Anthropogenic climate change impacts health, agriculture, food security, and national security, making it a priority for global governance (Oreskes, 2018; Walsh et al., 2014). Despite widespread global scientific consensus regarding its primary source, climate change remains a controversial topic in the United States (U.S.; Jang & Hart, 2015). While 97% or more of climate scientists support the notion of anthropogenic climate change, Pechar et al. (2018) found between 33 and 50% of U.S. citizens denied climate change was caused by humans. The observed gap between scientific and public opinion in the U.S. has consequences for evidence-based policy making, as policy implementation requires public support (Hart, 2011). Public advocacy for climate mitigation strategies will likely play a large role in reducing carbon emissions, but the gap between scientific and public opinion demonstrates a need for communicators to identify potential obstacles to political engagement in public climate change conversations (Hart & Feldman, 2016).

Science communication around environmental issues has primarily focused on disseminating information to increase public engagement (Munshi et al., 2020). Known as the deficit model, this approach assumes the gap between scientific and public perceptions can be resolved by providing the public with more scientific information (Nisbet & Scheufele, 2009). The deficit model approach is limited, however, because audiences are not homogenous and differences exist between social groups that impact message uptake (Merzdorf et al., 2019; Munshi et al., 2020). In the case of climate change, less than 10% of the variance in climate change perception is associated with knowledge (Merzdorf et al., 2019) compared to 50% of the variance accounted for by individual experiences and sociocultural factors (van der Linden, 2015). Thus, climate change perceptions are not based on a lack of public knowledge; rather, social groups influencing individuals' experiences and responses to environmental issues, especially within the climate change debate (Munshi et al., 2020). Specifically, conventional wisdom suggests socioeconomic and political groups have a significant impact on public perceptions of climate change (Huber, 2020; Ma et al., 2019). Additionally, the specific frames used within climate change messaging have been shown to influence individual's behavioral intentions and support for climate policy (Li & Su, 2018), highlighting the need for understanding the complex components of political affiliation and ideology for structuring climate change messages as to not use terminology not accepted by the target audience (Rohling et al., 2016).

Mass media impacts the diffusion of climate science at the nexus of public discourse, the scientific community, and sociopolitical domains (Hanson-Easey et al., 2015). The media articulates and regenerates public opinion by acting as a discursive site for public debates on scientific issues. Political polarization in the U.S. has culminated in a post-truth communication environment, in which objective, factual information has less influence on public opinion than emotional appeals or personal belief, further limiting the impact of the deficit model approach to science communication (Merzdorf et al., 2019; Munshi et al., 2020).

Previous research has identified political affiliation and ideology as the most consistent predictors of climate change belief (Bolsen & Druckman, 2018; Dunlap & McCright, 2008; McCright & Dunlap, 2011). However, emerging studies suggest a lack of trust in climate science may be due to an aversion to the message source or related policy implications (Huber, 2020; Merkley & Stecula, 2018; Pechar et al., 2018). Trust in science, and thus a belief in a specific scientific issue, may be contingent upon the issue, due to how the scientific evidence threatens one's worldview. Yet, the disproportionate attention to the partisan divide in climate change discussions limits investigations into the impact of other factors on public perception (Pearson &

Schuldt, 2015). Colvin et al. (2019) recommend the use of non-partisan and well-trusted messengers to communicate about climate change and emissions-related topics; however, because it can be difficult to identify those trusted messengers, more research is needed to understand the different facets of political polarization in the context of climate change. The purpose of this research was to explore the influence of perceived government control on climate change perceptions and knowledge.

Literature Review

Many scholars have identified political affiliation and ideology as the most consistent predictive factors for pro-environmental behavior, engagement in conservation efforts, and climate change belief (Antonio & Brulle, 2011; Dunlap & McCreight, 2008; Gromet et al., 2013). Political affiliation refers to a specific political party identification; where political ideology refers to shared principles, beliefs, and values that influence worldviews (Botzen et al., 2016). Within the context of the U.S., political party affiliation includes Republicans or Democrats, while political ideology would encompass liberal to conservative beliefs. Generally, Democrats/liberals believe in climate change and support related mitigation policies, while Republicans/conservatives do not believe in climate change and reject related mitigation policies on the grounds that they are economically detrimental (Bolsen & Druckman, 2018; Dunlap & McCright, 2008; McCright & Dunlap, 2011).

Historically, research has narrowly operationalized political ideology within the U.S. as party identification and differences between conservatives and liberals (Huber, 2020). According to Merkley and Stecula (2018), "if the U.S. is to mobilize the cross-partisan societal consensus necessary to effectively tackle climate change, it is essential [to] fully understand the factors that caused Americans to polarize on climate science" (p. 269). Pechar et al. (2018) posited attitudes toward government and corporations are important predictors of trust in science and belief in a scientific issue. Attitudes toward government are one dimension of political ideology (Huber, 2020). The U.S. has a unique relationship with climate policy, being the only industrialized country with a major political party "committed to preventing, and rolling back, all domestic federal action on climate change" (Selby, 2019, p. 483). For conservatives, a key aspect of their political worldview is to minimize the role of government in society (Cook & Gronke, 2005). The more favorable an individual's attitude is toward government, the more likely they are to believe in climate change (Pechar et al., 2018). Attitudes toward government often align with the types of science trusted by individuals due to their policy implications and can offer clearer predictions for patterns of trust in science (Pechar et al., 2018).

