BIC among the models, and the interactions between political party and experimental conditions were not significant in Model 4. I wanted to know if considering national security when making a decision about climate change was influenced by the political party of the respondent. An individual's *Party* was significant and positive ($\beta = 0.66$, $SE = 0.20$, $p < 0.05$), meaning that considerations of national security were higher among Republicans than non-Republicans. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between non-Republicans and Republicans. The predicted probability of considering national security by non-Republican individuals was 38.82%, compared to 55.11% for Republicans. Considering national security among non-Republicans was roughly 16-percentage points lower than Republicans. This marginal effect is shown in Figure 4.17.

Figure 4.17. *Predicted Probability of National Security Considerations Based on Party*



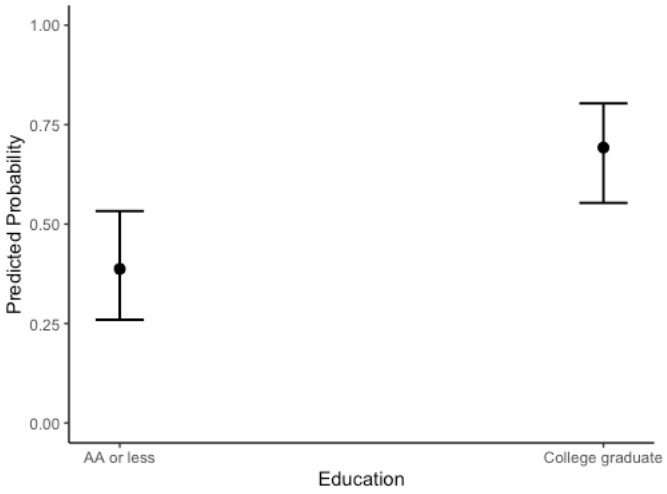
The variable *Race* was also significant and negative (β = -0.50, *SE* = 0.21, $p < 0.05$), meaning that non-whites were significantly more likely to consider national security than whites. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between non-whites and whites. The predicted probability of considering national security by non-white individuals was 38.82%, compared to 27.77% for whites. Considering national security among non-whites was roughly 11-percentage points higher than whites. This marginal effect is shown in Figure 4.18.

Figure 4.18. *Predicted Probability of National Security Considerations Based on Race*



Finally, the variable *Education* was also significant and positive ($\beta = 1.27$, $SE = 0.20$, $p < 0.05$), meaning that those with at least a college degree were significantly more likely to consider national security than those with an AA degree or less. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between having an AA or less and having a college degree or more. The predicted probability of considering national security by those with an AA or less was 38.82%, compared to 69.32% for college graduates. Considering national security among those with an AA or less was greater than 30-percentage points lower than college graduates. This marginal effect is shown in Figure 4.19.

Figure 4.19. *Predicted Probability of National Security Considerations Based on Education*



H_6: Emotion

In H_6, I made two predictions about how governor-messages would impact Republican-identifying individuals in their emotional reactions to reading the message about climate change. I predicted that Republican-governor messages with a public health frame would lead to less anger, less fear, and more hope among Republican-identifying individuals; I predicted that all other conditions would evoke more anger, more fear, and less hope. The theory behind this hypothesis is based on co-partisanship, as well as empirical findings that Republican-identifying individuals in previous studies responded positively to public health messages and negatively to national security messages (see Myers et al., 2012). I tested this hypothesis with three outcome variables: *Anger*, *Fear*, and *Hope*. For *Anger*, I asked respondents if they experienced anger while reading the news story about climate change. All five conditions were included in the analysis. The cross tabulations of the experimental conditions with the outcome variable are shown in Table 4.20 for Democrats and Independents and Table 4.21 for Republicans.

Table 4.20. Frequency Counts and Percentage for Anger Among Subjects Identifying with Democrats or as Independents

	Random Group Assignment				
Experienced anger?	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	53.85% (35)	68.00% (51)	68.24% (58)	70.67% (53)	67.42% (60)
Yes	46.15% (30)	32.00% (24)	31.76% (27)	29.33% (22)	32.58% (29)

χ^2 (4) = 5.41, $p > 0.05$

Table 4.21. Frequency Counts and Percentage for Anger Among Subjects Identifying with Republicans

	Random Group Assignment				
Experienced anger?	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	42.22% (19)	40.54% (15)	46.51% (20)	43.90% (18)	44.44% (20)
Yes	57.78% (26)	59.46% (22)	53.49% (23)	56.10% (23)	55.56% (25)

χ^2 (4) = 0.34, $p > 0.05$

First, I will note that there is more variation in the dependent variable *Anger* than in some of the other variables. Less than half of Democrats and Independents across conditions experienced anger, while more than half of Republicans said they experienced anger while reading the news story. The highest amount of anger was shown by Republicans in the *Republican Governor: National* Security condition at 59.46%. This could be explained by the boomerang effect: Republican respondents are reacting negatively to an in-group member who is tying an argument they care deeply about (national security) to one they do not (climate change). The lowest percentage of anger was among those in the *Democratic Governor: National Security* condition who identify as Democrats or Independents; over 70% said they did not experience anger. Second, Table 4.20 and Table 4.21 show that the experimental conditions were not significantly associated with a respondent's emotional response of anger, for either non-Republican or Republican individuals. There were no statistical differences between the

conditions among Democrats and Independents (χ^2 (4, N = 389) = 5.41, p > 0.05), or among Republicans (χ^2 (4, N = 211) = 0.34, p > 0.05). Overall, the cross tabulations for the *Anger* variable do not reveal support for the hypothesis.

I created several logistic regression models to further test for the potential of this association between the experimental condition and respondents' emotions when reading the news story about climate change. The variable *Anger* was coded as "0" for not experiencing the emotion and "1" for experiencing anger. Model 2 in Table 4.22 shows the results of the logistic regression model with only the experimental conditions as a predictor variable. The experimental conditions were not significant (all four $p > 0.05$), meaning that the party of the governor and the frame employed did not significantly impact whether a respondent was angered by the message. Further, Model 4 in Table 4.22 shows the results of the logistic regression model with control variables and the interaction between the experimental condition and the political party of the respondent. If these interactions were to be significant, then there would be potential evidence of the hypothesis. However, these interactions were not significant (all four $p > 0.05$). Thus, there is no evidence to support H_6 based on the *Anger* model. However, there were interesting main effect results based on demographics that I will discuss next.

Table 4.22. Regression Results for Anger

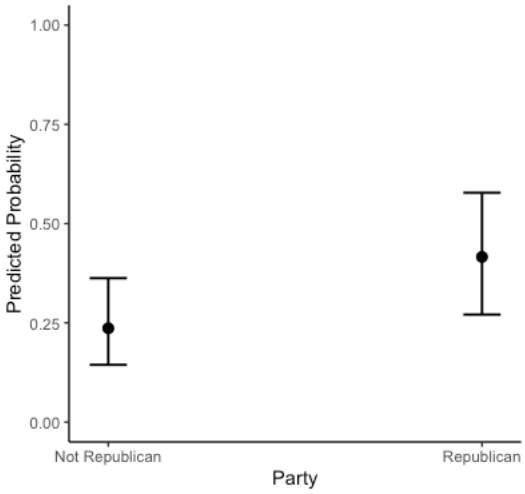
	Dependent variable:			
	Anger			
	(1)	(2)	(3)	(4)
Age			-0.01	-0.01
			(0.01)	(0.01)
Income			-0.44**	-0.45**
			(0.19)	(0.19)
Education			1.34***	1.34***

			(0.22)	(0.22)
Race			0.01	0.01
			(0.20)	(0.20)
Sex			0.19	0.19
			(0.18)	(0.19)
Party			0.83***	0.46
			(0.19)	(0.42)
GOP Governor: NS		-0.38	-0.39	-0.56
		(0.27)	(0.29)	(0.37)
GOP Governor: PH		-0.48*	-0.38	-0.55
		(0.26)	(0.28)	(0.36)
Dem. Governor: NS		-0.49*	-0.54*	-0.79**
		(0.27)	(0.29)	(0.38)
Dem. Governor: PH		-0.43*	-0.38	-0.52
		(0.26)	(0.28)	(0.35)
Party x GOP Governor: NS				0.44
				(0.61)
Party x GOP Governor: PH				0.42
				(0.58)
Party x Dem. Governor: NS				0.64
				(0.60)
Party x Dem. Governor: PH				0.35
				(0.57)
Constant	-0.33***	0.04	-0.84**	-0.70*
	(0.08)	(0.19)	(0.39)	(0.42)
Observations	601	601	588	588
Log Likelihood	-408.72	-406.39	-360.67	-360.06
Akaike Inf. Crit.	819.44	822.79	743.35	750.11
Note:			*p<0.1; **p<0.05; ***p<0.01	

For the purposes of analyzing the main effect results, I selected Model 3 because it had the lowest AIC and BIC, and the interactions between political party and experimental conditions

were not significant in Model 4. I wanted to know if being angered by the news story was influenced by the political party of the respondent. An individual's *Party* was significant and positive ($\beta = 0.83$, $SE = 0.19$, $p < 0.05$), which means that anger was higher among Republicans than non-Republicans. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between non-Republicans and Republicans. The predicted probability of experiencing anger by non-Republican individuals was 23.57%, compared to 41.51% for Republicans. The experience of anger by non-Republicans was roughly 18-percentage points lower than for Republicans. This marginal effect is shown in Figure 4.20.

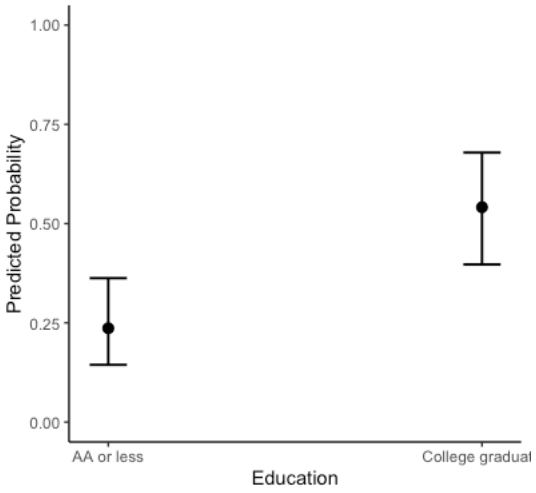
Figure 4.20. *Predicted Probability of Anger Based on Party*



The variable *Education* was also significant and positive ($\beta = 1.34$, $SE = 0.22$, $p < 0.05$), meaning that those with a college degree were significantly more likely to express anger than those with an AA degree or less. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between having an AA or less and having a college degree or more. The predicted probability of evoking anger was 23.57% for those with an AA or less, compared to 54.02% for college graduates. The experience of anger by those with

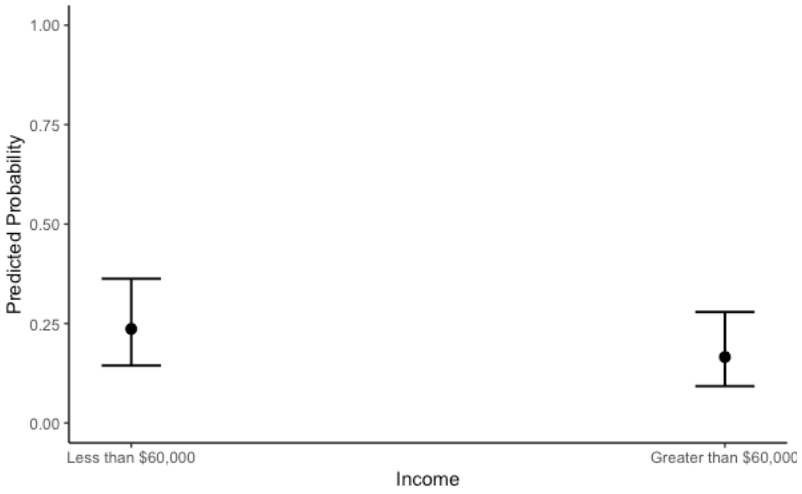
an AA or less was more than 30-percentage points lower than those with at least a college degree. This marginal effect plot is shown in Figure 4.21.

Figure 4.21. *Predicted Probability of Anger Based on Education*



Finally, the *Income* variable was also significant and negative (β = -0.44, *SE* = 0.19, $p <$ 0.05), meaning that those making $60,000 or more per year expressed less anger than those who made less than $60,000 per year. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between those making less than $60,000 per year and those making more than $60,000 per year. The predicted probability of expressing anger for those making less than $60,000 per year was 41.93%, compared to 16.51% for those making more than $60,000 per year. The experience of anger by those making less than $60,000 per year was over 25-percentage points higher than those making more than $60,000 per year. This marginal effect plot is shown in Figure 4.22.

Figure 4.22. *Predicted Probability of Anger Based on Income*



To further investigate the emotional response hypothesis, I assessed expressions of fear by respondents. For *Fear*, I asked respondents if they experienced fear when reading the news story about climate change. All five conditions were included in the analysis. The cross tabulation of the experimental conditions with the outcome variable are shown in Table 4.23 for Democrats and Independents and Table 4.24 for Republicans.

Table 4.23. Frequency Counts and Percentage for Fear Among Subjects Identifying with Democrats or as Independents

	Random Group Assignment				
Experienced fear?	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	40.62% (26)	66.22% (49)	61.90% (52)	56.00% (42)	51.69% (46)
Yes	59.38% (38)	33.78% (25)	38.10% (32)	44.00% (33)	48.31% (43)

χ^2 (4) = 11.11, $p < 0.05$

Table 4.24. Frequency Counts and Percentage for Fear Among Subjects Identifying with Republicans

Experienced fear?	Random Group Assignment				
	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	60.00% (27)	43.24% (16)	44.19% (19)	46.34% (19)	35.56% (16)
Yes	40.00% (18)	56.76% (21)	55.81% (24)	53.66% (22)	64.44% (29)

χ^2 (4) = 5.70, $p > 0.05$

First, I will note that the outcome variable was more uniformly distributed between the two choices, yet differences emerged among conditions and between parties. The percentage of those expressing fear peaked at 64.44% in the *Democratic Governor: Public Health* condition among Republicans. The lowest level of fear was 33.78% among Democrats in the *Republican Governor: Public Health* condition. Interestingly, fear decreased in every condition when compared to the control for Democrats and Independents but increased in every condition when compared to the control for Republicans. Second, Table 4.23 and Table 4.24 show that the experimental conditions were significantly associated with a non-Republican respondent's expression of fear (χ^2 (4, N = 386) = 11.11, p < 0.05). For Republicans, however, the experimental conditions were not significantly associated with expressing fear (χ^2 (4, N = 211) = 5.70, p > 0.05). Overall, the cross tabulations for the *Fear* variable do not reveal support for the hypothesis because the conditions were not significant among Republicans.

I created several logistic regression models to further test for the potential of this association between the experimental condition and the emotional response of respondents when reading the news story about climate change. The variable *Fear* was coded as "0" for not experiencing the emotion and "1" for experiencing fear when reading the news story about climate change. Model 2 in Table 4.25 shows the results of the logistic regression model with only the experimental conditions as a predictor variable. None of the experimental conditions

were significant (all four $p > 0.05$). Further, Model 4 in Table 4.25 shows the results of the logistic regression model with control variables and the interactions between the experimental conditions and the political party of the respondent. If these interactions were to be significant, then there would be potential evidence of the hypothesis. All four of the interactions were significant, and I will discuss each one of those now. The *Republican Governor: National Security* condition was significant and positive ($\beta = 1.75$, $SE = 0.60$, $p < 0.05$), the *Republican Governor: Public Health* condition was significant and positive ($\beta = 1.60$, $SE = 0.58$, $p < 0.05$), the *Democratic Governor: National Security* condition was significant and positive ($\beta = 1.31$, $SE = 0.58$, $p < 0.05$), and the *Democratic Governor: Public Health* condition was significant and positive ($\beta = 1.43$, $SE = 0.57$, $p < 0.05$). For this hypothesis, I interpreted the results for Model 4 because it had the lowest AIC, and all four interactions were significant. The intercept-only model (Model 1) did have the lowest BIC.

