



A new look at the racial differences in environmental attitudes: the roles of risk perception and group consciousness

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ABSTRACT

Racial minorities bear disproportionate share of pollution and environmental risk. A key solution to such disparities is to increase their participation in the environmental policymaking process. In this article, I test various theories of environmental attitudes and participation—with a special focus on risk perception and group consciousness—on Whites and Minorities and use them to explain the racial differences in environmental concern and participatory intentions. Using survey data, I find that risk perception is positively associated with environmental concern and participatory intentions for both Whites and Minorities. I also find that many theories of environmental attitudes apply to Whites and Minorities differently. While the traditional explanations of political orientation and social connectedness apply to Whites, their patterns are less clear for Minorities. Instead, group consciousness plays an exceptionally important role for racial minorities, and it accounts for much of racial minorities' higher levels of concern and participatory intentions compared with Whites. This study provides new perspectives to understand the racial differences in environmental concern and participation and has important implications for the environmental justice research and movement and environmental public policy.

1. Introduction

Scholars have long documented that racial minorities and the poor have been burdened with disproportionate share of pollution and environmental risk (e.g., Agyeman et al., 2016; Li et al., 2019; Mohai et al., 2009; Noonan, 2008; Ringquist, 2005; Schlosberg, 2013). While the related research originated in the US, the phenomena exist in many parts of the world—in the UK (Agyeman and Evans, 2004), European Union (Laurent, 2011), and Latin America (Carruthers, 2008; Schlosberg and Carruthers, 2010) among others. In tandem with the academic investigation is the strong and growing environmental justice movement, which seeks to correct such racial and class disparities. Many scholars point out that a “no-brainer” solution is to increase the participation of minorities in the policy decisions that affect them (e.g., Banzhaf et al., 2019; Hamilton, 1995; Mohai et al., 2009), as research shows that citizen participation in the decision-making process affects environmental regulations and outcomes (e.g., Daley, 2007). Moreover, “meaningful involvement of all people regardless of race, color ...” is the at the core of the definition of environmental justice by the Environmental Protection Agency (EPA) (U.S. EPA, n.d.). Understanding the

racial differences in environmental participation, thus, is critical for the environmental justice research and movement.

The racial differences in environmental participation can be explained, at least partly, by the differences in environmental attitudes, since values, beliefs, and norms are precursors of environmental actions (Stern, 2000; Stern et al., 1999). The scholarly interest in the racial differences in environmental attitudes dates to the 1970s. The conventional wisdom was that minorities were not as concerned about environmental issues as Whites were (e.g., Hershey and Hill, 1977).¹ But the idea has been challenged, and most of the later studies have found that racial minorities are as concerned as and often more concerned than Whites (e.g., Lazri and Konisky, 2019; Mohai and Bryant, 1998; Scarlett et al., 2021).

To explain the racial differences, scholars often cite the differences in exposure to pollution and social economic status (e.g., Mohai and Bryant, 1998; Whittaker et al., 2005), and the residuals are treated as “cultural differences.” While this approach has offered important insights, two challenges hinder a deeper understanding of the issue. First, the assignment of the residuals is overtly general and simplified. The literature on citizen participation has identified other theories such as

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¹ The context of this study is the US, where Whites are the majority. The environmental justice literature in the US primarily compares environmental burden and risk between White and non-White communities. Instead of majority vs. minority, I use Whites vs. Minorities in this article.

civic orientation, group consciousness, social connectedness that would help to further break down the differences (e.g., [Holbrook et al., 2016](#); [Leighley and Vedlitz, 1999](#); [Melissa, 2001](#)). While most of the theories were developed in the study of national electoral participation, they have important bearing for local and issue-specific attitudes and participatory behaviors as well (e.g., [Melissa, 2001](#); [Melissa, 2004](#); [Verba et al., 1995](#)). Second, the use of actual risk exposure has overlooked the role of perception of risk. Individuals develop attitudes and behaviors based on their perception (e.g., [Slovic et al., 1982](#)), which could deviate from reality. By using the actual risk as an explanation, we will not be able to accurately understand the role of risk perception for the environmental attitudes of different racial groups.