The U.S. represents an informative example of political polarization of climate science. Until the 1980s, support for environmental protection in the U.S. was mostly nonpartisan (Dunlap & McCright, 2008). However, during the Reagan administration environmental regulations were labeled as an economic burden; subsequently, President Reagan and his administration attempted to weaken environmental policy and reduce its enforcement. The political divide around environmental protection increased in the following decades (Antonio & Brulle, 2011). Republicans mobilized in the 1990s to challenge climate science and policy, which was reflected by public sentiment as voters took cues from party leaders (Dunlap & McCright, 2008). The Republican takeover of the U.S. Congress in 1994, along with the election of President George W. Bush, further amplified anti-environmental sentiment within the Republican party. Specifically, the Bush administration exemplified strong ideological

polarization around global warming, hostility toward climate policy, and misuse of climate science (Dunlap & McCright, 2008).

Comparisons can be made between the Reagan and Trump administrations' environmental policy approach (Hejny, 2018). The Trump administration, upon assuming office, rolled back most of the Obama administration's environmental policies, including eviscerating the Clean Power Plan, funding cuts to the Environmental Protection Agency, and removing the U.S. from the Paris Climate Agreement (Hejny, 2018; Huber, 2020). Additionally, motivations for policy changes under the Trump administration were populist in nature, intending to sustain status on the world stage (Huber, 2020; Selby, 2019). It can be categorized as a lack of trust in the political establishment, with President Trump's framing of the climate argument – as a hoax to limit the competitiveness of U.S. manufacturing within global markets –becoming a predominant theme underlying conservative climate skepticism in the U.S. (Selby, 2019).

Building off the predictive capacity of attitudes toward government, few studies have investigated how individuals' environmental behaviors are impacted by governmental approaches to environmental policy (Lavergne et al., 2010). Findings from Lavergne et al. (2010) have indicated whether an individual perceives governmental action as supporting their autonomy, or as controlling their behavior, impacts perceptions of policy implications. Given the government is responsible for enforcing environmental regulations, individual's perceptions of a government's autonomy-support or control may influence their motivation to engage in pro-environmental behavior. Perceptions of government autonomy-support contribute to higher levels of autonomous motivation toward a behavior and lower levels of amotivation (Lavergne et al., 2010). Perceived government control over environmental behavior is a dominant negative predictor for motivation to engage in pro-environmental behavior (Lavergne et al., 2010).

Previous studies have identified gaps in climate change knowledge among the U.S. public, leading to apathy towards climate friendly behaviors, skepticism, and lack of support for mitigation policies surrounding climate change (Stevenson et al., 2014; Tobler et al., 2012). Several misconceptions about climate change exist that are consistent over time and global in nature, including the difference between weather and climate or ozone depletion and climate change (Tobler et al., 2012). Climate change knowledge in the U.S. is often assessed in terms of demographic characteristics, such as gender (e.g., McCright, 2010) and age (e.g., Leiserowitz et al., 2011; Stevenson et al., 2014). However, simply increasing climate change knowledge among the public may not provide support for mitigation policies but rather further polarize individuals with worldviews that are threatened (Selm et al., 2019). Individuals who "subscribe to a worldview that ties authority to conspicuous social rankings become less concerned about the risks of climate change with increasing scientific literacy" (Selm et al., 2019; p. 2). In this instance, individuals will use information that supports their worldview and opinion rather than alter their worldview (Selm et al., 2019). Therefore, climate change knowledge needs to be examined through perceptions of governmental control, political affiliation, and political ideology.

Public support is critical for environmental policies targeting the reduction of the negative impacts of climate change, especially for policies which may impose a financial burden (Thaker et al., 2019). Scholars have suggested climate change denial is often rooted in opposition to regulation (Merkley & Stecula, 2018). The literature indicates government decisions influence motivations toward pro-environmental behavior, establish the connection between policy perceptions, and ultimately public trust in science (Lavergne et al., 2010; Pechar et al., 2018). Despite literature demonstrating connections between government perceptions, political

ideology, and pro-environmental motivations, few studies explore the relationship between these variables and knowledge of environmental issues. Steel et al. (2008) explored the extent to which perceptions of environmental risk to the Great Lakes region are affected by policy-relevant knowledge and political (value) orientations, suggesting that value orientations, rather than knowledge, are more influential to risk perceptions than knowledge. McCright (2010) examined climate change knowledge and concern but made comparisons based on gender, rather than examining the role of knowledge in the development of perceptions of environmental issues and political ideology. The majority of studies look at perceptions of the environment related to political ideology and perceptions of government, excluding knowledge as a predictor variable altogether (e.g. Cruz, 2017; Thaker et al., 2019). To date, little literature exists examining perceptions of government control on both perceptions and knowledge of climate change. Therefore, examining perceptions of government control on environmental behavior may increase the current understanding of the role of ideology in the politicized climate change debate and inform environmental communication efforts related to climate change perceptions.