Table 4.25. Regression Results for Fear

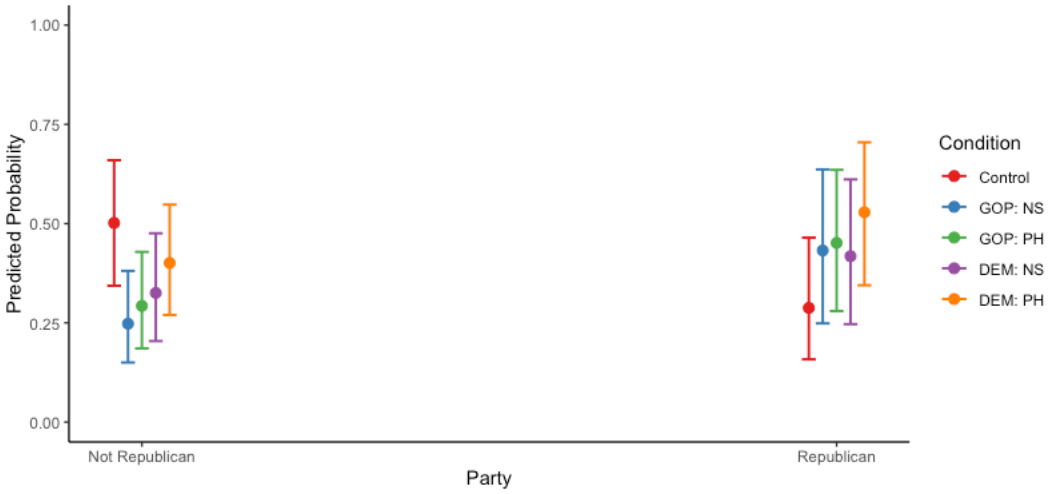
	Dependent variable:			
	Fear			
	(1)	(2)	(3)	(4)
Age			-0.01	-0.01
			(0.01)	(0.01)
Income			-0.31*	-0.31*
			(0.18)	(0.18)
Education			1.08***	1.09***
			(0.20)	(0.20)
Race			-0.05	-0.07
			(0.19)	(0.20)
Sex			-0.25	-0.25
			(0.18)	(0.18)
Party			0.31*	-0.91**

			(0.18)	(0.42)
GOP Governor: NS		-0.38	-0.44	-1.12***
		(0.27)	(0.28)	(0.37)
GOP Governor: PH		-0.29	-0.26	-0.89**
		(0.26)	(0.27)	(0.35)
Dem. Governor: NS		-0.16	-0.20	-0.74**
		(0.27)	(0.28)	(0.36)
Dem. Governor: PH		0.09	0.16	-0.41
		(0.26)	(0.27)	(0.35)
Party x GOP Governor: NS				1.75***
				(0.60)
Party x GOP Governor: PH				1.60***
				(0.58)
Party x Dem. Governor: NS				1.31**
				(0.58)
Party x Dem. Governor: PH				1.43**
				(0.57)
Constant	-0.09	0.06	-0.20	0.34
	(0.08)	(0.19)	(0.37)	(0.41)
Observations	598	598	586	586
Log Likelihood	-413.94	-411.59	-384.51	-378.71
Akaike Inf. Crit.	829.87	833.18	791.03	787.43
Note:				*p<0.1; **p<0.05; ***p<0.01

It is difficult to interpret an interaction effect without a figure, so I displayed the predicted probabilities of each condition in Figure 4.23. As shown in Figure 4.23, the experimental conditions reduced fear among non-Republicans when compared to the control, which is in line with the cross tabulations in Tables 4.23 and 4.24. Republicans, as seen in Figure 4.23, were more likely to express fear in every condition when compared to the control, which is also in line with the cross tabulations (although the chi-square test was not significant for Republicans). I found partial support for my hypothesis because the predicted probability of fear

in the *Republican Governor National Security* condition among Republicans (43.11%) was higher than in the *Control* (28.68%). Likewise, the predicted probabilities of fear in the *Democratic Governor: National Security* (41.68%) and *Democratic Governor: Public Health* (52.74%) conditions were higher among Republicans than the *Control* (28.68%). However, I predicted that the *Republican Governor: Public Health* condition (45.03%) should have lowered levels of fear among Republicans compared to the *Control* (28.68%). This was not the case; thus, I found no support for H_6 based on the *Fear* variable. I will discuss one additional main effect result from Model 4.

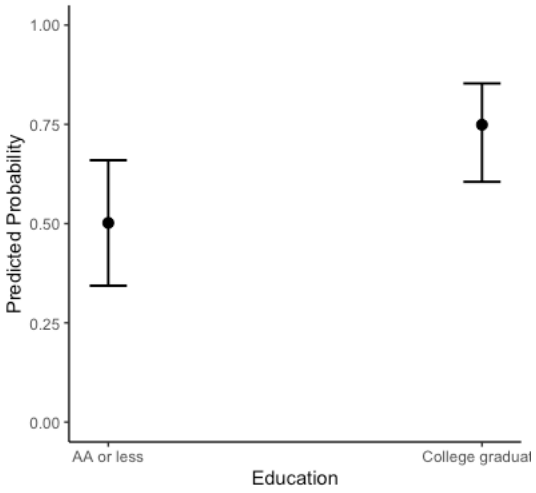
Figure 4.23. *Predicted Probability of Fear Based on the Interaction of Party by Condition*



Finally, the *Education* variable was also significant and positive ($\beta = 1.09$, $SE = 0.20$, $p < 0.05$), meaning that those with at least a college degree experienced more fear than those with an AA degree or less. To visually demonstrate this result, I created a marginal effect plot that shows the change in probability when moving from one category to another. In the case of *Education*, the marginal effect shows the change in probability when moving from someone with an AA degree or less to being at least a college graduate. The predicted probability of experiencing fear

for those with an AA degree or less was 50.01%, compared to 74.82% for college graduates. The experience of fear was nearly 25-percentage points lower for those with an AA or less compared to college graduates. This marginal effect plot is shown in Figure 4.24.

Figure 4.24. *Predicted Probability of Fear Based on Education*



To further investigate the emotional response hypothesis, I assessed emotions of hope evoked by respondents. For *Hope*, I asked respondents if they experienced hope when reading the news story about climate change. All five conditions were included in the analysis. The cross tabulation of the experimental conditions with the outcome variable are shown in Table 4.26 for Democrats and Independents and Table 4.27 for Republicans.

Table 4.26. Frequency Counts and Percentage for Hope Among Subjects Identifying with Democrats or as Independents

	Random Group Assignment				
Experienced hope?	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	52.31% (34)	58.11% (43)	65.88% (56)	69.33% (52)	68.54% (61)
Yes	47.69% (31)	41.89% (31)	34.12% (29)	30.67% (23)	31.46% (28)

χ^2 (4) = 6.72, $p > 0.05$

Table 4.27. Frequency Counts and Percentage for Hope Among Subjects Identifying with Republicans

	Random Group Assignment				
Experienced hope?	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	43.18% (19)	40.54% (15)	53.49% (23)	41.46% (17)	42.22% (19)
Yes	56.82% (25)	59.46% (22)	46.51% (20)	58.54% (24)	57.78% (26)

χ^2 (4) = 1.92, $p > 0.05$

First, I will note that the outcome variable was more uniformly distributed between the two choices, but there are some differences to note. The percentage of those expressing hope peaked at 59.46% in the *Republican Governor: National Security* condition among Republicans. The lowest level of hope expressed was 30.67% among Democrats in the *Democratic Governor: National Security* condition. Interestingly, hope decreased in every condition when compared to the control for Democrats and Independents but increased in three of four conditions when compared to the control for Republicans. Second, Table 4.26 and Table 4.27 show that the experimental conditions were not significantly associated with a non-Republican respondent's experiencing of hope (χ^2 (4, N = 388) = 6.72, p > 0.05) or for Republicans (χ^2 (4, N = 210) = 1.92, p > 0.05). Thus, between the experimental conditions and within parties there were no statistically significant differences. Overall, the cross tabulations for the *Hope* variable do not reveal support for the hypothesis.

I created several logistic regression models to further test for the potential of this association between the experimental condition and the emotional response of respondents when reading the news story about climate change. The variable *Hope* was coded as "0" for not experiencing the emotion and "1" for experiencing hope when reading the news story about climate change. Model 2 in Table 4.28 shows the results of the logistic regression model with only the experimental conditions as a predictor variable. *The Republican Governor: Public Health* condition was significant and negative (β = -0.53, SE = 0.26, $p < 0.05$), meaning that this message evoked less hope among individuals than the *Control*. This was a main effect result and did not take into account the party of the respondent. The other three experimental conditions were not significant (all three $p > 0.05$). Furthermore, Model 4 in Table 4.28 shows the results of the logistic regression model with control variables and the interactions between the experimental conditions and the political party of the respondent. If these interactions were to be significant, then there would be potential evidence of the hypothesis. None of the interactions were significant (all four $p > 0.05$). Thus, there is no evidence to support H_6 based on the *Hope* model. However, there were some interesting main effect results based on demographics that I will discuss next.

Table 4.28. Regression Results for Hope

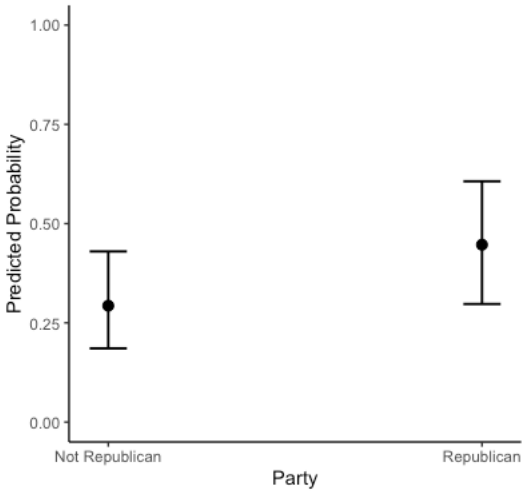
	Dependent variable:			
	Hope			
	(1)	(2)	(3)	(4)
Age			0.01	0.01
			(0.01)	(0.01)
Income			-0.31*	-0.31*
			(0.18)	(0.18)
Education			1.28***	1.28***

			(0.21)	(0.21)
Race			-0.08	-0.08
			(0.20)	(0.20)
Sex			-0.01	0.002
			(0.18)	(0.18)
Party			0.67***	0.33
			(0.19)	(0.42)
GOP Governor: NS		-0.13	-0.19	-0.26
		(0.27)	(0.29)	(0.36)
GOP Governor: PH		-0.53**	-0.52*	-0.56
		(0.26)	(0.28)	(0.35)
Dem. Governor: NS		-0.44	-0.50*	-0.84**
		(0.27)	(0.29)	(0.37)
Dem. Governor: PH		-0.45*	-0.44	-0.66*
		(0.26)	(0.28)	(0.35)
Party x GOP Governor: NS				0.15
				(0.60)
Party x GOP Governor: PH				0.09
				(0.58)
Party x Dem. Governor: NS				0.86
				(0.60)
Party x Dem. Governor: PH				0.57
				(0.57)
Constant	-0.27***	0.06	-1.18***	-1.06**
	(0.08)	(0.19)	(0.38)	(0.41)
Observations	599	599	586	586
Log Likelihood	-409.97	-406.90	-366.75	-365.19
Akaike Inf. Crit.	821.94	823.79	755.49	760.38
Note:				*p<0.1; **p<0.05; ***p<0.01

For the purpose of analyzing the main effect results, I selected Model 3 because it had the lowest AIC and BIC, and the interactions between political party and experimental conditions were not significant in Model 4. I wanted to know if feeling hopeful was influenced by the

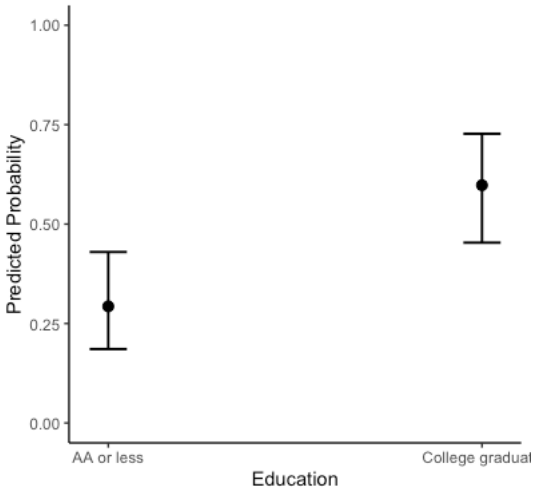
political party of the respondent. An individual's *Party* was significant and positive ($\beta = 0.67$, $SE = 0.19$, $p < 0.05$), which means that hope was higher among Republicans than non-Republicans. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between non-Republicans and Republicans. The predicted probability of experiencing hope by non-Republican individuals was 29.39%, compared to 44.78% for Republicans. The experience of hope by non-Republicans was more than 15-percentage points lower than Republicans. This marginal effect is shown in Figure 4.25.

Figure 4.25. *Predicted Probability of Hope Based on Party*



Finally, the *Education* variable was also significant and positive ($\beta = 1.28$, $SE = 0.21$, $p < 0.05$), meaning that those with a college degree or higher were more likely than those with only an AA or less to experience hope. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between having an AA degree or less and having a college degree or more. The predicted probability of hope was 29.39% for those with an AA or less, compared to 59.88% for college graduates. The difference between the two groups is more than 30-percentage points. This marginal effect plot is shown in Figure 4.26.

Figure 4.26. *Predicted Probability of Hope Based on Education*



H_7: Behavior

In H_7, I made two predictions about how governor-messages would impact climate-friendly behaviors among Republican-identifying individuals. I predicted that Republican-governor messages with a public health frame would lead to more climate-friendly behaviors among Republicans; I predicted that all other conditions would produce less climate-friendly behaviors. The theory behind this hypothesis is based on co-partisanship, as well as empirical findings that Republican-identifying individuals in previous studies responded positively to public health messages and negatively to national security messages (see Myers et al., 2012). I tested this hypothesis with three outcome variables: *Recycle*, *Energy*, and *Carpool*. For *Recycle*, I asked respondents if they agreed with the statement that they would recycle more in the future. All five conditions were included in the analysis. The cross tabulations of the experimental condition with the outcome variable are shown in Table 4.29 for Democrats and Independents and Table 4.30 for Republicans.

Table 4.29. Frequency Counts and Percentage for Recycle Among Subjects Identifying with Democrats or as Independents

Will recycle?	Random Group Assignment				
	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	12.31% (8)	12.00% (9)	8.24% (7)	13.33% (10)	11.24% (10)
Yes	87.69% (57)	88.00% (66)	91.76% (78)	86.67% (65)	88.76% (79)

χ^2 (4) = 1.21, $p > 0.05$

Table 4.30. Frequency Counts and Percentage for Recycle Among Subjects Identifying with Republicans

Will recycle?	Random Group Assignment				
	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	6.67% (3)	5.41% (2)	18.60% (8)	7.32% (3)	11.11% (5)
Yes	93.33% (42)	94.59% (35)	81.40% (35)	92.68% (38)	88.89% (40)

χ^2 (4) = 5.37, $p > 0.05$

First, I will note that there is little variation in the dependent variable *Recycle*. At least 86.67% of Democrats and Independents and 81.40% of all Republicans agreed that they planned to recycle more in the future. The highest amount of planned recycling was among Republicans in the *Republican Governor: National* Security condition at 94.59%, which is interesting because it goes against the boomerang effect hypothesis. The lowest percentage of planned recycling was in the *Republican Governor: Public Health* condition among those who identify as Republicans; this is contrary to both the co-partisanship hypothesis and that public health should lead to more support among Republicans. Second, Table 4.29 and Table 4.30 show that the experimental conditions were not significantly associated with a respondent's future recycling intentions, for either non-Republican or Republican individuals. This means that we should be cautious in reading any differences into the groups. There were no statistical differences between the conditions among Democrats and Independents (χ^2 (4, N = 389) = 1.21, p > 0.05), or among

Republicans (χ^2 (4, N = 211) = 5.37, p > 0.05). Overall, the cross tabulations for the *Recycle* variable do not reveal support for the hypothesis.

I created several logistic regression models to further test for the potential of this association between the experimental condition and respondents' potential climate-friendly behaviors. The variable *Recycle* was coded as "0" for not agreeing with the statement and "1" for agreeing with the statement that the respondent planned to recycle more in the future. Model 2 in Table 4.31 shows the results of the logistic regression model with only the experimental conditions as a predictor variable. The experimental conditions were not significant (all four p > 0.05), meaning that the party of the governor and the frame employed did not significantly impact whether a respondent was willing to recycle more in the future. Further, Model 4 in Table 4.31 shows the results of the logistic regression model with control variables and the interaction between the experimental condition and the political party of the respondent. If these interactions were to be significant, then there would be potential evidence of the hypothesis. However, these interactions were not significant (all four p > 0.05). Thus, there is no evidence to support H_7 based on the *Recycle* model. However, there were interesting main effect results based on demographics that I will discuss next.

