

The spillover of race and racial attitudes into public opinion about climate change

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Abstract:

This study examines the relationship between racial attitudes and public opinion about climate change. Public opinion data from Pew and ANES surveys are used to show that racial identification and prejudices are increasingly correlated with climate change opinions during the Obama presidency. Results show that racial identification has become a significant predictor of climate change concern following Obama's election in 2008, and that high levels of racial resentment are strongly correlated with reduced agreement with the scientific consensus on climate change today. These results offer evidence for an effect termed the *spillover of racialization*. This helps further explain why the public remains so polarized on climate change, given the extent to which racial grievances and identities have become entangled with elite communication about climate change and its related policies today.

Keywords: climate change; public opinion; race; racial resentment; polarization

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Although public expressions of racist attitudes largely declined in the 1980s and 1990s (Valentino et al. 2002), racial identities and attitudes have played increasingly powerful roles in shaping public opinion towards policies and Presidential candidates in the past decade. In the years following Barack Obama's 2008 Presidential campaign, racial identification and attitudes have “spilled over” into issues such as health care reform (Tesler 2012, 2016, Enders and Scott 2018) and polarized the general public on these policy matters. Race and racial resentment have subsequently helped predict support for John McCain and Donald Trump in their Presidential campaigns (Greenwald et al. 2009, Sides et al. 2017, Schaffner et al. 2018). While the spillover of race and racial attitudes has been well documented in the context of electoral campaigns and debates over healthcare policy, there has been less examination of several other issues where similar spillovers may have occurred. Here, I test whether racial attitudes have spilled over into public opinion about climate change, analyzing public opinion trends to show that racial identity and racial resentment are strongly associated with opinions about climate change today.

Americans have been divided along partisan and ideological lines in their views about climate change since the late 1990s; however, this gap has grown in recent years during the Obama presidency despite an increasing scientific consensus on climate change (Dunlap et al. 2016). Previous scholarship has examined several possible reasons for these trends, discussing the roles played by conservative think tank messaging, economic factors, and growing polarization among the electorate (Dunlap and Jacques 2013, Carmichael and Brulle 2017, Egan and Mullin 2017). However, the effects of racial identity and prejudice have been relatively unexamined in this regard.

I test these associations and find evidence supporting a racial spillover effect. I first show that associations between racial identification and concern about climate change have strengthened during the Obama presidency, with racial identification becoming increasingly correlated with concern about climate change after 2008. Due to this “spillover” of race into opinions about climate change, aggregate opinion trends have begun to diverge across racial lines, with the steepest declines in public concern after 2008 occurring among white Americans.

I then examine the extent to which racial prejudices have spilled over into views about climate change, showing that increasing levels of racial resentment are also strongly associated with decreased belief in climate change. These findings contribute to a growing body of scholarship on attitudes towards climate change in the US. While much of this literature has studied the polarization of climate change across partisan and ideological lines, I make a novel contribution to this debate by examining the associations between racial identification, prejudices, and public opinion trends. These findings have substantial implications for understanding the continuing partisan polarization over climate change and the persistence of climate change denialism.

Public opinion polarization and elite cues

There exists a significant gap between the scientific community and the American public in their views of climate change. While over 97% of climate scientists agree that climate change is presently occurring and anthropogenic (NASA 2017), roughly only two-thirds of the American population shares this view today. Aggregate belief that climate change was occurring slowly increased through the 2000s, peaking around 61% in 2008 before suddenly declining to as low as 49% in 2011, and increasing thereafter (Dunlap et al. 2016). Americans have also become

increasingly divided on this issue in recent years along partisan lines: Gallup polls from the late 1990s indicate a small gap between Democrats and Republicans in their responses on climate change, but partisans have become increasingly distant on the issue. Democrats today are almost twice as likely as Republicans to agree with the scientific consensus on climate change, with 75% of Democrats agreeing in 2016 that global warming is occurring, compared to only 41% of Republicans (Dunlap et al. 2016). Such trends are consistent for other attitudes related to climate change, such as the impact of human activity on climate change and support for ameliorative policies.

Previous studies examining American public opinion about climate change have offered several explanations for these opinion trends. Partisanship and ideology have been explored as a primary cause of the polarization that exists today (Carmichael and Brulle 2017, Shao 2017). The origins of this polarization can be largely traced to elite communications going as far back as political disputes over the 1997 Kyoto Protocol (Krosnick et al. 2000), with growing division among prominent partisans on both facts and policy solutions about climate change since. Given that most American citizens are poorly informed about the extent of scientific consensus on climate change, its likely causes, and probable consequences (Maibach et al. 2008), it is unsurprising that they turn to trusted elite cues to form their opinions on an issue where they generally lack information or knowledge (Zaller 1992). Elite communication and framing plays a critical role in opinion formation on “low information” issues: when addressing informational shortfalls or seeking new information on policy-relevant matters, individuals frequently turn to trusted elites, thus giving politicians significant influence on the salience and valence of attitudes among the general public. As a result of such reliance on elite communication, the general public has become increasingly divided on climate change, reflecting growing polarization among the

Democratic and Republican parties that has been consistently increasing since at least the late 1990s (Shipan and Lowry 2001, Guber 2013).