Social Judgement Theory

Understanding attitudes and social norms are essential when communicating about climate change, and social judgement theory (SJT) provides a theoretical framework for conceptualizing messages in relation to specific audiences. Receivers of a message do not evaluate the message solely on quality; rather, they draw upon various judgements, experiences, and attitudes when assessing communication (Sherif & Sherif, 1967). SJT posits that people make judgements toward a communication message by comparing their personal attitude or belief of the issue with the perceived attitude or belief portrayed in the message. When messages do not resonate with receivers, or if messages present ideas that strongly contrast receivers' attitudes or beliefs, communicators have difficulty achieving desired outcomes from the messages. This theory is composed of three concepts to explain how individuals judge communication messages: latitudes of acceptance, rejection, and non-commitment; assimilation and contrast, and ego-involvement (Sherif & Sherif, 1967).

Attitudes, conceptualized as learned evaluation of an object or concept that affects an individual's thoughts and actions, are developed within a social environment and are fairly stable once formed (Perloff, 2014; Ruth & Rumble, 2019; Sherif & Sherif, 1967). Attitudes reflect relationships with people, places, or things (Sherif & Sherif, 1967) and exist on a continuum of various positions (Perloff, 2014). Three latitudes describe the level of acceptability of a message in relation to an individual's attitude: acceptance, rejection, and noncommitment (Sherif & Sherif, 1967). A latitude of acceptance includes "the individual's most acceptable position along with all other positions they find acceptable […] while a latitude of rejection is simply the opposite" (Ruth & Rumble, 2019, p. 2). Latitudes of noncommitment include positions for which individuals neither agree nor disagree (Sherif & Sherif, 1967). Assimilation and contrast offer further explanations for how individuals make judgements toward scientific communication messages (Ruth & Rumble, 2019; Sherif & Sherif, 1967). Individuals use their personal attitudes as a reference to which they compare the message, and this results in a subjective judgement. In assimilation, an individual may assume a message is more similar to their attitude than it is in reality (Granberg, 1993). During contrast, individuals believe the message is more distinct from their own position than it actually is. The concepts of assimilation and contrast can hinder exposure to alternative views, especially among individuals with extreme views, who often have

large latitudes of rejection (Perloff, 2014; Sherif et al., 1965). The third component of SJT, ego-involvement, describes the situation in which individuals view messages they believe affect their core values (Sherif et al., 1965). When an individual experiences a high level of ego-involvement, there is often an associated large latitude of rejection. These individuals are more difficult to persuade, as they reject messages that misalign with their views, though they quickly assimilate to messages that align with their attitudes. Ego-involved individuals experience selective perception, in which they interpret messages in line with their attitudes and beliefs, regardless of how they might objectively align with the issue (Ruth & Rumble, 2019).

SJT demonstrates it is difficult to change the minds of people with strong attitudes, and thus has been used to study controversial topics such as politics, genetically-modified food, and global warming (Ruth & Rumble, 2019; Sherif & Sherif, 1967). With climate change, individuals may not have the time nor the capacity to understand the issue and thus rely on the views of trusted sources to make these judgements (Thaker et al., 2019). Within the U.S., trust in science is also associated with attitudes, making SJT a relevant theory through which to investigate the impact of government influence, especially due to the close association between policy support and climate change belief. Because climate change is a collective issue, people who feel a lack of efficacy as an individual may feel enhanced efficacy when acting as part of a group, supporting the power of social identity on perceptions of scientific issues (Merzdorf et al., 2019). Individuals' social values, identities, and worldviews interact in an iterative process with attitude and scientific information to continuously impact their perceptions of environmental issues (Pechar et al., 2018). In addition to SJT's focus on perceptions and attitudes, including knowledge as an additional variable may enhance the predictive capacity of models examining perceptions of government control related to climate change, as previous studies indicated knowledge is an important precursor to attitudes related to climate change (Tobler et al., 2012).

Purpose and Objectives

The purpose of this study was to determine if perceived government control on environmental behavior impacted perceptions and knowledge of climate change. Three objectives guided the study: 1) describe respondents' perceptions of government autonomy/control on environmental behavior, perceptions of climate change, and knowledge of climate change; 2) determine if political affiliation, political ideology, and perceptions of government autonomy/control on environmental behavior predicted perceptions of climate change; and 3) determine if political affiliation, political ideology, and perceptions of government autonomy/control on environmental behavior predicted knowledge of climate change.

Methods

The quantitative study described here was part of a larger research project focused on determining public perceptions of water and climate change issues in the U.S. (see Gibson, Fortner et al., 2021; Gibson, Lamm et al., 2021a; Gibson, Lamm et al., 2021b; Mayfield-Smith et al., 2021). Four sections of the survey instrument were developed and used: political affiliation and ideology, perceptions of government control on environmental behavior (adapted from Lavergne et al., 2010), knowledge of climate change, and perceptions of climate change.