Table 4.31. Regression Results for Recycle

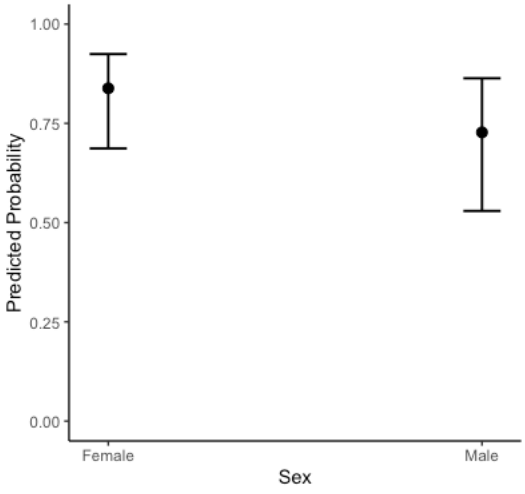
	Dependent variable:			
	Recycle			
	(1)	(2)	(3)	(4)
Age			-0.003	-0.002
			(0.01)	(0.01)
Income			0.24	0.25
			(0.28)	(0.28)
Education			0.60**	0.61**

			(0.29)	(0.29)
Race			0.54*	0.52*
			(0.28)	(0.28)
Sex			-0.66**	-0.70**
			(0.29)	(0.29)
Party			0.12	0.69
			(0.29)	(0.72)
GOP Governor: NS		0.03	0.09	0.11
		(0.45)	(0.47)	(0.54)
GOP Governor: PH		-0.18	-0.04	0.53
		(0.42)	(0.43)	(0.56)
Dem. Governor: NS		-0.13	-0.03	0.01
		(0.43)	(0.44)	(0.52)
Dem. Governor: PH		-0.13	-0.03	0.24
		(0.42)	(0.43)	(0.52)
Party x GOP Governor: NS				0.07
				(1.09)
Party x GOP Governor: PH				-1.55*
				(0.92)
Party x Dem. Governor: NS				-0.05
				(1.00)
Party x Dem. Governor: PH				-0.80
				(0.93)
Constant	2.11***	2.20***	1.74***	1.56***
	(0.13)	(0.32)	(0.57)	(0.60)
Observations	601	601	588	588
Log Likelihood	-205.92	-205.74	-192.58	-190.15
Akaike Inf. Crit.	413.85	421.49	407.16	410.30
Note:			*p<0.1; **p<0.05; ***p<0.01	

For the purposes of analyzing the main effect results, I selected Model 3 because it had the lowest AIC and the interactions between political party and experimental conditions were not significant in Model 4. To begin with, I wanted to know if recycling behavior was influenced by

the political party of the respondent. Interestingly, an individual's *Party* was not significant (β = 0.12, SE = 0.29, $p > 0.05$), meaning that intentions to recycle were the same for Republicans and non-Republicans alike. Next, I wanted to know if there was an association between the sex of the respondent and their intentions to recycle. The variable *Sex* was significant and negative (β = -0.66, SE = 0.29, $p < 0.05$), meaning that males were significantly less likely than females to say they had intentions to recycle. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between females and males. The predicted probability a female would recycle was 83.82%, compared to 72.71% for males. Intentions to recycle were high across the sexes, but female intentions were more than 11-percentage points higher than males. This marginal effect is shown in Figure 4.27.

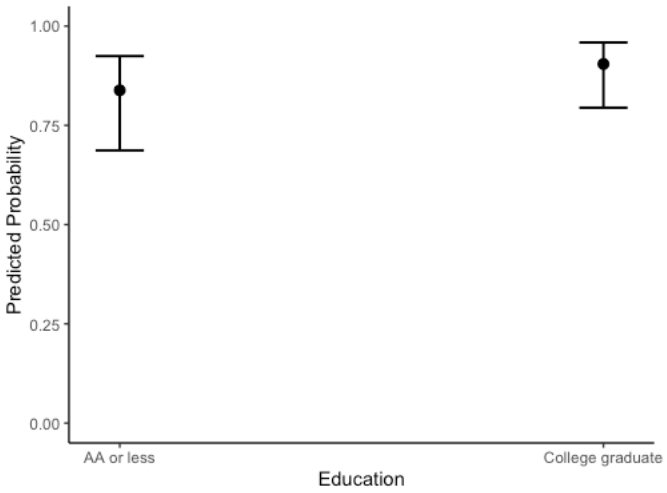
Figure 4.27. *Predicted Probability of Recycle Based on Sex*



Finally, the *Education* variable was also significant and positive (β = 0.60, SE = 0.29, $p <$ 0.05), meaning that college graduates were significantly more likely to say they would recycle in the future than those with an AA or less. To visually demonstrate this result, I created a marginal effect plot that shows the change in predicted probability between those who have an AA or less

and those who have at least a college degree. The predicted probability an individual with an AA or less would recycle was 83.82%, compared to 90.94% for a college graduate. Intentions to recycle were high across levels of education, but intentions to recycle were more than seven-percentage points higher among college graduates than those with an AA or less. This marginal effect is shown in Figure 4.28.

Figure 4.28. *Predicted Probability of Recycle Based on Education*



To further investigate the climate-friendly behavior hypothesis, I assessed intentions to reduce energy consumption by respondents. For *Energy*, I asked respondents if they planned to reduce their consumption of energy in the future. All five conditions were included in the analysis. The cross tabulation of the experimental conditions with the outcome variable are shown in Table 4.32 for Democrats and Independents and Table 4.33 for Republicans.

Table 4.32. Frequency Counts and Percentage for Energy Among Subjects Identifying with Democrats or as Independents

Will reduce energy use?	Random Group Assignment				
	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	9.23% (6)	12.00% (9)	4.71% (4)	6.67% (5)	17.98% (16)
Yes	90.77% (59)	88.00% (66)	95.29% (81)	93.33% (70)	82.02% (73)

χ^2 (4) = 9.96, $p < 0.05$

Table 4.33. Frequency Counts and Percentage for Energy Among Subjects Identifying with Republicans

Will reduce energy use?	Random Group Assignment				
	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	11.11% (5)	10.81% (4)	20.93% (9)	14.63% (6)	20.00% (9)
Yes	88.89% (40)	89.19% (33)	79.07% (34)	85.37% (35)	80.00% (36)

χ^2 (4) = 2.95, $p > 0.05$

First, I will note that the outcome variable was skewed heavily towards agreeing to reduce energy consumption by respondents. The percentage of those planning to reduce energy peaked at 95.29% in the *Republican Governor: Public Health* condition among Democrats and Independents. The lowest level of this planned behavior was 79.07% among Republicans in the *Republican Governor: Public Health* condition. This cuts against evidence of the co-partisanship hypothesis and the theory that public health messages are more amenable to Republicans. Second, Table 4.32 shows that the experimental conditions were significantly associated with the outcome variable among non-Republican respondents (χ^2 (4, N = 389) = 9.96, p < 0.05), but Table 4.33 shows this is not the case for Republicans (χ^2 (4, N = 211) = 2.95, p > 0.05). Overall, the cross tabulations for the *Energy* variable do not reveal support for the hypothesis.

I created several logistic regression models to further test for the potential of this association between the experimental condition and respondents' potential climate-friendly

behaviors. The variable *Energy* was coded as "0" for not agreeing with the statement and "1" for agreeing with the statement that the respondent planned to reduce energy consumption in the future. Model 2 in Table 4.34 shows the results of the logistic regression model with only the experimental conditions as a predictor variable. The experimental conditions were not significant (all four $p > 0.05$), meaning that the party of the governor and the frame employed did not significantly impact whether a respondent was willing to reduce energy consumption in the future. Further, Model 4 in Table 4.34 shows the results of the logistic regression model with control variables and the interaction between the experimental condition and the political party of the respondent. If these interactions were to be significant, then there would be potential evidence of the hypothesis. However, these interactions were not significant (all four $p > 0.05$). Thus, there is no evidence to support H_7 based on the *Energy* model. However, there were interesting main effect results based on demographics that I will discuss next.

Table 4.34. Regression Results for Energy

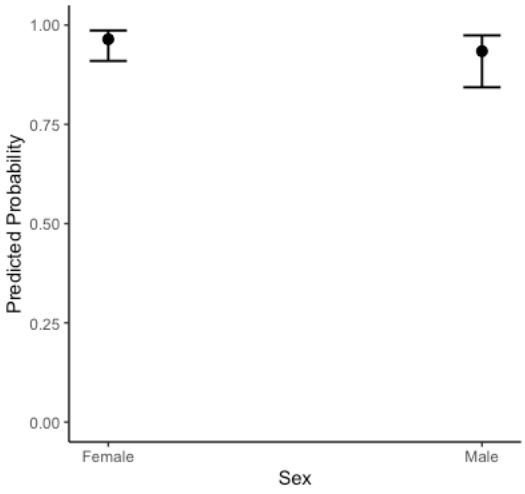
	Dependent variable:			
	Energy			
	(1)	(2)	(3)	(4)
Age			0.02*	0.02*
			(0.01)	(0.01)
Income			-0.02	0.04
			(0.26)	(0.27)
Education			0.28	0.25
			(0.29)	(0.29)
Race			-0.89***	-0.95***
			(0.34)	(0.34)
Sex			-0.64**	-0.70**
			(0.28)	(0.28)
Party			-0.49*	-0.15

			(0.26)	(0.65)
GOP Governor: NS		-0.16	-0.24	-0.42
		(0.43)	(0.44)	(0.57)
GOP Governor: PH		-0.02	-0.06	0.79
		(0.43)	(0.44)	(0.68)
Dem. Governor: NS		0.06	0.09	0.39
		(0.45)	(0.46)	(0.64)
Dem. Governor: PH		-0.72*	-0.74*	-0.66
		(0.39)	(0.40)	(0.52)
Party x GOP Governor: NS				0.56
				(0.92)
Party x GOP Governor: PH				-1.63*
				(0.92)
Party x Dem. Governor: NS				-0.59
				(0.92)
Party x Dem. Governor: PH				-0.10
				(0.81)
Constant	1.98***	2.20***	2.44***	2.37***
	(0.12)	(0.32)	(0.62)	(0.68)
Observations	601	601	588	588
Log Likelihood	-222.27	-219.00	-206.95	-203.47
Akaike Inf. Crit.	446.54	447.99	435.91	436.94
Note:				*p<0.1; **p<0.05; ***p<0.01

For the purposes of analyzing the main effect results, I selected Model 3 because it had the lowest AIC and the interactions between political party and experimental conditions were not significant in Model 4. To begin with, I wanted to know if energy consumption was influenced by the political party of the respondent. Interestingly, an individual's *Party* was not significant (β = -0.49, SE = 0.26, $p > 0.05$), meaning that intentions to reduce energy were the same for Republicans and non-Republicans alike. Next, I wanted to know if there was an association between the sex of the respondent and their intentions to reduce energy. The variable S*ex* was

significant and negative (β = -0.64, SE = 0.28, $p < 0.05$), meaning that males were significantly less likely than females to say they had intentions to reduce energy consumption. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between females and males. The predicted probability that a female would reduce energy consumption was 96.48%, compared to 93.51% for males. Intentions to reduce energy were high across the sexes, but female intentions were nearly three-percentage points higher than males. This marginal effect is shown in Figure 4.29.

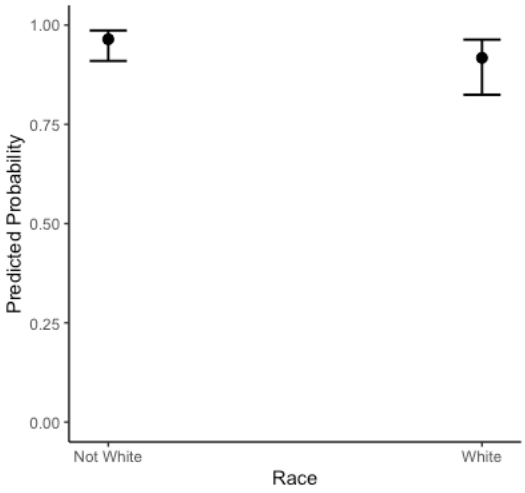
Figure 4.29. *Predicted Probability of Energy Based on Sex*



Finally, the *Race* variable was also significant and negative (β = -0.89, SE = 0.34, $p <$ 0.05), meaning that whites were significantly less likely to reduce energy consumption than non-whites. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between non-whites and whites. The predicted probability that a non-white individual would reduce energy was 96.48%, compared to 91.84% for whites. Intentions to reduce energy were high across races, but intentions to reduce energy were nearly

five-percentage points higher among non-whites than whites. This marginal effect is shown in Figure 4.30.

Figure 4.30. *Predicted Probability of Energy Based on Race*



To further investigate the climate-friendly behavior hypothesis, I assessed intentions to carpool by respondents. For *Carpool*, I asked respondents if they planned to carpool more in the future. All five conditions were included in the analysis. The cross tabulation of the experimental conditions with the outcome variable are shown in Table 4.35 for Democrats and Independents and Table 4.36 for Republicans.

Table 4.35. Frequency Counts and Percentage for Carpool Among Subjects Identifying with Democrats or as Independents

	Random Group Assignment				
Will carpool?	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	27.69% (18)	30.67% (23)	30.59% (26)	29.33% (22)	33.71% (30)
Yes	72.31% (47)	69.33% (52)	69.41% (59)	70.67% (53)	66.29% (59)

χ^2 (4) = 0.72, $p > 0.05$

Table 4.36. Frequency Counts and Percentage for Carpool Among Subjects Identifying with Republicans

Will carpool?	Random Group Assignment				
	Control	Rep. NS	Rep. PH	Dem. NS	Dem. PH
No	31.11% (14)	24.32% (9)	37.21% (16)	31.71% (13)	22.22% (10)
Yes	68.89% (31)	75.68% (28)	62.79% (27)	68.29% (28)	77.78% (35)

χ^2 (4) = 3.01, $p > 0.05$

First, I will note that the outcome variable was distributed more evenly than the previous two behavioral variables, with overall levels of agreement lower for carpooling. The percentage of those saying they plan to carpool peaked at 77.78% in the *Democratic Governor: Public Health* condition among Republicans. The lowest level of carpool commitment was 62.79% among Republicans in the *Republican Governor: Public Health* condition. This cuts against evidence of the co-partisanship hypothesis and the theory that public health messages are more amenable to Republicans. Second, Table 4.35 shows that the experimental conditions were not significantly associated with the outcome variable among non-Republican respondents (χ^2 (4, N = 389) = 0.72, p > 0.05), and Table 4.36 shows this is not the case for Republicans either (χ^2 (4, N = 211) = 3.01, p > 0.05). Overall, the cross tabulations for the *Carpool* variable do not reveal support for the hypothesis.

I created several logistic regression models to further test for the potential of this association between the experimental condition and respondents' potential climate-friendly behaviors. The variable *Carpool* was coded as "0" for not agreeing with the statement and "1" for agreeing with the statement that the respondent planned to carpool more in the future. Model 2 in Table 4.37 shows the results of the logistic regression model with only the experimental conditions as a predictor variable. The experimental conditions were not significant (all four $p >$ 0.05), meaning that the party of the governor and the frame employed did not significantly

impact whether a respondent was willing to carpool in the future. Further, Model 4 in Table 4.37 shows the results of the logistic regression model with control variables and the interaction between the experimental condition and the political party of the respondent. If these interactions were to be significant, then there would be potential evidence of the hypothesis. However, these interactions were not significant (all four $p > 0.05$). Thus, there is no evidence to support H_7 based on the *Carpool* model. However, there were interesting main effect results based on demographics that I will discuss next.

Table 4.37. Regression Results for Carpool

	Dependent variable:			
	Carpool			
	(1)	(2)	(3)	(4)
Age			0.004	0.003
			(0.01)	(0.01)
Income			-0.41**	-0.39**
			(0.19)	(0.20)
Education			1.19***	1.18***
			(0.20)	(0.20)
Race			-0.05	-0.06
			(0.21)	(0.21)
Sex			0.11	0.12
			(0.19)	(0.19)
Party			-0.12	-0.31
			(0.20)	(0.44)
GOP Governor: NS		0.04	0.05	-0.07
		(0.30)	(0.31)	(0.39)
GOP Governor: PH		-0.17	-0.08	-0.06
		(0.28)	(0.30)	(0.38)
Dem. Governor: NS		-0.05	-0.06	-0.13
		(0.29)	(0.30)	(0.39)
Dem. Governor: PH		-0.04	0.05	-0.17

		(0.28)	(0.30)	(0.37)
Party x GOP Governor: NS				0.34
				(0.65)
Party x GOP Governor: PH				-0.11
				(0.61)
Party x Dem. Governor: NS				0.14
				(0.62)
Party x Dem. Governor: PH				0.64
				(0.62)
Constant	0.84***	0.89***	0.15	0.26
	(0.09)	(0.21)	(0.39)	(0.43)
Observations	601	601	588	588
Log Likelihood	-367.72	-367.39	-341.58	-340.63
Akaike Inf. Crit.	737.44	744.77	705.15	711.26
Note:				*p<0.1; **p<0.05; ***p<0.01

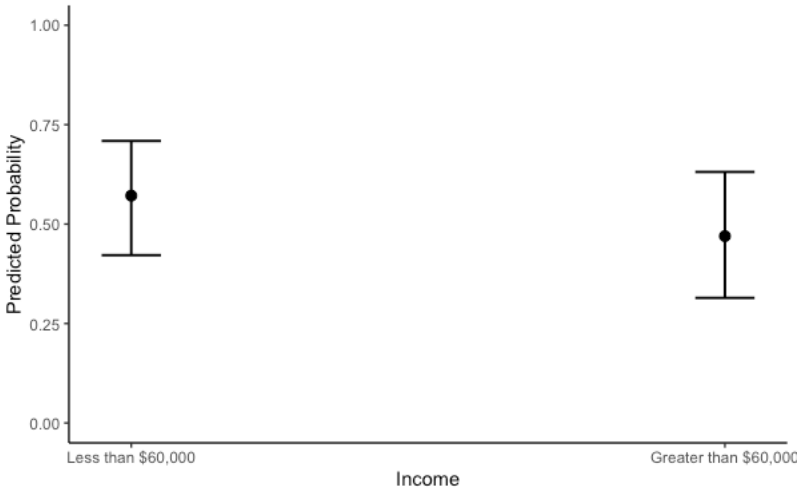
For the purposes of analyzing the main effect results, I selected Model 3 because it had the lowest AIC and the interactions between political party and experimental conditions were not significant in Model 4. To begin with, I wanted to know if energy consumption was influenced by the political party of the respondent. Interestingly, an individual's *Party* was not significant (β = -0.12, SE = 0.20, $p > 0.05$), meaning that intentions to carpool were the same for Republicans and non-Republicans alike. Next, I wanted to know if there was an association between the education of the respondent and their intentions to carpool more. The variable *Education* was significant and positive (β = 1.19, SE = 0.20, $p < 0.05$), meaning that college graduates were significantly more likely than those with an AA or less to say they had intentions to carpool more in the future. To visually demonstrate this result, I created a marginal effect plot that shows the change in predicted probability between having an AA or less and having a college degree or more. The predicted probability that an individual with an AA or less would carpool more was

57.19%, compared to 81.43% for college graduates. Intentions to carpool were more than 24-percentage points lower among those with an AA or less compared to college graduates. This marginal effect is shown in Figure 4.31.