Scholars of environmental attitudes have examined this problem to understand why polarization on this issue continues to persist and increase, in spite of growing scientific consensus on climate change. Many have highlighted the activity of prominent conservative think tanks (CTTs), whose networks with Republican politicians (see Skocpol and Hertel-Fernandez 2016) have allowed them to adversely influence and inhibit climate policy efforts (McCright and Dunlap 2003, Brulle 2014). Furthermore, CTTs have frequently disseminated misinformation about climate change that has undermined or questioned the scientific consensus, attacked the legitimacy of climate scientists, and more recently highlighted potential harms to consumers from addressing climate change (Oreskes and Conway 2011, Carmichael and Brulle 2017, Cann and Raymond 2018). Such misinformation has frequently been endorsed by other Republican elites, and Republican partisans have thus been increasingly exposed to cues denying or undermining climate change as a serious and anthropogenic problem. The frequency of such misinformation has also increased considerably since 2008 (Boussalis and Coan 2016). Consequentially, CTTs have played a substantial role in shaping and framing discourse about climate change facts and policy that many scholars argue has contributed to the partisan and ideological polarization in the American public's view of climate change (Dunlap and Jacques 2013, Brulle 2014).

Yet this partisan-ideological explanation alone does not explain the divide between Republicans and Democrats on the issue, nor does it fully explain the general divide between the American public and the scientific consensus on climate change. Several alternate or complementary explanations have been offered to further explain these trends. One explanation

posits that climate change opinions are also driven by education levels, and that higher education levels and increased science literacy may increase overall concern about climate change (Malka et al. 2009, Zia and Todd 2010); however, these factors also interact with partisan identities, with concern about climate change increasing with education levels among Democrats, but not among Republicans (Hamilton 2011).

Economic factors have also been explored as a competing explanation, with scholars finding that periods of recession have correlated with decreased concern and belief in climate change during periods of recession (Kahn and Kotchen 2011, Scruggs and Benegal 2012, Carmichael and Brulle 2017). The framing or discussion of climate change in news media has been raised as another explanation, with both newspaper coverage of skepticism and coverage prominently emphasizing or legitimizing denialist viewpoints being examined as reasons for these gaps in opinion (Boykoff 2013). However, while media coverage has been found to be important, it has again been identified as a “function of elite cues and economic concern” (Carmichael and Brulle 2017).

Other studies also examine how individuals’ personal experiences of weather outcomes affect public opinion, finding that short term trends of unseasonable warmth lead to increased belief and concern about climate change (Shao 2017); however, the effects of weather experiences on climate opinions are also moderated by partisan identity (Borick and Rabe 2014). Thus, while many explanations have been proffered to explain climate opinion trends, partisan affiliation remains consistent a key factor in both directly shaping opinion, and indirectly affecting other correlates such as media coverage and weather experiences. However, while this literature on climate attitudes is broad and has examined many possible causes and covariates of

public opinion, it has largely neglected the role of racial identity and racial prejudice have largely been neglected in these discussions.

Racialization and policy support

Associations between racial attitudes and policy support and other dimensions of public opinion have been examined in several other policy areas. Scholars have identified several critical issues of public policy where racial identities or prejudices have spilled over, or become increasingly correlated with specific policies or actions through a process commonly referred to as “racialization” (Winter 2006, Tesler 2012). In several cases, racial attitudes have influenced public opinion on issues where policy outcomes are directly associated with specific groups, such as affirmative action (Sears 1993). In other cases, racial attitudes have also spilled over into policies unassociated with specific racial groups due to racialized stereotypes or perceptions of the recipients of such policies, e.g. SNAP or unemployment benefits (Gilens 1995, 2009, Hancock 2003). More recently, policies and issues with no racial content or association have also become racialized through elite rhetoric and communications that increase associations between African-American (both citizens and elites) and policies themselves.

This became increasingly salient during Barack Obama's presidency (Tesler 2016), where many voters immediately identified and viewed him through a racial lens (Kinder and Dale-Riddle 2012), and political opponents used such cues to promote racialized associations of policies. The Affordable Care Act is the best-known example of this, as this was so strongly associated with Obama's presidency that it has become colloquially and commonly known as *Obamacare*. Political elites, in many cases opponents of the Affordable Care Act, often framed messages about the ACA in a way that reinforced the message between the policy and Obama:

this activated racial attitudes among voters who started to perceive the ACA through a racialized lens and allowed those biases to then affect their evaluations of the policy. White voters with higher levels of racial resentment became less supportive of the policy; concurrently, African-American voters who strongly identified with Obama became more supportive. Consequently, public support for the ACA became polarized across racial lines, despite the ACA's policy outcomes having little association with any particular racial groups (Tesler 2012, Tesler 2016).

As race spills over into perceptions of policies or other issues, racial identities, prejudices, or other racially-oriented attitudes have become increasingly correlated with support or concern about these issues. This is evident from opinion trends on social welfare and inequality (Gilens 1995), healthcare policy (Tesler 2012), and support for Presidential candidates or incumbents (Schaffner et al. 2018, Enders and Scott 2018). However, there has been little examination of whether a similar spillover has occurred in the context of climate change.

When scholars of climate change attitudes have examined race, it has typically been viewed more in the context of risk affinity, and often examined in conjunction with ideology as part of an overall identity. Slovic (1999) for instance shows that conservative white men are the most likely demographic to report low perceptions of environmental risk; similarly, McCright and Dunlap (2011, 2013) show that conservative white males are far more likely than members of all other groups to endorse climate change denial, and may perceive their social positions or roles being more threatened by environmental action. In these contexts, race has been discussed within the context of an overall conservative identity, and an identity-protective process of cognition. Yet race alone – either as a part of racial identification or in the context of racial attitudes – has thus been largely unexplored in the context of public opinion about climate change.