Instrumentation

A researcher-adapted online survey instrument was developed to achieve the study objectives. The survey included demographic, multiple choice, true/false, and Likert-type questions. Political affiliation was measured using a multiple-choice question. Respondents were asked to select the option that best described their political affiliation: *Republican, Democrat, Independent, Nonaffiliated,* and *Other*. Respondents were also asked to identify the response that best described their political ideology on a five-point Likert-type scale (1 = *Very Liberal*; 2 = *Liberal*; 3 = *Moderate*; 4 = *Conservative*; 5 = *Very Conservative*).

A scale was used to measure perceptions of government autonomy or control over environmental behavior developed by Lavergne et al. (2010). The scale, originally adapted from work conducted by Green-Demers et al. (1994), consisted of two subscales designed to measure perceptions of governmental pressure and autonomy-support for engaging in environmentally-conscious behavior (Lavergne et al., 2010). A four-item subscale measured respondents' perceptions of government control over environmental behavior (Lavergne et al., 2010). These questions when combined as a construct gauged the "extent to which individuals perceive that the government imposes itself or pressures citizens into making environmental decisions" (Lavergne et al., 2010, p. 172). The second subscale measured respondents' perceptions of government autonomy-support for engaging in environmentally-conscious behaviors. These questions when combined as a construct gauged the "extent to which individuals perceive that the government gives them choice when making environmental decisions" (Lavergne et al., 2010, p. 172). Both scales utilized a series of statements where respondents indicated their level of agreement or disagreement on a Likert-type scale ranging from 1 - *Strongly Disagree* to 5 - *Strongly Agree*. Responses to the scale items were averaged within each subscale to create overall index scores that ranged from one to five. For the perceived government control on environmental behavior scale, four items were reverse coded (Table 2) to ensure Likert-scale data was interpreted from 1 (negative perception) to 5 (positive perception). The government control scale had an alpha reliability of .90 *post hoc* and the government autonomy-support scale had an alpha reliability of .80 *post hoc*, both exceeding minimum requirements of reliability (Cronbach, 1951; Lavergne et al., 2010).

Climate change perceptions and knowledge was divided into two scales. The first scale measured attitudes toward climate change on a Likert-type scale comprising eight items ranging from 1 - *strongly disagree* to 5 - *strongly agree*. In order to elucidate the findings real limits were assigned. The real limits of the scale were 1.00 - 1.49 = *strongly disagree*, 1.50 – 2.49 = *disagree*, 2.50 – 3.49 = *neither agree nor disagree*, 3.50 – 4.49 = *agree*, and 4.50 – 5.00 = *strongly agree*. Items measured respondents' concern toward (adapted from Vedlitz et al., 2008) and perceptions of climate change related to their state, the U.S., other countries, their family, and their community (adapted from Vogt et al., 2008). Two additional questions in the scale addressed respondents' beliefs about the number and level of extreme weather events resulting from climate change. These two questions were adapted from Abdel-Monem et al. (2014). A reliability analysis of the instrument for the target population demonstrated the climate perception scale had an alpha reliability of .88.

The second scale measured respondents' knowledge about climate change, using a series of true/false questions that had correct and incorrect responses identified. The climate change knowledge subscale was adapted from Leiserowitz et al. (2010). Example statements included: global warming will cause some places to get wetter, while others will get drier (*true*); scientists'

computer models are too unreliable to predict the climate of the future (*false*); and global warming will cause temperatures to increase by roughly the same amount in all countries (*false*; Leiserowitz et al., 2010). A knowledge score was calculated as the number of correct answers out of 11; the number of items in the knowledge subscale.

The survey was reviewed by a panel of experts to determine face validity (Zamanzadeh et al., 2014). The panel included faculty with expertise in survey design, natural resource issues, agricultural and environmental communication, and educational research. Prior to data collection the University of Georgia Institutional Review Board approved the study. A pilot test was then conducted with 50 individuals who were representative of the population of interest.

Data Collection and Analysis

Data were collected using Qualtrics, an online survey platform in September of 2020. One limitation of online surveys is that responses are limited to residents with access to a computer and internet, which impacts the generalizability of the results (Ary et al., 2010). The researchers used non-probability opt-in sampling methods, a technique often used in public opinion research (Baker et al., 2013). Respondents were compensated by Qualtrics in accordance with their standard protocols for recruitment.

Non-probability opt-in sampling can lead to selection, exclusion, and participation bias (Baker et al., 2013) and is acknowledged as a limitation. The literature, however, demonstrates its efficacy within social science research (Twyman, 2008; Vavreck & River, 2008). Previous studies have shown non-probability samples utilizing weighting techniques to adjust for error introduced can yield results that are as robust as probability-based samples (Twyman, 2008; Vavreck & Rivers, 2008). Therefore, in this study, data were weighted *post hoc* using post-stratification methods (Kalton & Flores-Cervantes, 2003). The 2010 U.S. Census data were used to weight the dataset based on geographic location, age, gender, and race to ensure the respondents represented the target population (Baker et al., 2013; Lamm & Lamm, 2019; United States Census Bureau, 2010). An additional limitation was that data collection occurred during the COVID-19 pandemic, which may have influenced individuals' responses to survey items and should be considered in the interpretation of the results. However, through weighting data *post hoc* we have attempted to mitigate potential errors introduced through this limitation.