In this study, combining the previous theories that are specific to the racial differences in environmental attitudes and theories on citizen participation, I focus on the roles of risk perception and group consciousness in explaining the environmental concern and participatory intentions for Whites and Minorities and the differences between them. With survey data collected by YouGov, an internet-based market research company, my analysis shows that 1) perception of risk, instead of the actual risk, is strongly correlated with environmental concern and participatory intentions for both Whites and Minorities; 2) the various theories of environmental attitudes apply to the two groups differently: The predictions of theories such as political orientation and social connectedness are supported by the analysis on Whites, but the patterns are less clear for Minorities; 3) instead, group consciousness plays a critical role in the environmental attitudes of Minorities, and it can account for much of the differences of racial minorities' higher levels of concern and participatory intentions compared with Whites.

This study sheds new light on the racial differences in environmental attitudes and has important implications for environmental justice research and movement and public policy. First, the importance of group consciousness for Minorities' environmental attitudes highlights the potential of group-based mobilization strategy, which echoes with the messages of the environmental and social justice movements, to improve minority participation. Second, the relationship between risk perception and environmental attitudes, coupled with the existence of misperception, underlines the importance of information disclosure and risk education, which has the potential to correct misperception and align preferences better with reality.

2. Literature review and theory

Racial groups have different environmental attitudes, and the differences have evolved over time (e.g., [Lazri and Konisky, 2019](#); [Whittaker et al., 2005](#)). Even without observed differences, the underlying determinants for individual attitudes and their relative importance could also differ across racial groups ([Leighley and Vedlitz, 1999](#)). To identify individual-level determinants of attitudes and participation, scholars of different disciplines have developed various theories, many of which apply to environmental attitudes ([Dorceta, 1989](#)). Here I briefly survey the major theories.

2.1. Socioeconomic status (SES)/Hierarchy of needs

The most basic theory posits that SES affects participation (e.g., [Verba and Nie, 1972](#)). Participation in sociopolitical activities requires resources, and people with higher SES (e.g., education, income) possess more such resources (e.g., time, money, knowledge, civic skills), which make them (intent to) participate more (e.g., [Brady et al., 1995](#)). A closely related argument—"hierarchy of needs" theory—claims that people will only start to pay attention to higher order needs after the satisfaction of more basic needs, such as food, job, and shelter (e.g., [Dorceta, 1989](#); [Hershey and Hill, 1977](#)). Thus, racial minorities, who on average have lower SES, would be less concerned about environmental problems as they are preoccupied with more basic needs. Since its proposal, the SES model has become a starting point for almost all

analyses of general and environmental attitudes and participation. While numerous studies have found it an important factor in explaining general participation (for a review, see [Leighley, 1995](#)) and attitudes and participation in various other issues (e.g., [Holbrook et al., 2016](#); [Melissa, 2001](#); [Melissa, 2004](#)), most of the later studies have not found it to be a strong predictor for environmental attitudes (e.g., [Mohai and Bryant, 1998](#); [Whittaker et al., 2005](#)).

2.2. Civic orientation

The second theory focuses on civic orientation, such as political trust, efficacy, and interest ([Verba and Nie, 1972](#); [Verba et al., 1995](#)). The most robust finding from the empirical studies based on this theory is that people with higher levels of political efficacy and interest tend to participate more ([Rosenstone et al., 1993](#); [Verba and Nie, 1972](#); [Verba et al., 1995](#)). The argument for the role of political trust is more ambiguous and often depends on the types of attitudes and participation. It could be negatively associated with participatory intentions: when people lack trust in government to fix problems, they participate more as a form of supervision. But it could also be positively related to support for government actions such as environmental policy (e.g., [Konisky et al., 2008](#)). There is no strong theoretical expectation for the relationship between political interest and environmental concern. Given that most of the environmental related news in the past a few years was negative, I hypothesize that people with stronger political interest will have higher levels of environmental concern.

2.3. Group consciousness

The group consciousness theory was proposed to explain the fact that Minorities tend to participate more than Whites when controlled for SES ([Olsen, 1970](#); [Verba and Nie, 1972](#)). Individuals develop group consciousness when they identify with a group, express collective discontents, and commit to collective action to change the adverse conditions of the group ([Miller et al., 1981](#)). It increases participation because strong identification with a racial group exerts normative pressure on individuals to think in group terms and contribute to collective goals. ([Chong and Rogers, 2005](#)). [Verba and Nie \(1972\)](#) first find that African Americans who mentioned race more in their discussion of political issues also tended to participate more. Later studies with more accurate measurement for the multiple dimensions of the concept also find a strong correlation between group consciousness and participation (e.g., [Chong and Rogers, 2005](#); [Miller et al., 1981](#)). The relationship between group consciousness and environmental attitudes is less studied, but [Jones and Rainey \(2006\)](#) find that residents in a highly polluted community of color who believed their exposure to adverse environmental conditions was unfair expressed more environmental concern.