While racial groups and stereotypes are not explicitly associated with climate change and its related policies, there are multiple possible pathways through which racial associations or attitudes may have spilled over into climate change discourse and opinions, particularly in consideration of factors such as partisanship and economic risks that have already been identified as significant correlates of climate change opinions. As highlighted by prior scholarship on racial spillover, many Americans' opinions on non-racial policies became tied to racial attitudes when they were unable to separate Barack Obama's personal characteristics from his policy agendas (Tesler 2012, Nteta et al. 2016). This is especially well documented in the context of healthcare, but it is plausible that similar mechanisms exist for Obama's endorsement of climate change as a priority, and policy efforts related to the Clean Power Plan and the Paris Agreement. Consequently, one such mechanism for this spillover may be through Obama's policy initiatives activating increased concern or interest among African-American voters, while activating greater opposition among white voters with high levels of racial resentment.

Concurrently, conservative think tanks and interest groups opposing environmental policy advancements frequently made explicit associations to Obama with frequent use of frames and imagery highlighting a black President harming jobs in predominantly white areas. For example, Mike Carey, President of the Ohio Coal Association, frequently referred to the Obama administration and the EPA waging a "war on coal [across Appalachia]" in multiple Congressional hearings (McGinley 2011, US House Cmte on Oversight and Govt Reform 2011, US Senate Select Cmte on Energy Independence and Global Warming 2010), and numerous publications from CTTs such as Heartland Institute had titles such as "Obama Is Costing You \$1,300 Per Vehicle" (May 2009), and "Obama Administration's Plan to Coerce People out of Their Cars" (July 2009), in an increasing pattern of associating policy with costs for consumers

(Cann and Raymond 2018). Such rhetoric may have created alternate or complementary conditions for racial attitudes to spill over into views about climate change.

Perceptions of the economy may have also been racialized during this period (Tesler 2016). While some scholars argue that aggregate climate change opinion fluctuated with economic conditions (e.g. Kahn and Kotchen 2011), there is evidence that perceptions of the economy were strongly associated with racial attitudes during Obama's 2012 election campaign (Chen and Mohanty 2017). The impact of elite partisan cues, activity of conservative think tanks, and perceptions of economic insecurity offer multiple possible mechanisms through which racial identity or attitudes may have become increasingly associated with climate change opinions during the Obama presidency. These associations may have occurred or strengthened through Obama's own messages, CTT counter-climate rhetoric and framing, or racialized perceptions of a poor economy, which resonated more strongly with white voters or voters holding high levels of racial prejudice, than with non-white voters. Hence, while a single causal mechanism is challenging to isolate or identify, it is likely that through any one or a combination of these pathways, racial attitudes may have become increasingly correlated with opinions about climate change during the Obama presidency. If this is the case, then opinion trends on climate should mirror outcomes on other racialized issues (e.g. ACA), where there is a growing gap between white and African-American voters on policy support and concern, and where increasing levels of racial prejudice should correlate with lower support for an issue that is associated with Obama. I examine whether such a spillover has occurred by testing the following hypotheses:

First, I expect that racial identification has become increasingly associated with concern about climate change after Obama's election in 2008, as voters would increasingly associate

Obama's dispositional traits with his policy. Thus, voters' racial identification or characteristics should be more significantly correlated with their climate opinions after the 2008 election.

H₁: Racial identification should be more strongly associated with climate change opinions after Obama's election in 2008.

If racial identification is more strongly associated with climate change opinions, then I expect that this should lead to increasing divergence between different racial groups in their opinions about climate change after 2008. Accounting for other correlates of climate change such as partisanship, ideology, and economic conditions, I expect that aggregate opinion should decline to a far greater extent among white Americans than among African-Americans following Obama's election. Even as other factors such as increasing CTT messaging or worsening economic conditions may create a net-negative effect in lowering climate concern, these may be limited or potentially offset among African-American voters whose positive associations with Obama and his climate change messaging or policies may prime greater concern or interest on climate change. Thus, aggregate concern about climate change after 2008 should decline far more rapidly among white Americans overall than among African-Americans.

H₂: Concern over climate change will have declined to a greater extent among white Americans than African-Americans after Obama's election in 2008.

Third, I expect that racial attitudes are also strongly associated with these trends in public opinion, in addition to racial identification. Voters with high levels of racial prejudice or similar attitudes – typically those who have high levels of “racial resentment” (Kinder and Sanders 1996) may be more likely to form negative associations between Obama and climate change, and thus should be more likely to disagree with or dispute the scientific consensus on climate change.

H₃: Racial prejudices are strongly associated with Americans' disagreement with climate science: higher levels of racial resentment should be associated with lower levels of belief that anthropogenic climate change is occurring.

Evaluating the spillover of race into concern about climate change

To test whether climate change has become “racialized” during the Obama presidency, I examine trends in public opinion to see how attitudes towards climate change are correlated with racial identification and racial resentment. If, as hypothesized above, racial identification has become increasingly associated with climate change after Obama’s election, I expect to find increasingly significant correlations between these attitudes and views about climate change during and after the period of the Obama presidency.

Aggregate trends in concern

I first examine the extent to which race itself has become associated with environmental concern by analyzing pooled survey data from Pew. The pooled data are comprised of 10 nationally representative surveys conducted between 2006 and 2014, with each survey contacting between 1000 and 2000 respondents. Four of these surveys were conducted prior to June 2008, and the remaining six were conducted after spring 2009, following Obama’s inauguration. Each of these surveys asks an identically worded question on the seriousness of climate change with responses coded on a 4-point scale in order of increasing concern (1: “not at all serious”, 2: “not too serious”, 3: “somewhat serious”, 4: “very serious”). I use this question, *seriousness*, as the dependent variable in this analysis.

Aggregate trends show some variation in this question over time, with the overall levels of concern over climate change declining after 2009. Mean responses to this question are consistently between 3.02 and 3.14 (on a 4 point scale, with 4 indicating the highest level of seriousness); however, this falls to 2.77 in the October 2009 survey, and fluctuates between 2.73 and 2.85 in subsequent surveys. To test my first hypothesis, I first use a between-groups comparison to examine aggregate changes in concern about climate change before and during the Obama presidency, comparing responses across groups with different racial identifications.