Figure 4.31. *Predicted Probability of Carpool Based on Education*

Finally, the *Income* variable was significant and negative (β = -0.41, SE = 0.19, $p < 0.05$), meaning that those making more than $60,000 per year were less likely than those making less than $60,000 per year to carpool more in the future. To visually demonstrate this result, I created a marginal effect plot that shows the difference in predicted probability between those making less than $60,000 per year and those making more than $60,000 per year. The predicted probability of carpooling for those making less than $60,000 per year was 57.19%, compared to 47.02% for those making more than $60,000 per year. Intentions to carpool were more than 10-percentage points higher among those who make less than $60,000 per year compared to those who make $60,000 per year or more. This marginal effect plot is shown in Figure 4.32.

Figure 4.32. *Predicted Probability of Carpool Based on Income*



Discussion

The theoretical driving expectation of this research was that the experimental treatment assigned to each respondent, consisting of a partisan governor and one of two frames, would interact with the political party of respondents to influence climate change attitudes. I based my six hypotheses in this chapter on a theory of co-partisanship, which states that an in-party speaker would have greater influence over a respondent than an out-party speaker (e.g., Druckman, 2004), as well as empirical findings that have shown that Republicans respond more positively to public health messages about climate change as opposed to national security ones (see Myers et al., 2012). Across the models, I found no support for my hypotheses; Republicans were no more likely to follow the lead of an in-party governor with a public health message than they were in the control group. The closest evidence for the hypothesis was in the *Fear* model, where I found that Republicans in all conditions experienced more fear than those in the control. However, this included Republicans who received the Republican-governor public health message, which I predicted would lessen fear, not increase it when compared to the control. I

will discuss some theoretical reasons that might potentially explain why I did not find an interaction effect, as well as potential statistical reasons.

Lack of an Interaction Effect

There are a few plausible theoretical reasons why I did not find the effects I predicted from the interaction of the experimental conditions with political party. First, the online experiment was conducted in a heavily polarized environment, only weeks after the contentious 2020 election where climate change was a central issue. Then candidate (now President) Joe Biden said climate change was the "number one issue facing humanity" during the campaign (Newburger, 2020), and President Donald J. Trump long employed climate change denial as part of his America first agenda, referring to it as a Chinese hoax in a 2012 tweet (Wong, 2016).[15] At the first presidential debate climate change received attention (Aton, 2020), as well as a 12-minute discussion in the third presidential debate (Dennis et al., 2020). From previous public opinion polls (e.g., Brenan & Saad, 2018), the issue of climate change was already known to be heavily polarized. Individuals likely already sorted themselves into competing camps, with Democrats generally favoring taking action on climate change and Republicans in opposition. According to Kahan (2010), going against one's cultural in-group is unlikely, as individuals place a high-value on these relationships. Even when a highly respected member of an in-group speaks out on an issue that does not mean it will change deeply entrenched minds. Take for example House Minority Leader Kevin McCarthy (R-CA), who faced immediate backlash when he outlined a set of climate policies focused on business-friendly initiatives like carbon

[15] The author would like to note that he could not link directly to the tweet because former President Donald J. Trump was suspended from Twitter. This was due to his inciting of an act of insurrection against the U.S. Capitol on January 6, 2021 in order to disrupt the certification of President Joe Biden's Electoral College victory. Subsequently, the former President was impeached and narrowly acquitted, despite bi-partisan majorities in both chambers of Congress finding him responsible for the attack.

sequestration technologies (Natter, 2020). To put it simply, the political battle lines have been drawn on this issue, and a short news story might not have been enough of a stimulus.

Second, the control group contained a strong, pro-climate change action message that might have counteracted some of the effects of the treatment groups. Although the information was presented by a non-partisan governor with only a focus on general environmental themes, individuals could have been persuaded by this message. It is possible that the control group provided too strong of a stimulus in comparison to the experimental treatment groups. An alternative approach that would increase precision, but also decrease realism, would be to have respondents in the control group read a news story about an entirely different issue (e.g., tax reform). This would increase precision because the control would be more of a true placebo (since the respondent would not be receiving any message about climate change), while also reducing realism because in a real-world framing environment it is unlikely that someone would never be exposed to a climate change message. Additional analyses could compare the treatments versus one another, instead of just the control to see if the control is too strong. Given that the chi-square tests conducted on each outcome variable never revealed a significant result among Republicans, I do not think this would be the case. The opposite situation is also possible, in which the treatments were too weak. However, after the first pilot test, the treatments were strengthened, and the lack of a detectable effect persisted. It might simply be that respondents have already been exposed to a critical number of these climate change arguments to see an effect.

Third, the frames offered in the treatment groups were not intrinsic to this experiment. In an attempt to maintain as much realism as possible, I utilized the spoken words of American political leaders in the messages. Although the content analysis revealed that national security

was emphasized less frequently in the public sphere by political leaders than the public health frame, both frames appeared in this discourse, as well as in broader discussions in society on climate change. For example, the Obama administration tied climate change to national security in its National Security Strategy of 2015 (Baker & Sanger, 2015), which received national news attention. Also, as far back as 2007, the Supreme Court of the United States ruled in *Massachusetts v. EPA* that the federal government can regulate greenhouse gases as pollutants (Greenhouse, 2007), formally tying the issue to public health. It is possible that individuals were already "treated" by these messages in the real world, whether it be from other candidate messages, non-governmental organizations, their social media accounts, or the news in general. For example, in the 2020 election campaign alone, Republicans spent $23 million on advertising supporting traditional fuels like natural gas and oil, while Democrats spent $20 million on advertisements about preventing climate change (Roper, 2020). Thus, it is possible that Americans have already assessed climate change as a national security and public health issue.

Lastly, it is possible that America's governors are viewed as less partisan than federal office holders, such as Senators and Presidents, which could have diminished the effect of the partisan cue. In general, Americans tend to like their state and local officials more than their federally elected representatives. The last time Pew asked this question, they found that 57% of Americans held a favorable view of their state government officials, but only 28% held a favorable view of their federal officials, a 29-percentage point difference (Gao, 2013). For example, an April 2020 Monmouth poll showed that the American public rated their governor's response to the COVID-19 outbreak highly, giving them a 72% approval rating, 26-percentage points higher than they gave then-President Trump at 46% (Mehta, 2020). Even before the COVID-19 outbreak, 47 out of 50 state governors received higher approval ratings in their states

than Trump (Jacobson, 2019). Additionally, when elected to the U.S. Senate, governors tend to be less partisan than their colleagues. Keena and Knight-Finley (2017) examined floor votes of governors-turned-Senators and found that they voted with their party between seven and eight-percent less than other Senators. They explain that holding previous state-wide office, the necessity of building a broad coalition across the political spectrum to enact legislation, as well as generally accepting campaign contributions from less ideological sources makes them less partisan when they get to the Senate. Overall, it seems possible that the governor in the experimental condition might not have provided a strong enough partisan cue. While I expected a clear interaction effect between the experimental condition and party of the respondent, these four reasons provide some explanation as to why those effects were not found.

There are also two additional statistical reasons why I might have been unable to detect the predicted effects: statistical power and data quality issues. First, as described in Chapter 2, the 601 respondents I recruited should have provided a large enough of sample to produce meaningful results. With five experimental treatment groups, I should have been able to detect a relatively small effect size (0.15) 80% of the time with a p-value of less than 0.05. It is entirely possible that I simply "missed" finding support for the hypotheses, triggering a false negative. However, I think the more likely answer is a design decision made during the pilot-testing of the experiment. The original plan was to recruit approximately 600 Republican-identifying individuals through Amazon's MTurk service. I was forced to abandon this design due to the added cost of $.40 per respondent, the lack of quality data (many respondents who were screened by MTurk as being Republicans identified as Independents or Democrats in my experiment), and lastly the low number of workers with this qualification led to slow collection times. Having to add an interaction to a regression equation will reduce power, and this design decision might

have led to false negatives as a result. This might explain why there were several models where I found main effects for party and experimental treatment, but not an interaction effect between the two. For example, Merkley and Stecula (2020) conducted a similar online experiment with 3,000 respondents recruited from MTurk. They assigned the respondents to six experimental conditions and were able to find significant interaction effects between the message and partisanship of the respondent. This provides some evidence that the study in this dissertation was perhaps underpowered.

As noted in Chapter 2, the sample was not as attentive as I wished, according to the three-pronged test I instituted for attentiveness. Systematic bias was not introduced into the study because randomization was effective, and the inattentive respondents were distributed statistically evenly across groups. However, the inattentive group was statistically different from the attentive group on the *Overall Support* variable, which meant a large amount of noise was likely introduced into the data. Generally, experiments can detect even small effects, as long as the signal is distinguishable from the noise (Coppock, n.d.). However, 41.93% of respondents in my sample were deemed inattentive, which has a substantial effect of decreasing power for the study. Unfortunately, this was counter to the largely positive experience social science researchers have had with recruiting MTurk workers for online experiments (e.g., Buhrmester et al., 2011). There are a few potential remedies for this that could be employed in future studies. First, MTurk has a system of workers that are granted the status of Master based on the quality of previously submitted work. While these workers cost more per response, it is possible they could provide better quality data. However, the higher cost might not be justified because at least two studies have compared workers with the qualification and those without and found they produced similar quality data (Loepp & Kelly, 2020; Rouse, 2019). A future study might also increase the

payment given for completing the online experiment, although several studies have shown that payment does not impact data quality (Buhrmester, 2011; Mason & Watts, 2009). As a result, the inattentive respondents in the study may have reduced power. Despite my inability to find meaningful interaction effects, there were interesting main effect results that I will discuss next.

Experimental Treatment Main Effects

Three of the models revealed a main effect for at least one of the experimental treatments, meaning that the assigned condition significantly influenced the outcome variable for the respondent. The Republican-governor message in the *Trust* model evoked significantly lower levels of trust among respondents when compared to the non-Republican governor message. This is in line with the theory of issue ownership, which states that the major U.S. political parties have more credibility than others on various issues. In the case of the environment, Democrats have long been the issue owners of the environment, so seeing individuals express lower trust in the Republican governor is unsurprising (Calderwood, 2019a; Egan, 2013). Unfortunately, this also raises questions about the ability for a Republican governor in general to speak on the issue of climate change. If the hypothetical Republican governor in this study is not trusted to speak about climate change, then a real-world well-respected in-party group member might also be viewed as untrustworthy. Goodwin and Dahlstrom (2015) suggest that science communicators can increase perceived trust among their audience by making themselves vulnerable, providing opportunities for the audience to hold the speaker to account, acting with humility and admitting when they make mistakes, and beginning with the basics like a scientific consensus before moving on to consequences. Perhaps this overall lack of trust in Republican governors on climate change partially explains the lack of an interaction effect seen above.

Most promising for the goals of this dissertation, I discovered that the national security experimental treatments had a positive effect on how respondents viewed the impact on national security of reducing greenhouse gas emissions. While previous research has identified national security messages as counterproductive to Republican respondents (see Myers et al., 2012), I replicated a key finding from McCright et al.'s (2015) experiment: I found that individuals who were exposed to national security messages, regardless of the party of the speaker or their own party, were more likely to believe that reducing greenhouse gas emissions would have a positive impact on national security. Fortunately, I found that beliefs about this effect on national security extended to overall support about reducing greenhouse gas emissions. I found a main effect for the Democratic-governor message, which increased overall support by one-third of one-point on the seven-point scale. It is perhaps time for scholars to move beyond determining if *any* national security message could have an effect on attitudes, and instead turning the focus to *which* national security messages have the strongest effect. Future research could contain an experiment that compares only national security arguments across groups, with the goal of finding which messages are most effective in changing attitudes, instead of only a focus on what topics could be effective.

Party Main Effects

As expected, the political party of the respondent was a strong predictor of climate change attitudes, but this result was not present, interestingly, for behaviors. Party was significant in nine of the 13 models, and only lacked significance in the *Knowledge*, *Recycle*, *Energy*, and *Carpool* models. I will focus my points of discussion on explaining the lack of significance in the latter three models, as I believe there is preexisting evidence that ties one's political affiliation to their attitudes about climate change. I argue it is promising for future

policy that the pro-climate change behaviors were not associated with political party for two major reasons. First, while overall public opinion matters when making policy, individual behavioral change can have a strong impact on reducing greenhouse gas emissions. The Environmental Protection Agency (n.d.-b) argues that recycling releases fewer greenhouse gases than all other forms of waste disposal, except for source reduction. Recycling can have a major impact on net greenhouse gas emissions. Additionally, 20% of greenhouse gases in the United States are from residential energy use (Goldstein et al., 2020). Changing energy-use patterns could also help reduce this source of one-fifth of greenhouse gas emissions. Finally, the transportation sector is another major source of greenhouse gas emissions in the United States, making up 28% of total emissions (Environmental Protection Agency, n.d.-c). Carpooling can reduce work-commute transportation emissions by 22% (Bruck et al., 2017), and although this is only one area of transportation emissions, perhaps messaging to increase carpooling could spill-over to other situations beyond work.

Second, this disconnect between climate change attitudes and behaviors provides further evidence that the idea of climate change itself is politicized but the solutions to the problem are not. Recent research by Feldman and Hart (2018) argues that the phrase “climate change” serves as a polarizing cue that lowers support for climate friendly policies compared to frames that only focus on either pollution or security. They identified this phrase as leading to motivated reasoning, the process by which individuals interpret new evidence to support pre-existing beliefs. The results in my study provide further evidence that messaging should focus on behaviors and policies that can reduce greenhouse gas emissions without mentioning climate change to cut against this potential for motivated reasoning. For example, a message could focus on how a policy (e.g., nuclear power) could be beneficial to human health (e.g., declining asthma

rates from reducing air pollution) without mentioning the climate change phrase. A future study could extend the work done in both the current study and the Feldman and Hart (2018) study to see if this messaging would be effective on personal behaviors as well as government policy.

Sex and Race

The next set of findings I will discuss deals with the sex and race of respondents and serves as an extension of the findings about party. A seminal piece of research on climate change attitudes and communication by McCright and Dunlap (2011a) argues that white conservative males are the most likely to deny climate change for a variety of reasons, especially because of how they view risk. While I did not explicitly test for an interaction between party, sex, and race, I did find some evidence to support this "cool dudes" hypothesis. The sex of the respondent was significant in four models, including two of the behavioral models. Males were less likely to find governors knowledgeable, to support a reduction in greenhouse gas emissions, to recycle, and to reduce energy use. These findings are consistent with previous (McCright & Dunlap, 2011a) and more contemporary (Funk & Hefferon, 2019) public opinion surveys. It seems especially important to work on messaging that appeals to Republican men if society wants to close the gap on the need to take action on climate change, as well as to promote individual behaviors that are good for the environment. Some have explained this gap between men and women on the environment in terms of differing value systems as well as in how society socializes men and women (Pearson et al., 2017). If this explanation pans out, then the solution must run deeper than those predominantly seen in the climate change communication literature that focus on a spectrum of arguments, such as the national security and public health arguments presented in this dissertation and other publications. Instead, scholars will have to interrogate these value systems, much like Lakoff (1996) has done with the liberal versus conservative moral value

system. This study has demonstrated that sex can play a role in climate change attitudes and that communicators should take this demographic into account more frequently when forming messages about climate change.

Along with the party affiliation and sex of the survey respondent, I also found that race mattered in two of the models as well. Continuing with the line of argumentation about individual behavior, whites were less likely to say that they would reduce energy consumption in the future. Fortunately, there were no racial differences in willingness to recycle or carpool. I fully expected to see race as a stronger indicator because of the theory of environmental racism, which states that people of color are most likely to be disproportionately impacted by environmental problems such as pollution, toxic waste, and climate change (Morello-Frosch et al., 2009). Interestingly, whites were also less likely than non-whites to consider national security when forming an opinion about climate change. Given that environmental problems are more likely to negatively impact people of color, I would have expected white people to consider national security (a more traditional conservative issue), and people of color to be more likely to consider public health (a model that showed no significant result for race). Although limited, these findings provide some support for the "cool dudes" hypothesis.