Demographics

The population of interest were U.S. residents 18 years and older. A total of 1,049 usable responses were obtained. The respondents were 50.0% male and 50.0% female (Table 1). The average respondent was White (72.4%), 35 years or older (66.0%), and had at least some college education (78.6%). The majority of respondents identified as Democrats (41.3%) or Republicans (33.2%), with few respondents identifying as Independents (19.7%), non-affiliated (5.1%), or other (0.8%). Additionally, 33.5% of respondents identified as liberal or very liberal, 36.6% as moderate, and 29.8% as conservative or very conservative.

Table 1

Demographics of respondents (N = 1,049)

	F	%
Sex		
Male	525	50.0
Female	524	50.0
Age		
18-34 years	353	34.5
35-54 years	349	33.2
55+ years	350	32.8
Race[a]		
White	759	72.4
Black/African American	148	14.1
Asian or Pacific Islander	102	9.7
American Indian/Alaska Native	33	3.1
Other	22	2.1
Ethnicity		
Hispanic	99	9.4
Non-Hispanic	950	90.6
Education		
Less than 12th grade	22	2.1
High school diploma	202	19.3
Some college	204	19.4
2-year college degree	109	10.4
4-year college degree	272	25.9
Graduate or Professional degree	240	22.9
Family Income		
Less than $24,999	185	17.6
$25,000 - $49,999	240	22.9
$50,000 - $74,999	215	20.5
$75,000 - $149,999	256	24.4
$150,000 - $249,999	101	9.6
$250,000 or more	52	5.0
Political Affiliation		
Republican	348	33.2
Democrat	433	41.3
Independent	207	19.7
Non-affiliated	53	5.1
Other	8	0.8
Political Ideology		
Very liberal	146	13.9
Liberal	206	19.6
Moderate	384	36.6
Conservative	188	17.9
Very conservative	125	11.9

Note: [a]Respondents were allowed to select more than one race.

Data were analyzed using SPSS 26. Descriptive statistics were used to address objective one. Inferential statistics, including bivariate correlations and multiple linear regressions, were then used to address objectives two and three. Assumptions of normality, non-multicollinearity, and homoscedasticity were met for the independent variables in the multiple linear regression analyses, ensuring normal distribution of the data (Field, 2013).

Results

Objective 1: Perceptions of Government Autonomy/Control and Perceptions and Knowledge of Climate Change

The majority of respondents agreed or strongly agreed that they had autonomy related to engagement in environmental behavior (see Table 2). Generally, they felt they had the choice to use strategies provided by the government to help the environment (57.8%), that the government gave them the freedom to make their own decisions regarding the environment (58.0%), and that they had the choice to participate in government-established environmental programs (60.9%).

Table 2
Perceptions of Government Autonomy-Support on Environmental Behavior (N = 1,049)

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
	%	*%*	*%*	*%*	*%*
I feel I have the choice to use the strategies provided by the government in order to help the environment.	17.3	40.5	30.4	6.9	5.0
The government gives me the freedom to make my own decisions in regards to the environment.	15.4	42.6	31.3	6.2	4.5
I feel I have the choice to participate in the environmental programs established by the government.	19.2	41.7	28.4	6.0	4.8

When asked their perceptions of government control on environmental behavior, respondents did not indicate a majority agreement or disagreement (see Table 3). Around one third of respondents felt the government pressured people to adopt environmentally-conscious behaviors (37.6%), that the government imposes its environmental strategies (36.5%), that the government tries to force the adoption of environmental behaviors (31.6%), and that the government wants them to feel guilty when someone does nothing for the environment (32.6%).

Table 3

Perceptions of Government Control on Environmental Behavior (N = 1,049)

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
	%	*%*	*%*	*%*	*%*
I think the government puts a lot of pressure on people to adopt environmentally-conscious behaviors.	10.5	27.1	29.9	20.8	11.7
I feel the government imposes its environmental strategies on us.	11.4	25.1	31.1	21.1	11.3
I feel that the government is trying to force me to adopt environmental behaviors.	9.3	22.3	30.5	23.3	14.6
I feel the government wants to make me feel guilty when I do nothing for the environment.	10.6	22.0	29.3	22.2	15.9

The majority of respondents agreed or strongly agreed they were very concerned about climate change, that climate change would significantly impact their state, that climate change would significantly impact the U.S., that climate change would significantly impact other countries, that climate change would have a negative impact, that the number of extreme weather events will increase as a result of climate change, and the level of extremity of extreme weather events will increase as a result of climate change (see Table 4). Conversely, a majority of respondents disagreed or strongly disagreed climate change would have a positive impact. On average, the majority of respondents agreed they perceived climate change as having a negative impact ($M = 3.82$, $SD = .87$). A reliability analysis revealed a high level of internal consistency for the climate change perception construct ($\alpha = 0.95$).