I use a two-tailed t-test to compare differences in means in perceived seriousness of climate change across all respondents in surveys conducted prior to Obama's election (four surveys before November 2008), and in surveys conducted after Obama's election (six surveys between 2009 and 2014). A two-tailed t-test for the general population shows a decrease in overall concern after Obama's election, with the mean response falling by 0.234 points on a 4 point scale ($p < 0.001$). To test whether racial identification has become increasingly correlated with climate change concern, I then repeat these t-tests for only respondents who identified themselves as "white/Caucasian" or "black/African-American" in their demographic responses. A two-tailed t-test shows a significant drop in concern among white Americans following Obama's election (difference in means 0.286, $p < 0.001$). However, this effect is not evident among black/African-American respondents, where I find minimal decrease in aggregate concern about climate change (difference in means 0.0313, $p = 0.603$).

This offers support for Hypotheses 1 and 2, showing that aggregate opinion among white and black Americans has changed at considerably different rates following Obama's presidency, with significant declines among white Americans and minimal, statistically insignificant shifts among black Americans over this period. One explanation for this may be that black voters

tended to generally view Obama more positively than white voters (Tesler 2016, Kinder and Dale-Riddle 2012), and thus Obama’s policy initiatives and messages relating to climate change may have been received more favorably by black voters, with this effect reducing or offsetting to some extent the negative impact of other elite cues or economic factors on public opinion.

To properly account for these other effects, I conduct several multivariate regressions that control for other key correlates of climate opinion identified in prior literature. I use condensed three-point scales for partisanship (with leaners being coded with their party of choice) and ideology¹, and respondents’ self-identified age, religion, and education levels. As I am primarily interested in the interaction between white racial identification and the period of Obama’s presidency, I include a dummy variable coded 1 during the period of Obama’s presidency, and an interaction term between identification as white/Caucasian race and the Obama presidency variable. To control for economic conditions, I include the national unemployment rate for the month prior to the survey data obtained from the Bureau of Labor Statistics (BLS 2017). The general form for the multivariate equation is:

$$\begin{aligned} \text{Perception of climate concern} = & a + \sum b_r \text{Race} + b_d \text{Obama} + \sum b_{rd} \text{Race} \# \text{Obama} + \\ & \sum b_p \text{Partyid} + \sum b_i \text{Ideology} + b_{\text{Sex}} + \sum b_{\text{Age}} + \sum b_{\text{Education}} + \sum b_{\text{Religious attendance}} + \\ & b_{\text{Unemployment}} + e \end{aligned}$$

In which p indexes three categories of partisanship (Republican, Democrat, Independent (omitted reference category));

i indexes three categories of ideology (Conservative, Liberal, Moderate (omitted reference category));

¹ Results for race remained consistent when using the expanded five-point partisanship and ideology scales

d is a dummy variable coded 1 in years when Obama was President;

r indexes four categories of respondents' race based on categories from the Pew surveys (white/Caucasian, Hispanic, other/mixed, and black/African-American (omitted reference category));

indicates that interactions between race (identified as white) and the Obama presidency are estimated

Given the nature of the dependent variable (a 4-category measure in increasing order of concern), I first estimate an ordinal logistic regression model with fixed effects and clustered standard errors to examine the effect of racial identification on environmental concern between 2005 and 2013. Column 1 in Table 1 presents coefficients from this analysis. While neither white racial identification or the Obama presidency dummy are significantly correlated with environmental concern in the whole model, the interaction of white \times Obama is significant at $p < 0.01$. This suggests that while neither the race nor Obama dummy variables alone predict decreased concern about climate change, the interaction of these variables correlates with lower reported levels of environmental concern during the Obama presidency. Column 2 presents coefficients from an alternate estimation procedure using a multilevel ordinal logistic regression model to ensure that trends are not affected by the hierarchical nature of some data (e.g. unemployment): coefficient sizes and significant levels are generally consistent across both models.

[Table 1 here]

Results for other demographic and control variables are consistent with findings from prior research on environmental concern among the public (e.g. Carmichael and Brulle 2017).

These provide further evidence for significant polarization across ideological and partisan lines, with conservative or Republican respondents being far less likely than liberals or Democrats to acknowledge climate change as a serious issue. Women, respondents with lower religious attendance, and those with post-graduate education were also more likely than men, frequent religious attendees, or people with lower educational attainment respectively to acknowledge climate change as a very serious or somewhat serious problem. Increases in unemployment rates are also correlated with lower reported concern/perceptions of seriousness of climate change.

To examine the specific effects of racial identification prior to and during Obama's presidency, I also conduct ordinal logistic regressions with clustered standard errors separating the pooled surveys data into periods of pre-Obama presidency (Model 3) and during the Obama presidency (Model 4). In Model 3, there is no significant difference between white and African-American respondents in their reported concern about climate change when controlling for partisanship, ideology, education, religious attendance, and economic factors. However, Model 4 shows significantly different results for racial identification: after Obama's election, white Americans are approximately 18% less likely than black Americans to express high levels of concern about climate change ($p=0.013$). I also observe that identifying as African-American increases the predicted probability of higher climate concern *relative* to other racial groups following the election. Respondents identifying as other/mixed race were significantly more likely than African-Americans to view climate change as "very serious" prior to 2008 (model 3), but not after Obama's election in 2008 (model 4), where there is no significant difference between these groups. While racial identification changes in significance after Obama's election, the correlations between climate concern and other key covariates in the analysis do not change across these periods for variables other than unemployment.