Education

After their political party, a respondent's level of education was the most consistent finding, and typically had the largest effect size of all the variables in the models. In general, we would expect that higher levels of education are associated with belief in climate change and support for environmentally friendly policies (Kahan et al., 2012). However, this is not the case for Republicans, in which those with higher levels of education and scientific literacy are actually less likely to believe in climate science (Drummond & Fischoff, 2017; Kahan et al.,

2012). This is largely attributed to the increased skills those individuals have to engage in motivated reasoning, allowing them to dispel with evidence counter to their pre-existing in-group beliefs (Kahan, 2010). The reverse pattern is seen among Democrats, where lower-educated Democrats are more likely to view climate change as exaggerated, meaning in-group identity and not amount of education might be the driving force behind climate change attitudes (Newport & Dugan, 2015). If a higher education, then, is not intrinsically associated with stronger environmental attitudes, perhaps the solution is to increase the amount of environmental and climate education students receive at younger ages (Kelly et al., 2014; Monroe et al., 2017). With this in mind, there was an interesting outlier in my study in which college graduates were less likely to support reducing greenhouse emissions when compared to those without a college degree. One explanation is that this was measured on a scale that had reverse-coded items; given the aforementioned inattentiveness, it is possible that inattentive respondents simply clicked through the answers. However, the party variable was as expected in this model, so I think that explanation is not plausible. Future research could further explore the impact education has on climate change attitudes and could even explore different majors to see if there is something more at play here.

Age

The last variable of interest I will discuss is the lack of any effect of the age of the respondent on climate change attitudes. At first, it was somewhat surprising to see that age was not significant in any of the 13 models tested. In general, younger Americans are more likely to believe that climate change is happening, and this is especially the case among Republicans; generational differences are less apparent among Democrats (Ballew et al., 2019). Based on previous public opinion surveys, I would have expected age to be associated with strong pro-

climate change beliefs, such as supporting a reduction in greenhouse gas emissions, engaging in pro-environmental behaviors, and believing that reducing greenhouse gas emissions would have a positive impact on national security and public health. One explanation for this is that the sample in my experiment was much younger than the country as a whole. Respondents aged 19-34 in my experiment made up 59.10% of the sample, while this group only made up 27.75% of the general population aged 19 and older (Kaiser Family Foundation, 2019). This over-representation of younger respondents, as well as only having eight respondents over 64 in my sample, might explain why age was not significant; there simply was not enough variation in age. Overall, the two investigations in this dissertation, the content analysis and the experiment, served to expand the field's current understanding of climate change communication. The final chapter will provide some further points of discussion, limitations, and areas for future research.

Chapter 5: Discussion

"Anything else you're interested in is not going to happen if you can't breathe the air and drink the water. Don't sit this one out. Do something. You are by accident of fate alive at an absolutely critical moment in the history of our planet."

–Dr. Carl Sagan[16]

Left unchecked, climate change represents the gravest threat humanity currently faces. From rising sea levels to hurricanes, heats waves to asthma, and conflicts to energy security, the consequences of climate change respect no border (U. S. Global Change Research Program, 2018). The international community first recognized the need for greenhouse gas emission reductions in 1989 at the Noordwijk conference (Information Unit on Climate Change, 1993) and since has established ambitious, albeit unmet, goals to prevent the worst consequences of climate change (United Nations Framework Convention on Climate Change, n.d.). Despite the international recognition of this threat for more than thirty years, the world's largest economy and second largest emitter (Environmental Protection Agency, n.d.-c; The World Bank, n.d.), the United States, has largely failed to lead or act on this issue. There are many drivers of this inaction. The American electorate is sharply divided on the issue of climate change, which has only worsened with time (Brenan & Saad, 2018), culminating in the out-right denial of the problem espoused by former President Donald J. Trump (Baker, 2017). This denial of climate change is driven in part by campaign contributions from the fossil fuels industry (OpenSecrets, n.d.), research designed to call into question the scientific consensus of climate change (Weart, 2011), as well as the difficulty of communicating scientific findings to the general public (Valenti, 1999). The failure of U.S. leadership on this issue has international implications, with other countries feeling justified in bucking their obligations under climate change agreements as long as the U.S. does (Stern, 2020). Society's environmental destruction and subsequent delay in

[16] See Dauncey (2009).

addressing the issue is unacceptable, immoral, and risks planetary destruction. The Earth can only absorb a certain amount of carbon dioxide before runaway global warming sets in (Green et al., 2019), raising the risk of mass extinctions never before witnessed by humans (Penn et al., 2018). Quite literally, life as we know it is threatened.

This lack of action must, at least in part, be explained by ineffective communication strategies by American political leaders that support a reduction in greenhouse gas emissions.[17] Scholars of climate change communication have studied a wide array of messages relating to the issue, from presidential communications (e.g., Bricker, 2012; Calderwood, 2019a; Calderwood, 2019b; Wolfe, 2007) to the potential effects of distinct climate change messages (e.g., Myers et al., 2012; McCright et al., 2015). There is, however, a paucity of research about other American political leaders, most specifically governors who have taken an increasingly important role in the fight for emissions reductions (Igusky, 2019). Another gap in the field's knowledge on this topic centers on the lack of research surrounding the intersection of studies describing political discourse by American leaders and potential effects of said discourse.[18] By studying the climate change discourse of America's presidents and governors, as well as evaluating the potential effects of this discourse on climate change attitudes, I sought to fill this gap in the literature.

I advanced two specific communication theories within this project: framing and source credibility. The concept of framing is important on an issue like climate change because the deficit model of communication has been shown to be ineffective (Hart & Nisbet, 2011). In this model, the belief is that communicators must simply provide the general public with scientific facts about climate change for them to understand and accept the consensus and urgency

[17] It is also entirely plausible that inaction has been based on the effective communication strategies of climate change skeptics that have manufactured controversy where none should exist (see Ceccarelli, 2011). However, climate change skepticism is outside the purview of this dissertation.
[18] The exception being Zhou's (2016) study of the effect of messages invoked by congressional partisans.

surrounding this threat. Framing plays an important role in this because it allows the speaker to define the problem, isolate a cause, evaluate its morality, and advocate for a solution (Entman, 1991). In this project, I focused on how American political leaders employed a general environmental focus, national security, and public health frames when discussing the issue of climate change, as well as any potential effects of this discourse. I also examined the role of source credibility in these political messages about climate change, specifically the concept of co-partisanship. Source credibility, especially co-partisanship, can play an important role in the successful communication of messages. Research demonstrates that framing effects are generally strongest when the credibility of a source is high (Druckman, 2001a), and that individuals expressed more negative feelings towards out-partisans than even those of a different race (Iyengar & Westwood, 2015). Thus, studying the combination of framing and source credibility provided important insights into our understanding of climate change communication.

I conducted a content analysis and online experiment to assess frames present in and potential effectiveness of climate change discourse of American political leaders. The content analysis focused on the presence of national security and public health frames within presidential and gubernatorial discourse about the issue of climate change. I evaluated the partisan differences in the discourse (i.e., Republican versus Democratic), as well as any potential differences between levels of office (i.e., presidential versus gubernatorial). For the experiment, I evaluated the effect of a governor-message (Republican versus Democratic) and frame (national security versus public health) on a wide range of variables, with an overall focus on how Republican-identifying individuals reacted to these messages regarding their climate change attitudes. I focused the experiment on Republican-identifying individuals because of the clear partisan difference that exist across the political spectrum on this issue. Winning over Democrats

that are still not onboard with emissions reductions would not hurt, but to make true inroads, scholars must help find a way to limit the partisan gap in attitudes on this issue. In the remaining sections of this chapter, I will discuss the key findings from these two elements of my study, explore some limitations and areas for future research, and conclude with some suggestions for how best to communicate climate change in an increasingly partisan environment.

Key Findings from Content Analysis

I found some interesting results during my content analysis of presidential and gubernatorial discourse about climate change. Within the dataset of 3,413 climate change invocations, the general environmental focus was the most commonly employed frame. The presence of this frame is potentially explained by the lack of an economic frame category. In previous work I conducted, I discovered that economic arguments were employed by presidents in over 60% of their climate change invocations (Calderwood, 2019a). Thus, we might tentatively conclude that many of these general environmental focus mentions also contained economic arguments. After the general environmental focus, a public health frame was employed nearly three-times as frequently as a national security frame. There were more climate change invocations made by Democratic leaders than Republican leaders, so this could explain the higher proportion of public health frames within climate change invocations. When making comparisons between the parties it was much easier to control for this partisan imbalance because I was able to compare the overall proportions (i.e., Democratic proportion versus Republican proportion). However, when breaking the frames down by party and frame, I found that Republicans were also more willing to invoke public health frames than national security ones. This means in the future it is likely that Republicans and Democrats alike will be more

willing to invoke public health arguments than national security ones when discussing climate change.

There were of course some partisan differences, as I predicted. Republicans were 1.54 times more likely than Democrats to utilize a national security frame. I found support for my first hypothesis, which was based on the theory of issue ownership and overall public opinion (Egan 2013; Pew Research Center, 2021). On the other hand, Democrats were 1.36 times more likely than Republicans to employ a public health frame. These distinctions are explained in large part because of the concept of issue ownership and issue prioritization. In general, Republican leaders in American politics are viewed as the owner of national security issues, while Democratic leaders are typically viewed as the owner of public health issues (Egan, 2013; Seeberg, 2016). This is also borne out in the public opinion data based on the importance that the parties' voters place on these issues. Republican voters tend to care more about national security issues than Democratic voters, while Democratic voters tend to care more about public health issues than Republic voters. These partisan findings build on previous work I conducted, where I discovered that Republican presidents were more likely to invoke national security frames and Democratic presidents were more likely to invoke a general environmental focus (Calderwood, 2019a). Thus, in the future I would expect some partisan differences to continue, with Republican leaders continuing to invoke national security more than Democratic leaders, and Democratic leaders continuing to invoke public health frames more than Republicans.

To further understand this discourse, I was interested in any distinctions between the level of office held by the speaker, their party, and the frame they chose to invoke when discussing climate change. Governors in the dataset were 1.23 times more likely to invoke the general environmental focus than presidents. As mentioned previously, an economic frame could

be present in many of these invocations. It is plausible that general environmental concerns, such as sea level rise, biodiversity loss, and others are more proximal to governors. I would expect, for example, that a general reference to a wildfire would be made more frequently by a governor than a president because governors have more authority in dealing with these crises. Additionally, presidents were 4.64 times more likely to invoke the national security frame than governors, and I think this is for similar reason as above. National security issues are more likely in the purview of the president than a governor, since these involve international agreements, the military, and overarching energy policy. A national security issue like conflict is not as proximal to an American governor because they are usually discussed in terms of far-away wars or unstable regimes. Lastly, there were no differences in level of office concerning the public health frame. Although public health issues are often proximal impacts (e.g., clean air and water), these problems have long been talked about in the national discourse since the beginning of the environmental movement in the United States. Also, many of the public health problems in the codebook, such as hurricanes, enter the national consciousness because the sheer size of the storms brings death and destruction to many states. While the speaker's level of office was associated with the employment of the general environmental focus and national security, partisan distinctions were only present in the latter frame. In general, I would predict in the future that these level of office differences would remain stronger than partisan distinctions.

Key Findings from Online Experiment

The most interesting result from my experiment was the null result for the presence of an interaction effect in nearly all my statistical models. The theoretical driver of my experiment was that the condition consisting of a frame (national security versus public health) and a source (Democratic versus Republican) would interact with the political party of the subject. I predicted

that a Republican-governor message with a public health frame would cause Republican-identifying individuals, the key demographic in this study, to respond more positively to the notion of reducing greenhouse gas emissions. However, I found no support for any of my predictions based on this theory; the only statistically significant interaction happened to be in the opposite of the predicted direction. I explained this lack of an interaction effect in the previous chapter based on both theoretical and statistical reasons. In summary, it is possible that I found a true null result, which would go against some previous empirical research. The COVID-19 pandemic has potentially made public health a partisan issue, with Democrats more likely to support restrictions to fight the virus than Republicans (Gadarian et al., 2020; Thomson-Deveaux, 2020). At the same time, with the experiment being conducted only two weeks following the 2020 election, a message from a governor might not have been salient to the respondents. Governors in general are viewed as less partisan than presidents (e.g., Keena & Knight-Finley (2017) and then-President Trump was actively challenging the results of the election with false allegations of widespread voter fraud (Montague & Feuer, 2020). A true null result might have also occurred because the literature I based my predictions on was mixed. For example, McCright and colleagues (2015) argue that a public health message would be unlikely to be effective, however, Myers and colleagues (2012) found the opposite. More likely, however, I would expect that the underpowered nature of my study prevented me from finding significant interactions. As stated in the previous chapter, the design choice to recruit individuals across the political spectrum, necessitating the introduction of an interaction into my regression equations, likely substantially reduced the power of the study. This, compounded with a subject pool that was found to be 40% inattentive, likely produced the null results.

Despite the lack of an interaction effect, I was able to detect three main effects from the experimental treatments. The most important main effects for the treatments occurred in the national security belief content model. I found main effects for both national security messages, regardless of the governor's party, showing a significant increase in the view that reducing greenhouse gases would have a positive impact on national security. This is a promising sign because it demonstrates some association between the national security message and national security impacts related to climate change. Given that this question asked about the valence of the effect on national security, and not simply whether a respondent considered the issue, this finding provides some evidence for a framing effect instead of a simple priming effect. The second main effect concerns a Democratic-governor national security message. Individuals exposed to this message were significantly more likely to support a reduction of greenhouse gas emissions. This finding provides support for the slice of literature that supports the employment of national security messages (see e.g., McCright et al., 2015). It is prudent to remain cautious though given previous research on this topic showing the opposite result (see e.g., Myers et al., 2012; Zhou, 2016). Messages should perhaps be tailored to focus on how reducing greenhouse gas emissions would have a positive impact on America's national security, but I would advise restraint, especially with Republican-identifying audiences.

As one would expect on a polarized issue such as climate change, the political party of the respondent was significant across nine of the models. In general, Republicans were less likely to trust the governors in the messages, less likely to support a reduction in greenhouse gas emissions, to believe reducing greenhouse emissions would have a positive impact on public health, or to even consider public health when deciding on their attitudes about climate change. While Republicans were more likely to consider national security, they were also less likely to

believe that reducing greenhouse gas emissions would have a positive impact on national security. This latter finding provides some evidence that communicators should remain cautious with national security arguments when speaking with Republican-identifying individuals. The key takeaway here, though, was the null effect for party in all three of the behavioral models. Republicans were no less likely than Democrats to engage in pro-climate friendly behaviors such as recycling, reducing energy, and carpooling. Thus, it is possible that messaging could focus on promoting pro-climate friendly behaviors, instead of an overall focus on climate change.

Education was also a strong predictor of climate change attitudes, being significant in 10 of the 13 models and typically having the strongest effect sizes of all the variables. In general, college graduates were more likely to find sources trustworthy and knowledgeable, more likely to consider national security and find that reducing greenhouse gas emissions would have a positive impact on national security and engage in recycling and carpooling. Interestingly, college graduates were less likely to show support for reducing greenhouse gas emissions overall, which cuts against the findings in the other models in this study. There are a few explanations for this. First, it is possible that the inattentive nature of the sample led to this result by introducing noise into the sample, although due to the consistency in the direction of the other results this might not be the case. Second, and perhaps more likely, is that previous research has shown that more education is associated with an increase in partisanship on climate change because it gives more resources to the individual to engage in motivated reasoning (Drummond & Fischoff, 2017). Thus, the more educated an individual attains, the more likely they are to be able to identify that climate change is an in-group attitude and to align themselves with their in-group's overall position (Kahan et al., 2012). Although this would not account for educated Democrats, a strong effect on the most polarizing questions from educated Republicans could

have flipped the direction in relation to the other models. Overall, education was a strong predictor of climate change attitudes, with typically the largest effect sizes of the independent variables in the models.

Finally, there were main effects for race and sex in several of the models. These findings demonstrate some support for the "cool white dudes" hypothesis offered by McCright and Dunlap (2011a). They found that conservative white males were much more likely to deny the existence of climate change than others, in large part because of how this group assesses risk. Overall, I would have expected race to play a larger role in the formation of climate change attitudes because of the distinct environmental impacts poor minority communities experience when compared with more affluent white communities (Morello-Frosch et al., 2009). In my experiment, white individuals were less likely to support a reduction in greenhouse gas emissions or to reduce their own energy consumption. Likewise, males were also less likely to support a reduction in greenhouse gas emissions, to recycle, or to reduce their energy consumption. I found some support for the "cool white dudes" hypothesis, which shows that future climate change messaging perhaps needs to focus on winning over these groups of individuals. In the next two sections, I will discuss limitations and suggestions for future research.