Table 4

Perceptions of Climate Change (N = 1,049)

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
	%	*%*	*%*	*%*	*%*
I am very concerned about climate change	33.7	35.1	17.3	7.3	6.7
Climate change will significantly impact my state	26.6	36.5	23.5	7.8	5.5
Climate change will significantly impact the U.S.	36.7	34.8	18.4	6.0	4.1
Climate change will significantly impact other countries	35.9	37.0	18.1	4.9	4.1
I believe climate change will have a negative impact	34.6	33.7	21.8	5.3	4.6
I believe the number of extreme weather events will increase as a result of climate change (e.g. hurricanes, droughts, floods)	35.5	35.4	19.6	5.4	4.1
I believe the level of extremity of extreme weather events will increase as a result of climate change (e.g. hurricanes, droughts, floods)	34.1	36.1	20.5	5.3	3.9

When measuring climate knowledge, respondents, on average, selected the correct answer (true or false) for 62.5% of the questions ($M = 6.87$, $SD = 2.53$), with a minimum score of 0 and a maximum score of 11. For nine of the 11 questions, a majority of respondents selected the correct answer (see Table 5). The two statements for which a majority of respondents selected the incorrect answer were "in the 1970s, most scientists were predicting an ice age" (*false*; 52.2% incorrect) and "global warming will cause temperatures to increase by roughly the same amount in all countries" (*false*; 54.0% incorrect).

Table 5

Responses to Climate Change Knowledge Question (N = 1,049)

	Correct Responses *%*
Global warming will cause some places to get wetter, while others will get drier.	79.8
The decade from 2000-2009 was warmer than any other decade since 1850.	72.8
Scientists can't predict the weather more than a few days in advance – they can't possibly predict the climate of the future.	54.1
Global warming will increase crop yields in some places, and decrease it in others.	66.7
Scientists' computer models are too unreliable to predict the climate of the future.	56.4
In the 1970s, most scientists were predicting an ice age.	47.8
The Earth's climate has changed naturally in the past, therefore humans are not the cause of global warming.	55.7
Global warming will cause temperatures to increase by roughly the same amount in all countries.	46.0
Any recent global warming is caused by the sun.	66.1
The record snowstorms this winter in the eastern United States prove that global warming is not happening.	68.4
The earth is actually cooling, not warming.	73.3

Objective 2: Predictive Capacity of Government Autonomy/Control Beliefs on Perceptions of Climate Change

Correlations were used to examine the relationships between perceptions of government control, political affiliation, political ideology, perceptions of climate change and climate change knowledge (see Table 6). The rate of multicollinearity among the independent variables was small to moderate; thus, should not affect further regression analysis.

Table 6

Relationships between perceptions of government control, political affiliation, and political ideology

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	-													
2	.506**	-												
3	-.223**	-.438**	-											
4	.271**	-0.005	.223**	-										
5	.221**	0.034	-0.055	.108**	-									
6	.213**	.199**	-.104**	0.03	-.199**	-								
7	-0.003	.084**	-.073*	-.103**	-.306**	-.376**	-							
8	-.222**	-.159**	.091**	-0.026	-.188**	-.231**	-.355**	-						
9	-.231**	-.216**	.188**	0.033	-.148**	-.182**	-.279**	-.172**	-					
10	-.274**	-.277**	.209**	0.05	-.125**	-.206**	-.199**	.267**	.366**	-				
11	.356**	.227**	-.172**	0.059	.250**	.283**	-.094**	-.205**	-.231**	-.591**	-			
12	-.073*	.062*	-0.03	-.077*	-.130**	-0.058	.270**	-0.057	-.123**	-.349**	-.416**	-		
13	-0.044	0.005	-0.021	-.073*	-0.042	-.081**	.150**	-0.017	-0.058	-.163**	-.193**	-.114**	-	
14	-.087**	-.082**	0.032	-.070*	-0.035	-0.016	0.002	0.016	0.035	-.062*	-.073*	-0.043	-0.02	-

Note. *p < .05, **p < .01; 1 = *Climate change perception*, 2 = *Climate change knowledge*, 3 = *Government control*, 4 = *Government support*, 5 = *Very liberal*, 6 = *Liberal*, 7 = *Moderate*, 8 = *Conservative*, 9 = *Very conservative*, 10 = *Republican*, 11 = *Democrat*, 12 = *Independent*, 13 = *Non-affiliated,* 14 = *Other*.

Multiple linear regression was used to determine if political affiliation and political ideology predicted perceptions of climate change. The model was statistically significant ($F = 34.11$, $p < .001$) and predicted 20.8% of the variance (see Table 7). When perceived government autonomy-support and perceived government control on environmental behavior were added to the model, the model remained significant ($F = 44.59$, $p < .001$) and predicted 29.4% of the variance. The change in R^2 was statistically significant, indicating Model 2 was more effective at predicting the respondents' perceptions of climate change based on their perception of government control despite political affiliation or ideology. Democrats exhibited a higher level of climate change perception than all other political affiliations. When compared to moderates, conservative and very conservative respondents exhibited a lower level of climate change perception or concern while respondents exhibiting liberal and very liberal political ideologies exhibited higher levels of climate change concern.