[Figure 1 here]

Figure 1 presents predicted probabilities conducted after estimating Models 3 and 4 using the `prvalue` command in Stata. These estimate probabilities for a respondent identifying as either white/Caucasian or as African-American to agree that climate change is a “very serious” problem both prior to and during the Obama presidency, holding constant all other partisan, ideological, age, education, and religious attendance variables at their median values. Dots indicate the predicted probability of agreement that climate change is a very serious problem, with lines indicating 95% confidence intervals. For both groups of respondents, predicted probabilities are almost identical prior to Obama’s election. However, following Obama’s election, we see a small decrease in the predicted probability of this opinion among African-Americans, but a significantly larger decrease for white Americans. An aggregate decline is expected in light of national trends at this time, with worsening economic conditions (Scruggs and Benegal 2012) and increasing CTT messaging (Boussalis and Coan 2016). However, results show only a small decline among African-American respondents that is not statistically significant, while we see a significantly larger decline among white respondents after Obama’s election. This supports the second hypothesis, indicating that American public opinion on climate change has diverged across racial lines after 2008, while controlling for the expected effects of partisanship, ideology, education, religious attendance, and the economy.

Theories of racial spillover offer two possible mechanisms for how this may have occurred: first, if elite cues and economic factors created a net-negative effect on public concern about climate change, African-American voters who identified strongly with Obama may have become more concerned or interested in the issue following his policy initiatives and messages. Second, it is also plausible that white voters with high levels of racial prejudice also associated

Obama with climate change and related policy, but that this association amplified the negative effect of other factors on climate change, creating this divergence. To examine this second possibility, I analyze the effect of racial prejudices on attitudes about climate change.

The correlation of racial resentment with climate change denial

The analysis to this point identifies racial *identification* as a significant predictor of climate change attitudes during the Obama presidency, but not before, suggesting that the association between race and climate opinions has intensified during this time. However, to examine the relationship between racial *attitudes* and environmental views and to test my third hypothesis, I use pooled data from the 2012 and 2016 ANES surveys that include several questions about racial attitudes. These surveys also include two questions that ask respondents whether they agree or disagree with the scientific consensus that climate change is currently occurring, and that climate change is largely affected by human activity. A limitation to this analysis is that earlier versions of the ANES do not ask specific questions about either climate science or concern over climate change.² However, if the spillover hypothesis holds true, then it should be expected that higher levels of racial resentment in this period will correlate with lower levels of agreement with the scientific consensus on climate change.

To measure racial attitudes, I use four questions from the ANES surveys that are typically combined to form a scale of *racial resentment* (Kinder and Sanders 1996, Feldman and Huddy 2005). I combine these questions into a single index variable for racial prejudice. PCA factor loadings for these questions were all above 0.77 in the 2012 ANES and above 0.81 in the 2016 ANES, with Cronbach's alpha (scale reliability coefficient) of above 0.79 in both samples.

² Previous versions of the ANES (2008 and earlier) ask about opinions on specific aspects of environmental policy, such as cap-and-trade or carbon emissions caps; however, these do not ask for respondents' overall concern about climate change or agreement with climate science.

I use two measures of environmental attitudes here: whether respondents agree that climate change has been occurring (coded 1 “Has probably been happening” and 0 “Probably hasn't been happening”, don't know and unsure responses removed³), and whether climate change is largely anthropogenic (1 “Mostly by human activity”, 0 combining “Mostly by natural causes” and “About equally”, with don't know/unsure responses removed). I include controls for partisanship (combining strong and moderate partisans into the same category), ideology, sex, race, age, and educational attainment. The models estimated follow the equation:

$$\begin{aligned} \text{Agreement with climate science}_{cc} = & a + \Sigma b_{\text{Race}} + \Sigma b_{\text{Racial resentment scale}} + b_d \text{Obama} \\ & + \Sigma b_{rd} \text{Race} \# \# \text{Obama} + \Sigma b_p \text{Partyid} + \Sigma b_i \text{Ideology} + b_{\text{Sex}} + \Sigma b_{\text{Age}} + \Sigma b_{\text{Education}} + \\ & b_{\text{Unemployment}} + e \end{aligned}$$

In which cc estimates responses to each of the questions whether *climate change is occurring* and whether *climate change is anthropogenic* (each question is estimated in separate regressions);

p indexes three categories of partisanship (Republican, Democrat, Independent (omitted reference category));

i indexes three categories of ideology (Conservative, Liberal, Moderate (omitted reference category));

Table 2 presents coefficients from the logistic regressions examining the effect of racial attitudes on environmental views, controlling for partisanship, ideology, sex, education, age, and race.

Given the limitations of available data and appropriate survey questions, the results only show

³ “Don’t know”/refused responses accounted for between 0.5-1.7% of the total responses in both surveys. Including these responses in a separate regression (coding them as 0, non-agreement with the scientific consensus) did not alter significance or effects sizes of results.

these effects for the pooled 2012 and 2016 ANES sample during the Obama presidency; however, we see in this period that increased levels of racial resentment are significantly correlated with lower levels of agreement with the scientific consensus that climate change is presently occurring, and that it is anthropogenic. Standard errors are clustered by survey. The results presented in models 5 and 7 indicate that a one increment increase in feelings of resentment towards black Americans on the 5 point racial resentment scale is correlated with respondents being only 68% as likely to acknowledge that climate change is occurring, and 71% as likely to acknowledge that climate change is anthropogenic (estimated by $e^{\text{coefficient}}$). The sizes and significance ($p < 0.001$) of these effects remain consistent when including an interaction term for (racial resentment \times partisanship) in models 6 and 8 to control for possible interaction effects of racial resentment and partisanship, given that Republicans are the primary target of such contra-climate science cues from think tanks or co-partisan elites.