Limitations of the Content Analysis and Suggestions for Future Research

I uncovered interesting and robust results in my content analysis, yet there are some important limitations and suggestions for future research to discuss. First, I coded only for the presence or absence of a particular frame within each paragraph of context containing a climate change mention. In the current study, I treated the frame variable as nominal, with each mention receiving a code based on the presence or absence of a general environmental focus, a national security frame, a public health frame, or both a national security and a public health frame. In the

future, I would suggest a coding scheme where the frequency count of each frame would be recorded for each mention. In this example, each frame would be its own variable with a count recorded every time a mention was offered. For example, if a paragraph of context containing a climate change mention included three distinct references to public health issues, one national security issue, and one general environmental theme, then that would be coded as a "3" under the public health variable, a "1" under the national security variable, and a "1" under the national security variable. In the current coding scheme, the reference would receive a code for having mentioned both a national security and public health frame but would not indicate how many times each frame was offered. Changing to a frequency count approach would enable a more precise understanding of the discourse because currently a mention with three public health references is weighted the same as a mention with only one. This change would allow me to utilize more advanced statistical techniques, such as Poisson regression for count data. I could introduce additional co-variates, along with party and level of office. For example, I could model the predicted number of mentions of a frame based on party, level of office, location of the speech (e.g., foreign versus domestic), audience type (e.g., broadly versus narrowly cast), and communication type (e.g., spoken remarks versus press interactions), a strategy I employed in a recent project (Calderwood, 2019b). A more refined coding approach in the future could provide even more interesting findings.

The content analysis could also be strengthened by including more frames beyond the general environmental focus, national security, and public health ones I focused on in this project. Other content analysis studies have included a focus on economic arguments (e.g., Bonnefille, 2008; Calderwood, 2019a), uncertainty and sidestepping (Boykoff, 2013; Calderwood, 2019a), balancing "two sides" of the "debate" (Boykoff, 2007), and moral values

(Fine & Calderwood, 2019), and others outlined in Nisbet's (2009) article on climate change frames. There are a few benefits to this approach. First, the general environmental focus acts more as a "not the other categories" code, which heaps a lot of potential frames into an omnibus one. As explained previously, one reason for the high number of general environmental focus themes in this study, as opposed to other work I have conducted (see Calderwood, 2019a) is that there was no economic frame category. In that research, I found the economic frame appeared in over 60% of mentions, while the general environmental focus appeared in roughly one-third. Including more frames would allow the general environmental focus to evolve into its own distinct category. Second, including more frames would also provide for a richer description of the discourse, which is a key goal of any content analysis. Adding new frames can be an arduous task as it requires dictionary building, establishing intercoder reliability, and coding of the content.

Limitations of the Online Experiment and Suggestions for Future Research

The design of my online experiment contained several limitations that need further discussion, and I will offer some suggestions for future research. I will discuss issues with the sample size, inattentive respondents, the lack of a true placebo group, the focus of the experimental conditions, as well as issues with internal and external validity. To begin with, I believe the sample size I recruited for this study led to underpowered results. I utilized the "pwr" package in R (Champely, 2020) to calculate a sample size that should have been able to detect results for five groups, with an effect size of 0.15, significance level of 0.05, and 80% power. The results of the power analysis suggested I needed to recruit 535 individuals; I ended up recruiting 601. While this number of respondents was clearly enough to detect main effect results, it seems like it might not have been enough to detect interactions. The original design of

the experiment called for recruiting only Republican-identifying individuals; however, issues with the MTurk platform necessitated recruiting respondents across the political spectrum. This change required an interaction effect between the party of the respondent and the experimental condition to be introduced into the regression equation. When introducing an interaction, power is generally substantially reduced (Gelman, 2018; Giner-Sorolla, 2018; Institute for Digital Research & Education, n.d.).[19] A similar study that utilized interactions and recruited individuals on MTurk was conducted with 3,000 respondents (Merkley & Stecula, 2020). A future study could recruit more respondents utilizing the same experimental treatments to determine if this study was simply underpowered.

A further reduction in power possibly occurred due to the inattentive nature of the sample. I deemed over 40% of the sample inattentive because they failed at least two elements of a three-pronged test I adapted from Buchanan and Scofield (2018). I measured how long respondents spent on the page, how many unique answer choices they selected, and how many clicks they made on the page. Although the inattentive respondents were significantly different on the overall opinion scale than attentive ones, randomization was successful, so I concluded that systematic bias was not introduced into the study. However, the large number of inattentive respondents likely introduced substantial noise into the data, further reducing the study's power.[20] This is further justification for conducting the study again with a larger sample size. In

[19] Gelman (2018) estimates that introducing an interaction requires sample sizes as much as 16 times larger than one needs to estimate a main effect. He criticizes researchers who seek a significant finding by adding interactions. While this criticism does not apply here because the theoretical focus was on the interactions from the onset, the significant interactions I did find might simply be the result of noise.

[20] This noise may also have led to Type M errors (Gelman, 2017), which tend to increase when uncertainty is high (Gelman et al., 2012). Gelman (2004) defines a Type M error as claiming an effect size as large when it is actually small, or vice versa. Traditionally, researchers have identified this type of error as dealing with multiple comparisons. I ran many statistical tests in this study, and adherents to the Bonferroni correction (Diez et al, 2012) would recommend adjusting alpha prior to the running of the statistical tests to account for this. Gelman et al. (2012), however, offer a potential Bayesian solution to deal with Type M errors. They suggest utilizing multilevel Bayesian models that build in these multiple comparisons into the model itself in the form of partial pooling.

an attempt to increase attentiveness in the current study, I provided a warning at the beginning of the study that encouraged respondents to pay attention to the questions and that sophisticated statistical controls would be employed to determine attentiveness (adapted from Clifford & Jerit, 2015). I chose this method instead of employing attention check questions because removing respondents that fail attention checks has its own set of problems (Leiner, 2019), as well as advice indicating that attention checks reduce data quality (Vannette, 2017). Future studies could increase payment or require a Master qualification to participate, however, several studies have found these to be ineffective (Buhrmester, 2011; Loepp & Kelly, 2020; Mason & Watts, 2009; Rouse, 2019). The best solution appears to be to increase the sample size in the future to account for noise introduced by inattentive respondents.[21]

Another limitation could be the absence of a true placebo group in the study. The control group received a robust argument in favor of reducing greenhouse gas emissions, which might have been too strong. Other studies such as McCright et al.'s (2015) research included similarly strong control groups and were able to detect significant effects. If this study were to be conducted again, a true placebo group could serve as the control instead of the current climate change message. A respondent could be asked to read a message about an entirely different political issue (e.g., tax reform), or something less political entirely (e.g., sports, popular culture, etc.). It would also be possible to create a placebo group that contained no message at all. A few of the questions on the post-test would have to be altered to accommodate this, such as those relating to the credibility of the message source. This approach is not unforeseen in online experiments (Clarke et al., 1999; Gaines et al., 2007), with the control group receiving a different battery of questions than the experimental treatment groups. Alternatively, the messages

[21] There are also alternative crowdsourcing worker sites, such as Prolific, that could be explored.

respondents receive in the treatment groups can be strengthened, although this could come at the expense of realism, a tactic Chong and Druckman (2007) caution against. Either adding a true placebo group, or strengthening the treatment messages, could show clearer experimental treatment effects in a future study.

This study focused on two distinct frames and I believe future research should focus on refining messages with frames as opposed to consistently comparing between frames. For years, climate change researchers have been testing the effectiveness of competing frames (e.g., public health versus national security, as in this study, see e.g., McCright et al. 2015; Myers et al., 2012), instead of distinct frames on the same topic (e.g., a public health message focusing on clean air versus a public health message focusing on clean water). New research could move beyond finding out if a generic public health frame was effective and instead attempt to determine what specific arguments within public health frames are the most effective. For example, the treatments in this study brought together several public health messages and put them into one message (e.g., asthma, heat waves, severe weather events, etc.). It is possible that a specific message could be more effective. Future studies could test distinct public health arguments, for example, against one another.

Lastly, there are internal and external validity issues to discuss. I encountered one potential internal validity issue within the experimental treatments. The only difference between the two national security conditions was supposed to be the party of the governor, however, seven words were missing from the Republican-governor message. This occurred when transferring the treatments from Microsoft Word onto the Qualtrics platform. This would potentially raise internal validity issues if I compared between these two groups, however, I only compared between the individual treatments and the control group. Thus, while the weaker treatment could

have produced a false negative, there was only one instance where the Democratic-governor message was significant, and the Republican-governor message was not. Ensuring the treatments are identical would strengthen internal validity in future studies, especially if comparisons are made between treatments. There were issues with external validity in this study, although generalizability was not an explicit goal. For example, this MTurk sample was younger than the American population, and older Americans were substantially underrepresented. A future study could seek a nationally representative sample. However, in the age of targeted messaging (Haenschen & Jennings, 2019), I do not think a representative sample is necessary. While there were two validity issues within this study, they were minor and should not lead readers to discount the findings.

Advice for Climate Change Communicators

The final section of this dissertation provides some advice for how best to communicate climate change in a highly polarized environment. I will discuss how communicators should focus on behaviors, further exploring national security messages, encouraging governors and others to speak on the issue, finding targeted messages for specific groups, focusing on moral values, and educating people early on about climate change. First, the findings of this study provide evidence that messaging should potentially focus on climate-friendly behaviors and policies, as opposed to the broader issue of climate change. While previous research has shown that messages about renewable energy policies are less polarizing than those that also mention climate change (Feldman & Hart, 2018), I discovered that climate-friendly behaviors are also less polarizing. For example, I did find an effect of political party on attitudes about reducing greenhouse gas emissions, but I did not find an effect of political party on climate-friendly behaviors like recycling, reducing energy use, and carpooling. Since party did not predict support

for behaviors, then these elements of emission reductions might not be as polarized, and thus messengers could tap into these behaviors more easily. My advice for communicators would be to avoid the climate change and global warming phrases entirely, and instead focus on less polarizing ideas such as renewable energy, recycling, reducing energy, and carpooling. These behaviors alone will not be enough, but they could encourage people to care more about the environment in general and climate change more specifically.

I also discovered in this project that national security messages could be effective, which went against the theoretical approach I adopted. The prior experimental evidence on national security messages was mixed, with some research finding that national security messages were ineffective (e.g., Myers et al., 2012; Zhou, 2016), while McCright and colleagues (2015) argued that national security arguments could be effective, especially among military families. My research indicated that both national security messages led respondents, regardless of their own party, to believe that reducing greenhouse gas emissions would have a positive impact on national security. This is even true when looking at only Republican respondents, although the association between the experimental group and outcome variable was not significant when looking at the cross-tabulations. Both national security messages also increased Republican-individual support for reducing greenhouse gas emissions, although only the Democratic-governor message was significant in the model. These results should be interpreted and applied with caution. I would still advise communicators to remain prudent when making national security arguments in front of Republican audiences. We need to determine which types of these messages are most effective overall for national campaigns, and also consider targeted messages for today's digital age. This means finding messages that work for each subset of the population as the well. It is possible that one type of national security argument (e.g., energy security)

resonates with a Republican audience while another argument (e.g., conflict) creates the aforementioned boomerang effects. Overall, national security arguments hold more promise than I previously theorized.

Next, I would encourage governors and other less partisan leaders to continue taking a leading role on climate change. Governors appear to be viewed as and behave in less partisan ways (e.g., Gao, 2013; Keena & Knight-Finley, 2017) than other political leaders, which could make them uniquely capable of communicating climate change. This study revealed that there is still a potential credibility gap among Republican governors on climate change, but this could be explained by the anonymity of the governor in the treatments. For example, a moderate, anti-Trump, Republican governor like Larry Hogan of Maryland, could be the key to unlocking support among Republicans on the fence about climate change. Pragmatically, the goal should never be to win over every climate change skeptic, instead climate change communicators should focus on winning over those in the middle. These individuals are described by the Yale Program on Climate Change Communication (2020) as "cautious" about climate change and make up 20% of the population. Finding trusted, knowledgeable, speakers is a necessary step to reach this population. America's governors in the United States Climate Alliance might be able to help convince Americans to take climate change seriously and support emissions reductions. Calling on America's governors to take a larger public leadership role on other partisan issues such as gun control, race relations, and poverty (Pew Research Center, 2021), could go a long way in dealing with some of the most pressing issues facing the nation. I would encourage climate change advocates to recruit individuals respected across the political spectrum, especially among Republicans with "cautious" views about climate change, to serve as ambassadors in the fight to reduce greenhouse gas emissions.

Another approach to take when discussing climate change in the public sphere is to focus on moral values, especially on issues as polarizing as climate change. In general, an individual's partisanship is a product of one's deeper set of moral values, which are made up of their views on care, fairness, loyalty, authority, and sanctity (Graham et al., 2009). In terms of the environment and climate change, Lakoff (2010) argues that communicators should, "Talk at the level of values, and frame issues in terms of moral values. Distinguish values from policies" (p. 79). Support for this view is also demonstrated in work by Feinberg and Willer (2013) who discovered that when conservatives read messages framed around the moral value of purity, the attitudinal distinctions between conservatives and liberals were lessened. Preliminary work on moral values and presidential climate change discourse revealed that Democratic presidents have been utilizing the purity moral value, indicating that they might be trying to reach out to Republican audiences (Fine & Calderwood, 2019). Climate change communicators should consider framing messages in terms of moral values. This does not mean that they must abandon making public health or national security arguments, I am suggesting that these types of arguments could be combined to make the most effective argument possible.

I would like to end with a brief discussion about incorporating climate change into all levels of education curriculum. One key finding of this dissertation was that higher education is not the silver bullet to increasing support for reductions in greenhouse gas emissions. While it is reasonable to expect that more education and scientific literacy would lead to higher acceptance of climate change, this is not the case for Republicans (Kahan et al., 2012). As Kahan and colleagues (2012) note, more education and scientific literacy grants additional skills to individuals to engage in motivated reasoning. Incorporating climate change into the education curriculum early on must be a priority and will require a lot of additional research from

education communication researchers. A good start is a free resource from Armstrong and colleagues (2018) which covers a wide range of topics including the psychological elements of climate change, how best to discuss climate change, and strategies for teaching climate change at various education levels. The same problems that exist with communicating climate change to the general public applies to the education system as well. Armstrong and colleagues (2018) aver, “The complexity of climate science combined with the complicated political and cultural context in which people live makes climate change a particularly challenging topic to approach no matter the educational setting” (loc 104). As researchers, it is up to us to discover the best ways to communicate climate change to all audiences. The fate of future generations rests in large part on finding effective ways to build a coalition of in favor of reducing greenhouse gas emissions. Let us all employ the power of language to save the planet from destruction.

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Appendix A: Codebook

Building the dataset

The conceptual definition of climate change I used was from the Environmental Protection Agency (EPA): "Climate change refers to any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among others, that occur over several decades or longer."

I queried five search terms: carbon*, emission*, greenhouse*, climat*, and warm*.

The purpose of this portion of the content analysis was to identify if an invocation met the conceptual definition of climate change from the EPA.

Each invocation included at least one of the search terms. To identify if the invocation met the conceptual definition, I used the following operational definition:

0 = Does not meet conceptual definition
1 = Meets conceptual definition

Examples of relevant:

Caron dioxide leads to climate change
Emission of CO2 leads to climate change
The greenhouse effect leads to climate change
Climate change is a problem
Global warming is a problem

Examples of irrelevant:

Carbon life forms might exist in our solar system
The emission of light from the lamp
The greenhouse at the university is pretty
The economic climate is weak
Thank you for the warm welcome

Variables

Date

CD: The date was when the president or governor made the communication.

OD: I coded the day, month, and year of each communication.

Speaker

CD: Each speaker had a name.

OD: I assigned a number to each speaker.

1- George H. W. Bush
2- Bill Clinton
3- George W. Bush
4- Barack Obama
5- Donald Trump
6- Jerry Brown
7- Gavin Newsom
8- John Hickenlooper
9- Jared Polis
10- Dannel Malloy
11- John Carney
12- David Ige
13- J. B. Pritzker
14- Janet T. Mills
15- Larry Hogan
16- Charlie Baker
17- Gretchen Whitmer
18- Tim Walz
19- Steve Sisolak
20- Phil Murphy
21- Michelle Lujan Grisham
22- Andrew Cuomo
23- Kate Brown
24- Phil Scott
25- Terry McAuliffe
26- Ralph Northam
27- Jay Inslee
28- Tony Evers
29- Roy Cooper

President

CD: The speakers held either the presidency or a governorship.

OD: Each speaker received a code based on the office they held.

0 = Not a president
1 = President

Party

CD: From 1989-2018, all five presidents identified with either the Democratic or Republican Party. All state governors in the United States Climate Alliance identified with either the Democratic or Republican Party.

OD: I coded each communication based on the party affiliation of the president:

0 = Republican
1 = Democratic

Title

CD: Each communication delivered by a president and governor had a title.

OD: I provided the title for each communication.

Mention

CD: The invocation of climate change served as the unit of analysis for this study.

OD: I retained the climate change invocation along with the paragraph in which the communication occurred.

Frame

CD: A president or governor could have offered several frames when discussing climate change. Scholars have identified national security and public health frames as potentially important frames when discussing climate change.

OD: Each invocation received one of the following four codes:

0 = Not about national security or public health (General environmental focus)
1 = About national security
2 = About public health
3 = About both national security and public health

National security. A national security frame was defined as present when the speaker made a reference to the national security of the country or state. Examples of this included references to "energy independence," "national security," and "military leaders." Bill Clinton offered a representative example of this when he stated, "Climate change, if we don't do something about it, will become a national security concern because more and more land will become unarable, and people will fight more and more over that which is."