Table 7

Government Control Predictive Capacity on Respondents' Perceptions of Climate Change

	Model 1	Model 2
R^2	0.21*	0.31*
ΔR^2		0.09*
Political Affiliation[a]		
Republican	-0.40*	-0.36*
Independent	-0.36*	-0.31*
No political affiliation	-0.38*	-0.30*
Other political affiliation	-0.94*	-0.67*
Political Ideology[b]		
Very liberal	0.34*	0.25*
Liberal	0.25*	0.20*
Conservative	-0.34*	-0.31*
Very conservative	-0.43*	-0.39*
Government Control		-0.16*
Government Support		0.29*

Note. *$p < .05$; [a]Democrat was left out of the model as the comparison variable; [b]Moderate was left out of the model as the comparison variable.

A second multiple linear regression model was used to determine if political affiliation and ideology predicted knowledge of climate change. The model was statistically significant ($F = 19.27$, $p < .001$) and predicted 12.9% of the variance (see Table 8). Additionally, when perceived government autonomy-support and perceived government control on environmental behavior were added in Model 2, the model remained significant ($F = 37.51$, $p < .001$) and predicted 26.5% of the variance. The change in R^2 was statistically significant, indicating Model 2 was more effective at predicting respondent's knowledge of climate change based on their perception of government influence. In both models, political affiliation and ideology had a statistically significant predictive capacity for knowledge of climate change. Democrats exhibited a higher level of climate change knowledge than all other political affiliations. Republicans and Other political affiliations exhibited significantly lower levels of climate change

knowledge. When compared to moderate respondents, liberal political ideologies exhibited higher levels of climate change knowledge, while conservative and very conservative respondents exhibited lower levels.

Table 8

Government Control Predictive Capacity on Respondents' Knowledge of Climate Change

	Model 1	Model 2
R^2	0.13*	0.27*
ΔR^2		0.14*
Political Affiliation[a]		
Republican	-1.07*	-0.76*
Independent	-0.25	-0.11
No political affiliation	-0.45	-0.30
Other political affiliation	-2.59*	-2.00*
Political Ideology[b]		
Very liberal	-0.21	-0.28
Liberal	0.57*	0.48*
Conservative	-0.78*	-0.60*
Very conservative	-1.22*	-0.80*
Government Control		-0.94*
Government Support		0.25*

Note. * $p < .05$; [a]Democrat was left out of the model as the comparison variable; [b]Moderate was left out of the model as the comparison variable.

Conclusions, Implications, and Recommendations

Given policy is the primary way in which environmental protection and regulation are introduced to society, and public support for policy change is crucial, a clear understanding of the factors influencing perceptions of environmental policy is needed to direct climate change communication efforts. Previous research has emphasized the role of political affiliation and ideology in individual perceptions of climate change. The current study went a step further by examining perceptions and knowledge of climate change related to political ideology and perceptions of government control. The results indicated political affiliation and ideology were significant predictors of climate change perceptions, but perceptions of government control of environmental behavior add to the discussion. These findings support previous literature detailing the predictive value of political affiliation and ideology on climate change beliefs (Gromet et al., 2013; Merzdorf et al., 2019) but also supports the work of Pechar et al. (2018) and Lavergne et al. (2010) in exploring additional factors related to political ideology. Despite literature suggesting moving beyond political affiliation and ideology to explain climate change knowledge and perceptions, the findings suggest political affiliation and ideology are still significant predictors of climate change perception, at least in the U.S. Thus, when creating messages segmented for multiple audiences, communicators should continue to attend to political affiliation and ideology while taking perceptions of government control into account.

Political affiliation and ideology also predicted climate change knowledge. Overall, respondents had low levels of climate change knowledge, answering just over half of the knowledge questions correctly. When perceived government control of environmental behavior was included in the model, Republicans, conservatives, and very conservative respondents had a negative, statistically significant relationship, indicating that negative perceptions of government control significantly predicted climate change knowledge when compared to Democrats and moderates. Conversely, liberals had a significant positive relationship with climate change knowledge, but very liberal respondents did not, indicating a liberal ideology (more positive perceptions of government) significantly predicted climate change knowledge when compared to moderates.

According to Lavergne et al. (2010), when communicating about climate change and associated environmental policy, science communicators working with agencies, researchers or government entities should place more emphasis on supporting autonomy and appearing less controlling in more conservative regions of the U.S. However, when drafting policy and communicating with a more liberal audience about climate change, government control on environmental behavior may be perceived as a positive attribute for climate mitigation policy. Therefore, climate change and environmental policy communication messages should be framed as supported by government entities through power and influence.

Previous research has found perceptions of climate change are more influential on public policy support than knowledge of climate change (Merzdorf et al., 2019; van der Linden, 2015). Given the results aligned with party and ideological divisions, the notion that socio-political identity divisions influence individuals' acceptance of controversial messaging strategies in science communication was supported. Thus, communication strategies that are identity-supportive for both parties should be utilized moving forward (Merzdorf et al., 2019; Ruth & Rumble, 2019; Sherif & Sherif, 1967). These messages targeting more conservative political ideologies might emphasize free market solutions to climate change (Dixon et al., 2017) though Severson and Coleman (2015) suggested frames emphasizing science, secular morality, and economic equity have potential to increase widespread public support for climate-mitigation policies. Additionally, Wolsko et al. (2016) reported evidence that a binding moral frame, in which natural resource protection was framed as a way to obey authority, defend nature's purity, and demonstrate one's patriotism to the U.S, may shift political conservatives' pro-environmental attitudes.