2.4. Social connectedness

The literature suggests that social network and the connection between individuals and political and social communities play important roles in explaining attitudes and participation (e.g., [Putnam, 1995](#); [Rosenstone et al., 1993](#)). People with deeper ties to communities have larger stake at the wellbeing of their communities, hence be more concerned about local environmental risk. People who involve in social and political organizations are more integrated in the communities and learn about social norms of and opportunities for participation.

2.5. Political orientation

Numerous studies have found that party affiliation and ideology are strong predictors of environmental attitudes (e.g., [Egan and Mullin, 2017](#)). The partisan and ideological divides are also escalating, with Democrats and liberals, on average, becoming more concerned about environmental problems and supportive of environmental regulations in

comparison with Republicans and conservatives (e.g., Dunlap, 2014).

2.6. Risk perception

Beyond the above models, individuals' perception of the underlying conditions should also matter. Citizens' attitudes and preferences rest on their policy knowledge/issue perception (Kuklinski et al., 2000). If people perceive their circumstances to be unsatisfactory, they will be more likely to take actions to improve the conditions. In the environmental area, previous research suggests that experience of or proximity to pollution, which tends to correlate with risk perception, results in greater concern about environmental problems (e.g., Konisky et al., 2016; Mohai and Bryant, 1998; Whittaker et al., 2005). This phenomenon underlies the environmental deprivation theory, which claims that minorities should be more concerned about environmental issues because of their disproportionate exposure to pollution (e.g., Liere and Dunlap, 1980). A contradicting theory—the relative deprivation theory—however, posits that minorities would care less about environmental issues despite the larger exposure to environmental risk because they have got used to and less aware of the adverse situation (e.g., Hershey and Hill, 1977).

Both the deprivation and relative deprivation theories rest on racial groups' perception of environmental risk and how they use the perception to form attitudes. Instead of perception, previous research, however, mostly uses the real conditions, such as neighborhood environmental quality, to test the theories and explain racial groups' environmental attitudes. While perception and reality may be highly correlated, they could also be very different. Scholars have demonstrated that citizens' policy knowledge in many policy domains often greatly deviate from reality (e.g., Kuklinski et al., 2000). Individuals may have misperception about environmental problems as well. Without directly measuring perception, we cannot have an accurate picture of how different racial groups respond to their perception of risk and the implications for racial groups' different environmental attitudes.

In this paper, I bring together all the above theories to provide a more comprehensive understanding of the racial differences in environmental attitudes. Specifically, I use individuals' perception of local risk associated with toxic emissions—together with other theories—to explain the issue-specific environmental concern and participatory intentions of Whites and Minorities, respectively, and the differences between them.

3. Data and measurement

The data come from a survey (survey questions in Appendix A) on a representative sample of 500 adult respondents (age >18) in the contiguous U.S., which was implemented in February 2020 by YouGov, an internet-based market research firm. Respondents were compensated with points that they can accumulate for gift cards. YouGov created the sample by drawing respondents from their opt-in panel to match a population-based target sample that is based on the 2018 American Community Survey (ACS) (Table B1 in appendix B compares the sample with the population profile based on the 2018 ACS). Its methodology for generating representative samples has been validated extensively (e.g., Ansolabehere and Schaffner, 2014; Liu et al., 2010).

3.1. Risk perception

This study uses respondents' perception of zip-code level risk associated with toxic emissions. Specifically, the EPA tracks the emissions of toxic chemicals that may threaten human health and harm the environment under the Toxics Release Inventory (TRI) program. Every year, more than 20,000 industrial facilities report to the TRI how much of each toxic chemical is released to the environment. To understand the impact of toxic emissions on communities, the EPA has developed the Risk-Screening Environmental Indicators (RSEI) model. The RSEI model

calculates a variety of risk measures at different geographical levels by incorporating information from the TRI and other factors such as chemicals' fate and transport through the environment, and each chemical's relative toxicity. The RSEI score measures geographic units' relative risk from toxic emissions.