Any word that discussed the national security consequences of climate change:

War
Peace

Conflict
Energy dependence
Energy independence
Dependence on foreign oil
Reliance on foreign oil
Importer of foreign oil
Addiction to foreign oil
Imports of oil
Reliant
Security
Energy security
Military
Men and women in uniform
Generals
Admirals
Public safety
Safe
Existential
Survival
Conflicts
Frontlines
Hostile
Unstable
National security
Import
Air Force
Coast Guard
Dependency from certain parts of the world
Energy independent
Defense Department
Less dependence on foreign sources of energy
Energy independent
Army
Foreign oil
Oil that's controlled by foreign dictators
Foreign sources of energy
Dependent on foreign oil
Secure
"If another country threatened to wipe out an American town…" is a national security metaphor. These types of comparisons should be considered national security invocations.
"On the frontlines of climate change" is a national security metaphor. These types of comparisons should be considered national security invocations.

Public health. A public health frame was identified as present when the speaker made a reference to the health benefits of acting on climate change. Examples of these terms included references to "air pollution," "asthma," and "malaria." Barack Obama offered a representative example of

this frame when he stated, “Over the past three decades, nationwide asthma rates have more than doubled, and climate change puts those Americans at greater risk of landing in the hospital.”

(1) Air Quality

Any word(s) that discussed public health consequences of polluted air:

Aeroallergen
Allergens
Air
Airborne particles
Air pollutants
Air pollution
Air quality
Asthma
Breathe
Bronchitis
Clean air
Clean Air Act
Clear Skies
Coughing
Dirty
Ground-level ozone
Lung illnesses
Particle pollution
Particulate matter
Particulates
Pollen
Pollutants
Polluting
Pollution
Respiratory disease
Respiratory disorders
Respiratory infections
Respiratory syncytial pneumonia
Respiratory syncytial virus
Smog
Smoke
Smokestack
Super pollutants
Upper respiratory tract symptoms
Wheezing
Big polluters
Polluter

(2) Water Quality

Any word(s) that discussed public health consequences of unclean water:

Water
Water intrusion
Fresh water inundation (from sea level rise)
Reduced water quality
Water quality
Clean water
Fresh water
Water system
Water shortage
Water supplies

(3) Emissions

Any word that clearly marked a type of emission as potentially bad for public health:

Harmful
Dirty
Toxic
Hazardous
Dangerous

Examples that were excluded:

“Carbon emissions”
“Fossil fuels”
“Tailpipe emissions”
“Powerplant emissions”

Examples that were included:

“Harmful carbon emissions”
“Dirty fossil fuels”
“Toxic tailpipe emissions”
“Hazardous powerplant emissions”
“Dangerous greenhouse gases”

(4) Food

Any word(s) that clearly connected declining agricultural production and public health:

Famine
Food security
Food insecurity

Malnutrition
Nutritional value
Safe food

An example that was excluded:

“Climate change causes higher food prices”

Examples that were included because they make a direct connection to public health:

“Climate change causes higher food prices leading to malnutrition.”

(5) Extreme Weather Events

Examples of extreme weather events were:

Acid rain, hurricanes, drought, sea level rise, flood, heat waves, algal blooms, dust storms, rising oceans, sea levels rise, and wildfires

Extreme weather events were only included if the speaker directly tied the event to harming people.

An example that was excluded:

“Climate change causes heat waves”

An example that was included:

“Climate change causes heat waves that leads to premature deaths”

“Island nations could literally be buried”

“Swallow up entire countries”

“Mass migration” (from sea level rise)

“Cities submerged”

(6) Health complications from climate change (diseases, infections, etc.)

Note: Most of these diseases/infections/health conditions were unlikely to appear in political communications because they were too scientific. If an unfamiliar disease/infection/health condition appeared it was checked against this list.

Any word(s) that connected climate change to a disease, infection, or other human health condition:

Age related macular degeneration
Amoebiasis
Anthroponosis
Anxiety (as a result of extreme weather events)
Arbovirus
Atopic eczema
Autoimmune diseases
Biotoxin
Campylobacter
Campylobacteriosis
Cardiovascular disease
Cardiovascular disorder
Cataract
Center for Disease Control and Prevention (CDC)
Cerebrovascular disease
Chagas disease
Chest pain
Chikungunya
Chloroquine
Cholera
Chronic obstructive pulmonary disease (COPD)
Ciguatera
Coccidioidomycosis
Copepods
Cryptosporidiosis
Cryptosporidium
Cytomegalovirus
Dementia (during heat waves)
Dengue
Diarrheal disease
Diphtheria
Diseases
Drowning (as a result of flooding)
Dysentery
Emerging infectious disease
Encephalitis
Endemic
Enzootic disease
Epidemic
Epidemiology
Epizootic
Erythema
Falciparum malaria
Fleas
Fungal

Fungi
Global Outbreak and Response Network Program for Monitoring Emerging Diseases (PROMED)
Hantavirus
Hantavirus pulmonary syndrome
Hard ticks
Health
Health for All
Health impact assessment
Heat stroke
Helminths
Herbicide
Hypothermia
Immunosuppression
Incidence
Indirect transmission
Infection
Ischemic heart disease
Kidney disorders
Leishmaniasis
Leptospirosis
Livestock production
Lower respiratory tract infections
Lyme disease
Lymphatic filariasis
Malaria
Melanoma
Meningococcal meningitis
Mental health
Mental illness
Minimum erythemal dose
Mold
Mosquitoes
Non-Hodgkin's lymphomas
Onchocerciasis
Oropouche
Pandemic
Pathogen
Pesticide
Pests
Photoconjuctivitis
Photokeratitis
Plague
Plasmodium falciparum
Plasmodium vivax
Pneumonia

Post-traumatic stress disorder
Premature death (from health problems)
Pterygium
Public health
Red tide
Rift Valley Fever
River blindness
Rocky Mountain Spotted fever
Salmonellosis
Schistosomiasis
Schizophrenia
Skin cancer
Snowshoe hare virus
Soft ticks
Spirochete
Spores
St. Louis encephalitis
Suicide
The Centre for Research on the Epidemiology of Disasters (CRED)
Tick-borne encephalitis
Ticks
Trachoma
Trypanosomiasis
Tsetse fly
Tuberculosis
Tularemia
Typhoid
Unstable malaria
Urban heat islands
Valley fever
Vector
Vector borne diseases
Vivax malaria
Waterborne disease
Weeds
West Nile Virus
Western equine encephalitis
World Health Organization (WHO)
Yellow Fever
Zoonotic

Both national security and public health. The speaker could also offer both national security and public health frames.

Additional Notes from Two Intercoder Reliability Sessions

(1) Exclusions for public health

(a) “Stuff into the air” was too vague for public health

(b) The word “harmful” needed to modify some type of emission to be considered a public health term. For example, “harmful effects of carbon dioxide” would be considered public health. However, “harmful effects of climate change” was too vague to be considered public health.

(c) Natural disasters needed to have an impact on humans. These were not public health because the intensification of natural disasters does not talk about human effects:

Decades of carefully reviewed science tells us our planet is changing in ways that will have profound impacts on the world we leave our children. Already, we know that the 12 warmest years in recorded history have all come in the last 15 and that last year was the warmest in American history. And while we know no single weather event is caused solely by climate change, we also know that in a world that's getting warmer than it used to be, all weather events are affected by it: more extreme droughts, floods, wildfires, and hurricanes.

So, the climate is changing, and the globe is warming at an unsustainable rate. And if it is not slowed and ultimately reversed, what will happen is, the polar ice caps will melt more rapidly; sea levels will rise; you will have the danger of flooding in places like the precious Florida Everglades or the sugarcane fields of Louisiana; island nations could literally be buried. The whole climate of the United States, for example, could be changed where you would have more flooding, more heat waves, more storms, more extreme weather events generally.

When we made a decision that we were going to double fuel efficiency standards on cars, everybody said, oh, this is going to ruin the American auto industry. The American auto industry has been booming over the last couple years. Acid rain: When George H.W. Bush instituted a system to charge for the emissions that were causing acid rain, everybody said, well, you can't do that, that's going to ruin business. And it turned out it was smoother, faster, quicker, better. And acid rain—folks who were born—I don't know, some of you reporters are getting younger, or I'm getting older—may not remember it, but that was a big deal. Now most folks don't even remember it anymore, because it got solved. And there's no reason why the same won't happen here.

(2) Inclusions for public health

(a) This was about public health because it talked about the direct effect it had on humans:

And this bill gives a green light to 34 water infrastructure projects across the country, including projects to deepen Boston Harbor and the Port of Savannah and to restore the Everglades. And with Congress's authorization, these projects can now move forward. So this bill will help towns and cities improve their commerce, but it's also going to help them prepare for the effects of climate change—storms, floods, droughts, rising sea levels—creating more adaptability, more resilience in these communities.

The President. Well, with climate change, 99 percent of scientists have said if we do not do something now, then we may not be able to deal with rising oceans, we may not be able to deal with increased drought, we may not be able to adapt fast enough so that our children and our grandchildren are able to enjoy this beautiful planet the same way we did. Ninety-nine percent of them!

So on all these issues, the good news is, is that we have within our ability—we have within our grasp the ability to solve them. Even an issue as big as climate change. And I know it's hot today. [Laughter] We can't correlate any single weather event to climate change, but what we know is, is that the planet is getting hotter. And here in California, what we know is, is that the historic drought that you're going through is not going to get better if temperatures rise and snowpacks are nonexistent and water becomes scarce and wildfires rage all across the West.

(b) This was about public health because dangerous modified greenhouse gases:

I look forward to hearing Angela's assessment of how Europe and the IMF can work with the new Greek Government to find a way that returns Greece to sustainable growth within the euro zone, where growth is critical to both the United States and the global economy. And we'll be discussing our work to get all major economies to take ambitious action on climate change, including our initiative to limit public financing for coal-fired power plants overseas and our global efforts to phase down some of the most dangerous greenhouse gases.

(c) This was about public health because clean air, clean water, and safe food were references to public health and global warming

If we want to build a nation that lives by community—what does that mean? It means we have to continue to improve the environment even as we grow the economy—cleaner water, cleaner air, safer food, fewer toxic waste dumps. It means we have to meet our challenge of doing our part on the issue of global warming. And it means we have to do it in a way that uses technology and common sense and creativity to continue to create jobs and grow the economy as we improve the environment. Now, which party is more likely to do that?

(3) Exclusions for national security

(a) Safe nuclear power was not a national security term:

But to create more of these clean energy jobs, we need more production, more efficiency, more incentives. And that means building a new generation of safe, clean nuclear power plants in this country. It means making tough decisions about opening new offshore areas for oil and gas development. It means continued investment in advanced biofuels and clean coal technologies. And yes, it means passing a comprehensive energy and climate bill with incentives that will finally make clean energy the profitable kind of energy in America. Now, I am grateful to the House for passing such a bill last year. And this year, I'm eager to help advance the bipartisan effort in the Senate.

The energy bill that passed the House will finally create a set of incentives that will spark a clean energy transformation in our economy. It will spur the development of low carbon sources of energy, everything from wind, solar, and geothermal power to safer nuclear energy and cleaner coal. It will spur new energy savings, like the efficient windows and other materials that reduce heating costs in the winter and cooling costs in the summer. And most importantly, it will make possible the creation of millions of new jobs.

The other thing is, is that we got to promote nuclear power. I am convinced that the plant designs today are safe. I know we have got to do research on how to burn down the spent fuel in order to make people comfortable that we can deal with the waste in a smart way. If you're an environmentalist and concerned about greenhouse gases, you got to be for nuclear power. Nuclear power enables the developed world and the developing world to generate, get a—get cheap electricity without one iota of greenhouse gases.

(b) The words “peace” and “safe” needed to be more specific when tied to national security. For example, these were not considered national security:

Peace with justice means refusing to condemn our children to a harsher, less hospitable planet. The effort to slow climate change requires bold action. And on this, Germany and Europe have led. In the United States, we have recently doubled our renewable energy from clean sources like wind and solar power. We're doubling fuel efficiency on our cars. Our dangerous carbon emissions have come down. But we know we have to do more, and we will do more.

Safe drinking water was not a national security term.

Leaving the planet safer was not national security, unless the speaker mentioned what the planet was safer from. For example, if the speaker said “the planet is safer from conflict” then that would be national security. However, if the speaker said “the planet is safer from environmental destruction” that would not be national security.

(c) These were also not national security:

As Democrats, our plans to combat climate change actually recognize the existence of climate change. [Laughter] And we see—and it's not just a matter of trying to solve a problem—avert danger, it's we see opportunity and jobs in moving to a clean energy economy. We want America to be out front. We embrace our responsibility to leave our kids with a safe, prosperous, habitable planet.

So the idea of setting standards and cutting carbon pollution is not new. It's not radical. What is new is that, starting today, Washington is starting to catch up with the vision of the rest of the country. And by setting these standards, we can actually speed up our transition to a cleaner, safer future.

(4) Look out for lists: these were not national security about climate change.

I know that at the G-20, we're committed to working with other countries to build sustainable, inclusive economies and create opportunities for all of our people. In joining the Paris Agreement today, we're demonstrating our shared commitment to climate change. I look forward to an extensive discussion on our shared interests in advancing regional and global security, from the Korean Peninsula to the fight against ISIL. We very much welcome China's contributions to global development, peacekeeping, and refugee assistance.

To help achieve all these priorities, I set an ambitious goal in my State of the Union: to cut America's gasoline usage by 20 percent over the next 10 years. I call this goal 20-in-10, and I have said—sent to Congress a proposal that would meet it in two steps. First, this proposal will set a mandatory fuel standard that requires 35 billion gallons of renewable and other alternative fuels by 2017. That's nearly five times the current target. Second, the proposal would continue our efforts to increase fuel efficiency. My administration has twice increased fuel economy standards for light trucks. Together, these reforms would save billions of gallons of fuel and reduce net greenhouse gas emissions, without compromising jobs or safety.

This budget, in short, makes really strong and significant steps toward achieving the great goals that I believe America should pursue in this new century. It helps us move toward an America where every child starts school ready to learn and graduates ready to succeed; where parents are able to succeed at home and work, and no child is raised in poverty; where we meet the challenge of the aging of America; where we provide health care to all; where we make America the safest big country on Earth; bring prosperity to the communities and people who have been left behind; pay off our national debt; reverse the course of climate change; keep America leading the world in science and technology and toward peace and prosperity; and bring our country together, at last, as one America.

(5) Look out for lists: these were not public health about climate change.

The knowledge we gain from our space missions could help us treat Diseases here on Earth, from osteoporosis to ovarian cancer. It could make our farms more productive. It could help us meet the challenge of global climate change. And perhaps help us to uncover the very origins of life itself.

Isn't it ironic that, on the verge of a new century and a new millennium, where most of us—most of the people in this room have this great dream of a 21st century world that is more peaceful, more prosperous, and more free than any time in all of human history; where people work together across national lines to lift each other up and solve problems together, whether they're the spread of Disease or climate change or the threat of terrorism or narcotrafficking or weapons of mass destruction. We're working together to make good things happen and to press bad things down. And this whole vision, with this explosion of modern technology and science, is threatened by the prospect that we will marry modern technology with the most ancient hatreds known to human society, rooted in the fear of people who are different from us.

(6) Look out for changes in topic: these were not national security about climate change.

How are we going to grow the economy and deal with the challenges of the local environment, where you have a lot of growth, and the global environment and global warming, which is real and can change everything about the way our children live? How are we going to be a force for peace and freedom and decency throughout the world and minimize the new security challenges that the young people in this audience will face from chemical, biological, nuclear weapons that like everything else will benefit from, unfortunately, new technology and miniaturization? How are we going to give all of our kids a world-class education? How are we going to make sure everybody has got a chance to participate in this economy?

Just as democracies are premised on the peaceful resolution of disagreements within our societies, we also believe that cooperation and dialogue is the best way to address challenges between nations. And so it is my belief that democracies are more likely to try to resolve conflicts between nations in a way that does not result in war. That's how, with diplomacy, we were able to shut down Iran's nuclear weapons program without firing a shot. With diplomacy, the United States opened relations with Cuba. With diplomacy, we joined Greece and nearly 200 nations in the most ambitious agreement ever to save our planet from climate change.

THE PRESIDENT: No, I — well, I understand. But at some level, they're going to be a big dog in that neighborhood, and we welcome China's peaceful rise. In many ways, it would be a bigger national security problem for us if China started falling apart at the seams. So we — we want the Chinese people to steadily have a higher standard of living; we want China to have increased capacity to participate in international efforts around issues like climate change.

(7) Look out for changes in topic: these were not public health about climate change.

Whenever we act to heal our environment, some always question whether it will hurt our economy. But today, our economy is the strongest in a generation and our environment, the cleanest in a generation. Whether the problem has been acid rain, deadly Pesticides, polluted rivers, or the ozone hole, the ingenuity of the American people has always proved to carry the day—and we'll do it once again. Working together, we will overcome the challenge of global climate change and create new avenues of growth for our economy. And most important, we'll honor our deepest responsibility to pass on this home, without harm, to our children, our grandchildren, and generations yet to come.