I also estimate predicted probabilities for these attitudes for white Republicans over the racial resentment scale, following estimation of models 6 and 8. Figure 2 presents these predicted probabilities for reported agreement that climate change is presently occurring (left image), and that climate change is largely anthropogenic (right image). Holding ideology, age, and education constant, we see that moving from least resentful to most resentful increases the probability that a white Republican disagrees that climate change is occurring from 7% to 26%. For the second question, asking respondents if they agree that climate change is largely due to human activity, we again see an even larger effect size for with a 57% probability that a white Republican disagrees that climate change is anthropogenic at the lowest level of racial resentment, increasing to 84% at the highest level of racial resentment.⁴

⁴ These results are also consistent when looking at data from the 2012 and 2016 surveys separately, rather than the pooled sample.

[Figure 2 here]

In sum, analyses of multiple public opinion datasets support my argument that racial identification and prejudices have spilled over into Americans' perceptions of environmental matters today. Survey data from Pew indicate that race has become a more significant correlate of environmental concern since 2009, following the election of Barack Obama. As a consequence, overall declines in public concern about climate change after 2008 has been significantly steeper among white Americans. Furthermore, the 2012 and 2016 ANES suggest that racial prejudices today are a significant correlate of Americans' views towards climate change and climate science, even when controlling for other well-established covariates of environmental public opinion such as partisanship, ideology, and education.

Discussion

The spillover of racial identity and attitudes into public policy and opinion has significantly impacted both political campaigns in the US and public policies such as the Affordable Care Act. This phenomenon has been well documented in the context of healthcare (e.g. Tesler 2012), and other evidence shows that race has “spilled over” into policy debates over immigration and social welfare (Kinder and Sanders 1996, Gilens 1999) in the past. This study offers evidence for a similar trend in the context of climate change, with Americans' racial attitudes becoming increasingly linked to climate change opinions during the Obama presidency. This is evidenced by growing associations between racial identities and climate concern, and highly significant associations between racial resentment and rejection of the scientific consensus on climate change.

While a single causal mechanism for why this has occurred is hard to identify given the limitations of the data examined and available, there are several plausible (and complementary) pathways that may have contributed to this spillover. One plausible mechanism is the potential for increased partisan sorting along racial attitudes. However, this is not a new phenomenon and can be traced back to the “Southern Strategy” several decades ago (see Carmines and Stimson 1989, Mendelberg 2001). However, correlations between racial resentment and partisanship have increased considerably over the past two decades, and racial attitudes have consequently become highly correlated with other policy issues such as healthcare and various government services (Enders and Scott 2018). However, this alone would not explain this trend, given – as evidenced by the earlier analysis – increasing levels of racial resentment are associated with reduced agreement with the scientific consensus even when controlling for partisanship and potential interactive effects.

Hence, other mechanisms need to be considered for why both racial identity and resentment have become so strongly associated with climate change opinions in recent years. Given that public opinion is largely a result of elite communication (Zaller 1992), it is more likely that elite rhetoric and framing on climate change and related policy initiatives have led to pathways for this racial spillover. One such pathway may have emerged from Obama’s own policy association and rhetoric on climate change: while Obama was not associated with climate change policy to the same extent as healthcare, significant climate change mitigation policies such as the Clean Power Plan and the entry to the Paris Agreement occurred during his presidency. Consequently, Obama’s own rhetoric and policy initiatives acknowledging and addressing climate change may have primed conditions for a possible spillover.

Elite rhetoric from conservative and Republican opponents of climate policy offers another plausible pathway for this spillover to occur. Conservative think tanks (CTTs) have been particularly prominent among elites shaping or influencing climate change rhetoric, both directly and through their other political networks (Skocpol and Hertel-Fernandez 2016, Dunlap and Jacques 2013), and numerous Republican politicians have been vocal in both questioning climate science and arguing against climate policy (Guber 2013). Following Obama's election in 2008, think tanks and various Republican elites have frequently engaged powerful, often apocalyptic language to draw associations between Obama's environmental policy initiatives and severe economic impacts harming American jobs or consumers (Schneider et al. 2016). Rhetoric such as "Obama's war on the middle class" or similar language from coal industry representatives have served to strongly associate a black identity to action aimed at addressing climate change (e.g. the Clean Power Plan), and consequences that would harm Americans, frequently highlighting adverse consequences to those in industries such as coal where an overwhelming majority of workers are white.

Concurrently, rhetoric from other political elites on the right have made aspects of white identity and grievance increasingly salient. Such rhetoric - employed by politicians such as Scott Walker and later Donald Trump - has frequently appealed to grievances and resentment among white working-class voters, providing cues that they were entitled to far more than they were getting, but have been steadily losing power and influence due to the rise of other groups (Cramer 2016, King 2017). On his political campaign trail, Trump frequently promised voters that he would restore these lost privileges, while promising to address issues such as immigration and the lost jobs in the coal industry, and largely focusing on issues tied to ethnic and social identities (Sides et al. 2017).

While these trends emerged during the Obama presidency (see Cramer 2016) and intensified during Trump's campaign, they have continued throughout Trump's first year as president with narratives of white grievance and resentment being frequently employed in the context of climate change and energy policy. Such narratives have been used in justifications for the retrenchment of multiple Obama-era energy and climate regulations with frequent claims that such regulations actively harmed the economy (Hejny 2018), often in ways that disproportionately affected white working-class voters. They have also been employed in promises to restore "energy dominance" through the restoration of the coal industry (Schneider and Peeples 2018), as themes of grievance, resentment towards racial outgroups, and climate or energy policy have become increasingly entangled in political rhetoric. The emergence and increasing use of such rhetoric by elite partisans in recent years offers another potential and plausible mechanism for the spillover of race into public opinion about climate change. While the limitations of the data examined do not allow a specific causal mechanism to be identified for this spillover, these are avenues that future scholarship should consider in further examining the growing entanglement between racialized rhetoric or grievances and attitudes towards climate change.