Increasing public trust in science is critical for evidence-based policymaking, but a clearer understanding of the factors influencing scientific trust and distrust is a vital step in this process (Pechar et al., 2018). The current study advances the literature in several key ways. First, knowledge and perceptions of climate change are distinct and interact with political identification in different ways, enhancing perspective- and attitude-based messaging strategies (building from SJT) related to climate change (Tobler et al., 2012). Second, positive government perceptions were related to greater concern about climate change, while negative government perceptions related to climate change denial. Even though political affiliation and ideology were significant predictors, factoring in perceptions of government control as a broader conceptualization of the ideology increases the explanatory and predictive capacity of the model. Third, literature aligned social identity with climate change perceptions and connected the influence of these groups with judgements of communication messages through SJT (Sherif & Sherif, 1967). SJT posits that social groups and political cues inform individuals' values as a

basis of judgement. Therefore, the implications of social identity on the political polarization communication effects are seen not just in the U.S., but globally.

The results indicated framing climate change communication messages should be done in conjunction with political ideology perspectives, especially with more conservative audiences, to increase message uptake (Antonio & Brulle, 2011). For example, using loss frames focused on the negative economic impact of climate change may be more effective due to the more conservative, neoliberal worldview. Framing becomes critical in the post-trust communication climate, as stories covering science from all sides may give equal weight to both true and false information (Merzdorf et al., 2019). Hence, aligning the science with political views related to neoliberalism for audiences less likely to believe in climate change may increase message uptake, rather than giving increased airtime to false claims. Additionally, Veldman (2019) suggested framing climate change messages from a local perspective rather than a global perspective when targeting a more conservative audience. Framing becomes important when creating strategic messages aligned with SJT as people compare their own attitudes toward the perceived attitudes within a message (Ruth & Rumble, 2019; Sherif & Sherif, 1967), which impacts the acceptance of various messages particularly from an environmental context.

Moving forward, future studies should investigate these concepts – perceived government control on environmental behavior, political affiliation, and political ideology – with more attention to various demographic characteristics. According to Pearson and Schuldt (2015), public opinion on climate change may be less polarized for racial and ethnic minorities. Additionally, political ideology varies across the U.S., as a liberal in the Southern U.S. may be more conservative than a liberal in the Western U.S. Future studies could also compare these results based on states or regions within the U.S. Additionally, much scholarship related to this topic is U.S.-centric (Huber, 2020; Pechar et al., 2018). Diversifying the countries investigated could yield insights about the effect of government perceptions on climate change policy support around the world considering it is an issue requiring global efforts to solve.

The results also have implications for the training of future agricultural and environmental science communicators. Operationalizing characteristics of political ideology helps demonstrate the complexity of socially-influenced perceptions that impact message acceptance or rejection. The first implication is that messaging strategies developed around the deficit model of communication are inherently limited as knowledge is not as significant a predictor of message acceptance as attitudes and pre-existing socio-political perceptions (Merzdorf et al., 2019; Munshi et al., 2020). Thus, increasing knowledge should not be a primary communication strategy, as framing around value orientations may be more effective (Steel et al., 2008). When communicating about contentious topics, communicators must understand the socio-political context of an issue, both in the underlying politics as well as the associated policy implications that emerge from solutions-based messaging (Pechar et al., 2018; Ruth & Rumble, 2019). There is more than one underlying cause for political ideology formation, and these are closely related to sociocultural contexts (Sherif & Sherif, 1967). Thus, communicators should be trained in identifying component parts of a specific demographic, like political ideology, so as to not alienate audiences due to an incomplete assessment of their underlying value orientations (Botzen et al., 2016; Steel et al., 2008). Curriculum addressing the formation of socio-political value orientations may enhance future communicators' ability to navigate a complex and contentious communications environment.

The findings implied political ideology and perceptions of government need to be considered when crafting communication messages to increase positive perceptions of specific

climate policy. Other aspects of political ideology, such as nationalism and populism (Kulin et al., 2021), should be further examined and potentially integrated into climate communication efforts. Additionally, when political ideology is used as a predictor for scientific trust, the perspective is limited, as liberals and conservatives do not distrust or trust science generally; rather, it is innovation-specific (Pechar et al., 2018). These diverse perspectives cannot be explained solely by ideology as differences in opinion on environmental innovations or issues stem from policy implications, largely connected to whether they trust or distrust the government, not science specifically. The framing of messages also influences message uptake and subsequent behavior (Li & Su, 2018; Rohling et al., 2016). Thus, planning communication messages through a government-perception framework rather than political ideology may increase public support for pro-climate change policy by framing specific messages congruently with complex components of political affiliation and ideology.

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