Perhaps most importantly, we believe in the equality and inherent dignity of every human being. Today in America, people have the freedom to marry the person that they love. We believe in justice, that no child in the world should ever die from a Mosquito bite; that no one should suffer from the ache of an empty stomach; that, together, we can save our planet and the world's most vulnerable people from the worst effects of climate change. These are things that we share. It's born of common experience.

We've got to devise answers to the problems of ozone depletion and global warming and acid rain. We've already joined with other nations to call for the elimination of CFC's [chlorofluorocarbons] and the development of environmentally safe substitutes, as well as adopting a tough new policy on the export of hazardous waste. We can do these things without stifling the economic growth that is necessary, indeed, essential for our nation's economic health.

The time has come to set aside partisan approaches to these and these other enormous environmental questions. We've got to ensure that our grandchildren can fish on the same lakes we've enjoyed.

Appendix B: Online Experiment

CONSENT TO PARTICIPATE

You are invited to participate in a web-based online experiment on climate change communication. This is a research project being conducted by Kevin Calderwood, a graduate student at the University of Washington. It should take approximately 15 minutes for you to complete the task.

PARTICIPATION
Your participation in this experiment is voluntary. You may refuse to take part in the research or exit the questionnaire at any time without penalty. You are free to decline to answer any question you do not wish to answer for any reason.

BENEFITS
You will receive an incentive of $1.25 upon completion of the experiment. Additionally, your responses may help us learn more about how best to communicate about climate change.

RISKS
The Institutional Review Board at the University of Washington approved this project with exempt status, indicating minimal or no risk to participants (IRB ID #STUDY00007388). You will be asked a series of questions about your demographics (age, income, race, education, gender, party affiliation, and political ideology) and questions about your climate change attitudes. You will also read a brief news story about climate change.

CONFIDENTIALITY
Your survey answers will be submitted through Qualtrics, where data will be stored in a password protected electronic format. No personal identifying information will be collected, and the survey will not ask for your Mechanical Turk worker ID. Your Mechanical Turk worker ID will be associated with participating in the HIT. Your responses will remain confidential.

CONTACT
If you have questions at any time about the study or the procedures, you may contact the principal investigator by email at kjcalder@uw.edu.

If you feel you have not been treated according to the descriptions in this form, or that your rights as a participant in research have not been honored during the course of this project, or you have any questions, concerns, or complaints that you wish to address to someone other than the investigator, you may contact the University of Washington Institutional Review Board via phone at 206-543-0098 or by email at hsdinfo@uw.edu.

ELECTRONIC CONSENT: Please select your choice below. You may print a copy of this consent form for your records. Clicking on the “Agree” button indicates that:

- You have read the above information
- You voluntarily agree to participate
- You are 18 years of age or older

- Agree
- Disagree

Skip logic: If disagree is selected skip to end of survey.

[New page]

I check responses carefully using sophisticated statistical control methods in order to make sure that people have read the instructions for the task and responded carefully. I try to only use data from participants who clearly demonstrate that they have read and understood the survey. Do you understand?

- I understand
- I do not understand

[New page]

Instructions: Please answer the following demographic questions about yourself.

1. What is the year of your birth? [Drop down menu]
    a. Years listed from 1900-2002
2. In which of these groups did your total household income, from all sources, fall in 2019 before taxes? [Drop down menu]
    a. Under $29,999
    b. $30,000-$59,999
    c. $60,000-$89,999
    d. $90,000-$119,999
    e. $120,000 or more
3. What racial or ethnic group describes you? [Drop down menu]
    a. White
    b. Black or African American
    c. American Indian or Alaska Native
    d. Asian
    e. Native Hawaiian or Pacific Islander
    f. Hispanic
    g. None of the above
4. What is the highest level of school you have completed or the highest degree you have earned? [Drop down menu]
    a. Did not graduate high school
    b. High school graduate
    c. Some college
    d. Associate's degree
    e. Bachelor's degree
    f. Master's Degree
    g. Professional degree (MD, MBA, JD)
    h. Doctoral degree
5. Where would you place yourself on this scale of political ideology? [Radio buttons]
    a. Extremely liberal (1)

   b. Liberal (2)
   c. Slightly liberal (3)
   d. Middle of the road, independent (4)
   e. Slightly conservative (5)
   f. Conservative (6)
   g. Extremely conservative (7)
6. Generally speaking, do you usually think of yourself as a Republican, a Democrat, or an Independent? [Radio buttons]
   a. Strong Democrat (1)
   b. Weak Democrat (2)
   c. Independent Democrat (3)
   d. Independent (4)
   e. Independent Republican (5)
   f. Weak Republican (6)
   g. Strong Republican (7)
7. What sex were you assigned at birth, on your original birth certificate? [Drop down menu]
   a. Male
   b. Female
8. How do you describe yourself? [Drop down menu]
   a. Male
   b. Female
   c. Transgender
   d. Do not identify as female, male, or transgender

[New page]

[Randomly assign participants to one of five groups, four treatments and one control]

Instructions: Please read the following news story about climate change and then answer the questions on the next page.

Control

abc NEWS

Governor cites risks from climate change

By SETH STEIN November 10, 2020

WASHINGTON, D.C. (ABC News) — Today's scientific report from the Fourth National Climate Assessment provides unequivocal evidence that climate change is happening now and is caused by humans. Many scientists and policy-makers urge us to take action to reduce our greenhouse gas emissions. Various groups, including the U.S. Global Change Program and the Intergovernmental Panel on Climate Change are advocating for us to reduce our nation's greenhouse gas emissions to slow climate change.

According to one of the authors of the new report, published by the U.S. Global Change Program, "The average global temperature is much higher and rising more rapidly than anything modern civilization has experienced." An unchecked rise in global temperatures will potentially lead to drought, sea level rise, and famine, among other problems. The authors suggest that these problems will be felt worldwide unless immediate action is taken to stop temperatures from rising above 2 degrees Celsius.

After the release of the report, a nationally recognized governor issued the following statement: "The release of carbon dioxide and greenhouse gases into the atmosphere will have a destructive effect on our state and our country. Many people will die as a result. This is not just an American problem; it will have a worldwide impact. That's not just my opinion. That is the opinion of the Intergovernmental Panel on Climate Change, the world's leading authority on this issue: climate change is a problem. It is caused by humans and demands immediate attention. It will lead to problems ranging from drought to famine to sea level rise that costs lives. The world must

prepare to deal with these potential problems. The world's leading climate scientists suggest that society must keep the warming of the planet to less than 2 degrees Celsius in this century or run the risk of runaway global warming."

Republican Governor with National Security Frame

abc NEWS

Republican Governor cites national security risks from climate change

By SETH STEIN November 10, 2020

WASHINGTON, D.C. (ABC News) — Today's scientific report from the Fourth National Climate Assessment provides unequivocal evidence that climate change is happening now, is caused by humans, and is a growing threat to our country's national security. Many scientists and policy-makers urge us to take action to reduce our greenhouse gas emissions. Several Republican governors offered their support of the assessment, citing high ranking military officials at the Pentagon who are advocating for us to reduce our nation's greenhouse gas emissions to slow climate change.

According to one of the authors of the new report, published by the U.S. Global Change Program, "The average global temperature is much higher and rising more rapidly than anything modern civilization has experienced." The rapidly changing environment raises the risk of national security crises, such as intensifying conflicts over arable land, declining oil reserves, and rising sea levels harming the military's readiness to defend the country. The report noted that Americans, especially Republicans, care deeply about national security issues.

After the release of the report, a nationally recognized Republican governor made the following statement, "The release of carbon dioxide and greenhouse gases into the atmosphere will have a destructive effect on our state and our country. Climate change will devastate our communities as political conflicts over resources intensify into full-fledged hot shooting wars. This is not just an American problem; it will have a destabilizing impact worldwide. That's not just my opinion. That is the opinion of our Joint Chiefs of Staff, the country's leading military officials: climate

change is a direct national security threat. It will cause more instability in regions like the Middle East. It will lead to conflicts that cost thousands of lives. The military is unprepared to deal with these potential new hotspots." This sentiment was broadly shared by other Republican governors interviewed for this story.

Democratic Governor with National Security Frame

abcNEWS

Democratic Governor cites national security risks from climate change

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After the release of the report, a nationally recognized Democratic governor made the following statement, "The release of carbon dioxide and greenhouse gases into the atmosphere will have a destructive effect on our state and our country. Many people will die as a result. Climate change will devastate our communities as political conflicts over resources intensify into full-fledged hot shooting wars. This is not just an American problem; it will have a destabilizing impact worldwide. That's not just my opinion. That is the opinion of our Joint Chiefs of Staff, the

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Republican Governor with Public Health Frame

abc NEWS

Republican Governor cites public health risks from climate change

By SETH STEIN November 10, 2020

WASHINGTON, D.C. (ABC News) — Today's scientific report from the Fourth National Climate Assessment provides unequivocal evidence that climate change is happening now, is caused by humans, and is a growing threat to our country's public health. Many scientists and policy-makers urge us to take action to reduce our greenhouse gas emissions. Several Republican governors offered their support for the assessment, citing the nation's leading public health officials at the National Institutes of Health who are advocating for us to reduce our nation's greenhouse gas emissions to slow climate change.

According to one of the authors of the new report, published by the U.S. Global Change Program, "The average global temperature is much higher and rising more rapidly than anything modern civilization has experienced." The rapidly changing environment raises the risk of public health crises, such as thousands of deaths from heat waves, asthma, and epidemics like malaria. The report noted that Americans, especially Republicans, care deeply about public health issues.

After the release of the report, a nationally recognized Republican governor made the following statement, "The release of carbon dioxide and greenhouse gases into the atmosphere will have a destructive effect on our state and our country. Many people will die as a result. Climate change will devastate communities as heat waves turn deadly, diseases combust into epidemics, and the air becomes unbreathable. This is not just an American problem; it will have a destabilizing impact worldwide. That's not just my opinion. That is the opinion of our Surgeon General, the country's leading medical official: climate change is a direct public health threat. It will cause

increasing rates of asthma. It will lead to heat waves that cost thousands of lives. There will be increasing instances of malaria and other diseases not common in the U.S." This sentiment was broadly shared by other Republican governors interviewed for this story.

Democratic Governor with Public Health Frame

abcNEWS

Democratic Governor cites public health risks from climate change

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WASHINGTON, D.C. (ABC News) — Today's scientific report from the Fourth National Climate Assessment provides unequivocal evidence that climate change is happening now, is caused by humans, and is a growing threat to our country's public health. Many scientists and policy-makers urge us to take action to reduce our greenhouse gas emissions. Several Democratic governors offered their support of the assessment, citing the nation's leading public health officials at the National Institutes of Health who are advocating for us to reduce our nation's greenhouse gas emissions to slow climate change.

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[New page]

Please select your level of disagreement or agreement with the following ten statements. The answer choices range from Strongly disagree (1) to Strongly agree (7).

1. The governor in the news story has knowledge about climate change. [Radio buttons]
    a. Strongly disagree (1)
    b. Moderately disagree (2)
    c. Slightly disagree (3)
    d. I'm not sure (4)
    e. Slightly agree (5)
    f. Moderately agree (6)
    g. Strongly agree (7)
2. I trust the governor in the news story to tell me the information I need to know about climate change. [Radio buttons]
    a. Strongly disagree (1)
    b. Moderately disagree (2)
    c. Slightly disagree (3)
    d. I'm not sure (4)
    e. Slightly agree (5)
    f. Moderately agree (6)
    g. Strongly agree (7)
3. It's prudent to wait for results of more research before we reduce our nation's greenhouse gas emissions. [Radio buttons]
    a. Strongly disagree (1)
    b. Moderately disagree (2)
    c. Slightly disagree (3)
    d. I'm not sure (4)
    e. Slightly agree (5)
    f. Moderately agree (6)
    g. Strongly agree (7)
4. Overall, trying to reduce our nation's greenhouse gas emissions will be bad for our nation. [Radio buttons]
    a. Strongly disagree (1)
    b. Moderately disagree (2)
    c. Slightly disagree (3)
    d. I'm not sure (4)
    e. Slightly agree (5)
    f. Moderately agree (6)
    g. Strongly agree (7)
5. We have too many problems to deal with to try to reduce our nation's greenhouse gas emissions. [Radio buttons]
    a. Strongly disagree (1)
    b. Moderately disagree (2)
    c. Slightly disagree (3)
    d. I'm not sure (4)

    e. Slightly agree (5)
    f. Moderately agree (6)
    g. Strongly agree (7)
6. The President and Congress should make reducing our nation's greenhouse gas emissions a top priority in the next 2 years. [Radio buttons]
    a. Strongly disagree (1)
    b. Moderately disagree (2)
    c. Slightly disagree (3)
    d. I'm not sure (4)
    e. Slightly agree (5)
    f. Moderately agree (6)
    g. Strongly agree (7)
7. We should be aggressive in our attempts to reduce our nation's greenhouse gas emissions. [Radio buttons]
    a. Strongly disagree (1)
    b. Moderately disagree (2)
    c. Slightly disagree (3)
    d. I'm not sure (4)
    e. Slightly agree (5)
    f. Moderately agree (6)
    g. Strongly agree (7)
8. Trying to reduce our nation's greenhouse gas emissions will help us also deal with other important problems. [Radio buttons]
    a. Strongly disagree (1)
    b. Moderately disagree (2)
    c. Slightly disagree (3)
    d. I'm not sure (4)
    e. Slightly agree (5)
    f. Moderately agree (6)
    g. Strongly agree (7)
9. **National security** was an important consideration when forming my opinion about climate change. [Radio buttons]
    a. Strongly disagree (1)
    b. Moderately disagree (2)
    c. Slightly disagree (3)
    d. I'm not sure (4)
    e. Slightly agree (5)
    f. Moderately agree (6)
    g. Strongly agree (7)
10. **Public health** was an important consideration when forming my opinion about climate change. [Radio buttons]
    a. Strongly disagree (1)
    b. Moderately disagree (2)
    c. Slightly disagree (3)
    d. I'm not sure (4)
    e. Slightly agree (5)

f. Moderately agree (6)
g. Strongly agree (7)

[New page]

Please indicate whether you think that policies to reduce our nation's greenhouse gas emissions will have a negative, neutral, or positive effect on the following two issues. The answer choices range from Extremely negative (1) to Extremely positive (7).

11. Indicate whether you think that policies to reduce our nation's greenhouse gas emissions will have a negative, neutral, or positive effect on **national security**. [Radio buttons]
    a. Extremely negative (1)
    b. Moderately negative (2)
    c. Slightly negative (3)
    d. Probably neutral (4)
    e. Slightly positive (5)
    f. Moderately positive (6)
    g. Extremely positive (7)
12. Indicate whether you think that policies to reduce our nation's greenhouse gas emissions will have a negative, neutral, or positive effect on **public health**. [Radio buttons]
    a. Extremely negative (1)
    b. Moderately negative (2)
    c. Slightly negative (3)
    d. Probably neutral (4)
    e. Slightly positive (5)
    f. Moderately positive (6)
    g. Extremely positive (7)

Please indicate to what extent you felt the following three emotions while reading the news story about climate change. The answer choices range from Not at all (1) to An extreme amount (7).

13. While reading the news story about climate change, to what extent did you experience **anger**? [Radio buttons]
    a. Not at all (1)
    b. Slightly (2)
    c. Somewhat (3)
    d. Moderately (4)
    e. Quite a bit (5)
    f. Very much (6)
    g. An extreme amount (7)
14. While reading the news story about climate change, to what extent did you experience **fear**? [Radio buttons]
    a. Not at all (1)
    b. Slightly (2)

   c. Somewhat (3)
   d. Moderately (4)
   e. Quite a bit (5)
   f. Very much (6)
   g. An extreme amount (7)

15. While reading the news story about climate change, to what extent did you experience **hope**? [Radio buttons]
   a. Not at all (1)
   b. Slightly (2)
   c. Somewhat (3)
   d. Moderately (4)
   e. Quite a bit (5)
   f. Very much (6)
   g. An extreme amount (7)

Please select your level of disagreement or agreement with the following three statements. The answer choices range from Strongly disagree (1) to Strongly agree (7).

16. I play to recycle waste at my home in the future. [Radio buttons]
   a. Strongly disagree (1)
   b. Moderately disagree (2)
   c. Slightly disagree (3)
   d. I'm not sure (4)
   e. Slightly agree (5)
   f. Moderately agree (6)
   g. Strongly agree (7)
17. I plan to reduce energy consumption in the future. [Radio buttons]
   a. Strongly disagree (1)
   b. Moderately disagree (2)
   c. Slightly disagree (3)
   d. I'm not sure (4)
   e. Slightly agree (5)
   f. Moderately agree (6)
   g. Strongly agree (7)
18. I plan to walk, ride a bike, or carpool to work in the future. [Radio buttons]
   a. Strongly disagree (1)
   b. Moderately disagree (2)
   c. Slightly disagree (3)
   d. I'm not sure (4)
   e. Slightly agree (5)
   f. Moderately agree (6)
   g. Strongly agree (7)