Conclusion

The US has seen growing political polarization on climate change among both elites and the general public in the last two decades. I argue that an important factor contributing to this is the spillover of racial attitudes into climate change public opinion. In examining public opinion trends over recent years, I find that racial identification has become increasingly correlated with concern about climate change since the Obama presidency. As a result of this, public opinion

among white Americans has declined after 2008 at a much higher rate than among African-Americans. Furthermore, I find that higher levels of racial prejudices and resentment are highly correlated with lower levels of agreement that climate change is occurring, and that it is anthropogenic. These findings add to a substantial body of research that has shown partisan identity and elite cues to be especially important in shaping climate change opinions. While these factors have been examined in considerable depth as correlates of climate change belief and concern, this research adds a complementary explanation that highlights the increased salience of racial attitudes in association with climate change opinions. Given current trends in US environmental policy and rhetoric from elites, which have seen a growing convergence in themes of racialized grievances and opposition to climate change policy and expertise, these results raise several questions and new avenues to be explored in research on climate change public opinion and policy communication.

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Table 1: Ordinal logistic regression for survey response on perceived seriousness of climate change, asked in Pew surveys from 2006 to 2013.

	Perceived seriousness of climate change			
	Ordinal logit, fixed effects for survey (1)	Multilevel ordinal logit (2)	Ordinal logit, pre-Obama presidency (3)	Ordinal logit, during Obama presidency (4)
Race variables				
Race: White	.026 (.072)	.027 (.091)	.029 (.105)	-.181** (.073)
Race: Hispanic	.474*** (.097)	.473*** (.081)	.559*** (.102)	.448*** (.121)
Race: Other/mixed	.209* (.087)	.208** (.084)	.734*** (.034)	.087 (.055)
Obama Presidency	-7.774*** (.105)	.077 (.124)		
White × Obama Presidency	-.231*** (.058)	-.230** (.092)		
Partisanship				
Republican	-.778*** (.068)	-.778*** (.057)	-.588*** (.081)	-.845*** (.074)
Democrat	.630*** (.066)	.629*** (.056)	.504*** (.057)	.669*** (.081)
Ideology				
Conservative	-.550*** (.057)	-.551*** (.036)	-.419*** (.131)	-.596*** (.065)
Liberal	.456*** (.037)	.454*** (.036)	.418*** (.131)	.452*** (.028)
Sex: Male	-.322*** (.040)	-.321*** (.031)	-.367*** (.062)	-.312*** (.048)
Age	-.002*** (.001)	-.002*** (.001)	-.001 (.001)	-.003** (.001)
Education: HS or less	.019 (.039)	.019 (.039)	.052 (.055)	-.002 (.050)
Education: College grad	.051 (.067)	.051 (.042)	.094 (.062)	.027 (.087)
Education: Post- grad	.223*** (.039)	.225*** (.048)	.157 (.111)	.232*** (.049)
Low religious attendance	.126** (.062)	.126** (.053)	.318* (.172)	.076 (.051)
Weekly religious attendance	-.098*** (.034)	-.097** (.037)	-.106*** (.034)	-.094* (.048)
High religious attendance	-.360*** (.041)	-.358*** (.047)	-.327*** (.094)	-.365*** (.052)
Unemployment	-.182*** (.021)	-.111*** (.022)	.327 (.191)	-.108*** (.016)

N	15121	15121	3869	11252
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Reference categories for each variable type are: Race: black; Independents; Center (moderate) ideology, some college education, Seldom attend religious services

Robust standard errors clustered by survey in parentheses

***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$

Figure 1: Predicted probabilities showing changing climate change concern by race, before and during the Obama Presidency

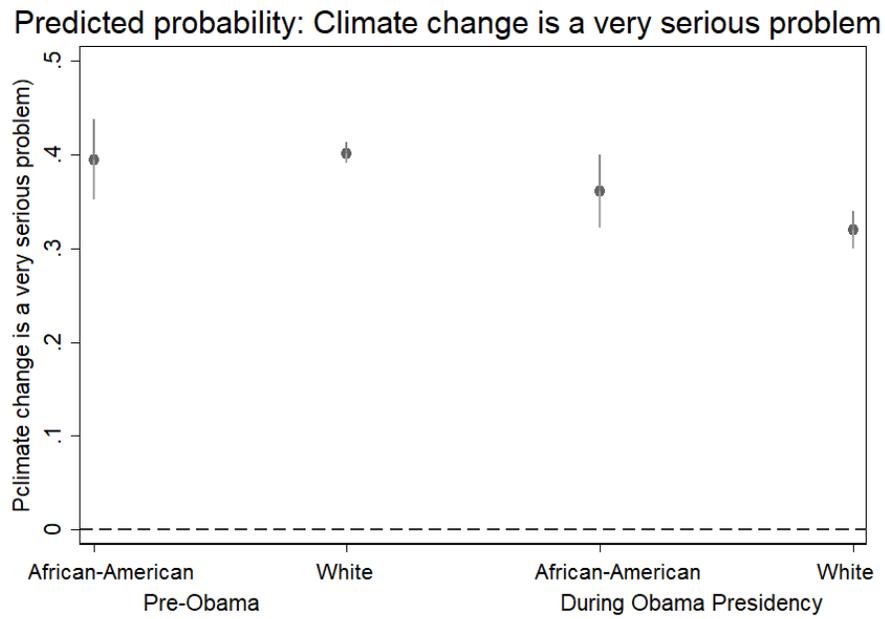
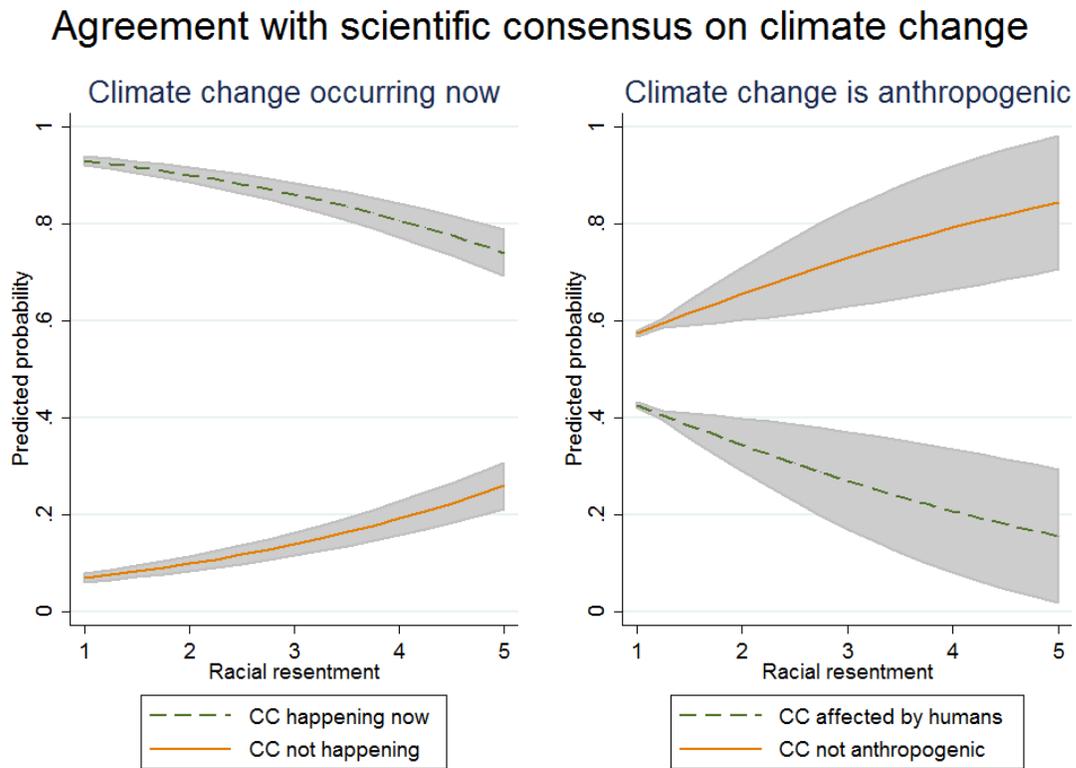


Table 2: Logistic regression for survey responses about climate change, asked in 2012 and 2016 ANES surveys

	Global warming is happening		Climate change mostly due to human activity	
	(5)	(6)	(7)	(8)
Racial resentment	-.387*** (.053)	-.387*** (.014)	-.335*** (.072)	-.347** (.135)
Republican	-.497*** (.056)	-.164*** (.024)	-.382*** (.036)	-.701 (.616)
Democrat	.378*** (.053)	.024 (.322)	.150*** (.015)	.164 (.209)
Republican × racial resentment		.081*** (.086)		.085 (.180)
Democrat × racial resentment		.106 (.089)		-.005 (.070)
Conservative	-.757*** (.076)	-.756*** (.080)	-.483*** (.008)	-.484*** (.002)
Liberal	.421*** (.015)	.448*** (.028)	.544*** (.062)	.537*** (.075)
Male	-.007 (.079)	-.006 (.076)	.120 (.094)	.120 (.093)
High school or less	-.154* (.017)	-.160* (.152)	-.075*** (.012)	-.073 (.067)
College graduate	.177* (.077)	.172* (.079)	.262*** (.010)	.264*** (.070)
Post-graduate education	.312** (.062)	.315** (.063)	.394*** (.002)	.392*** (.015)
Race: non-white	.212** (.078)	.196* (.093)	.392*** (.053)	.397*** (.046)
Age	.004*** (.001)	.004*** (.001)	-.012*** (.002)	-.012*** (.001)
Constant	2.815*** (.186)	2.817*** (.033)	.706 (.488)	.744 (.692)
N	7545	7545	7598	7598

Figure 2: Predicted probabilities for agreement with scientific consensus as racial resentment increases



Appendix: Question wording

Concern over climate change

From various Pew surveys (2006 to 2014)

In your view, is global warming a very serious problem, somewhat serious, not too serious, or not a problem?

Responses coded as: 1: “not at all serious”, 2: “not too serious”, 3: “somewhat serious”, 4: “very serious”

Surveys used were conducted in June 2006, July 2006, January 2007, April 2008, May 2009, October 2009, October 2010, November 2011, October 2012, and March 2013.

Climate change is happening

From ANES 2016 and ANES 2012:

You may have heard about the idea that the world's temperature may have been going up slowly over the past 100 years. What is your personal opinion on this? Do you think this has probably been happening, or do you think it probably hasn't been happening?

Responses coded as: 1: climate change is happening, or 0: climate change is not happening.

Climate change is anthropogenic

From ANES 2016 and ANES 2012:

[Do / Assuming it's happening, do] you think a rise in the world's temperatures would be caused mostly by human activity, mostly by natural causes, or about equally by human activity and by natural causes.

Responses coded as 1: caused mostly by human activity, or 0: caused by natural causes OR equally by human activity and by natural causes