To assess respondents' risk perception, I first provide them with background information about the RSEI score and ask them to answer the question "If we rank all zip codes in the contiguous U.S. from the lowest risk to the highest risk from toxic chemicals, how do you think your zip code compares to other zip codes?" Respondents answer the question by moving a needle on a scale (Fig. 1). The risk perception is measured as a percentile ranking (ranges from 0 to 100) relative to other zip codes. Higher percentiles mean that respondents perceive their zip codes to have relatively worse environmental quality.

A few unique features of the risk perception are worth noting. First, it is comparative. The RSEI score is from a screening-level model and comparative in nature, and it cannot be interpreted directly into tangible health impacts, such as mortality and life expectancy. The comparative format overcomes this limitation and makes the measurement concrete and intuitive. In addition, perception based on social comparison is ubiquitous as people constantly benchmark themselves against others, and it often can facilitate the development of descriptive and injunctive norms (Schultz et al., 2007).

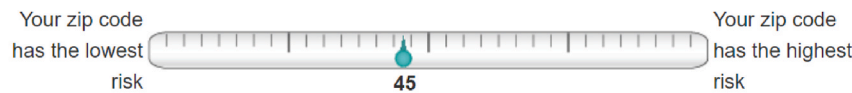
Second, the comparison is based on zip code instead of population. Comparison based on zip code will differ from that based on population as the distribution of population is not even across zip codes. However, for environmental risk, it is very common to compare neighborhoods—even when we describe personal exposure—as environmental risk is often understood through place. The risk perception measure of this study represents how respondents perceive the level of the environmental risk in their neighborhoods compared to other neighborhoods in the country.

3.2. Other variables

I include four commonly used variables for the SES theory: education (college degree), income (>60 k), age, and gender. The **civic orientation** theory is comprised of three variables measuring political trust, political efficacy, and political interest, respectively. Specifically, the political trust measure consists of two items: how much they can trust "the government in Washington" and their "local government" to do what is right; the political efficacy measure consists of three items: how much they agree that they have "no say in what the government does," "public officials do not care what people like me think," and "politics and government seem so complicated that I can't understand what's going on"; the political interest variable measures whether they follow what's going on in government and public affairs most of the time. I include two variables—party affiliation (Democrat = 1) and ideology (conservative = 1)—to measure **political orientation**.

Group consciousness is a multidimensional concept and arises when members of a racial group closely identify with the group, recognize the deprived status of the group, and commit to collective actions to change the disadvantages faced by the group (Chong and Rogers, 2005; Miller et al., 1981). Following Chong and Rogers (2005), to capture the multiple dimensions of the concept, I use four questions that measure respondents' views on 1) the importance of their race and ethnicity to their identity, 2) the amount of discrimination against their groups, 3) the amount of influence of what happens to the group on their individual life, and 4) the importance for the members of the group to work together to change the discrimination and disadvantages. A factor analysis shows that all the four questions load on one factor and they have a Cronbach's alpha of 0.84, which suggests that these questions are consistent. As a result, I develop the group consciousness measure by averaging the scores of the four questions.

I include two variables for the **social connectedness** theory. The two variables are home ownership (owns home = 1) and community



Your estimate: The potential risk from toxic chemicals for your zip code is higher than **45%** and lower than **55%** of the zip codes.

Fig. 1. Assessment of Risk Perception.
Source: Snapshot from the survey.

involvement. The community involvement variable is comprised of three items: 1) involvement in groups for leisure, sports, or culture; 2) involvement of political groups; and 3) involvement in groups for charitable and voluntary work.

As for environmental attitudes, I have two items in the survey for **environmental concern**, which measure how serious respondents think toxic chemicals in the environment is a problem for themselves and their family, and for the nation, respectively. I ask a battery of questions to gauge respondents' **behavioral and participatory intentions**. A factor analysis of the items suggest that they load on four factors. (I consider all items with loading values above 0.4 on a factor as a component of the factor.) The first factor—**consumer behaviors**—consists of the intention to avoid buying product from bad polluters and the intention to buy environmentally friendly household chemicals such as detergent and cleaning solutions (Cronbach's alpha: 0.75). The second factor—**willingness to pay**—includes two items that measure their willingness to pay higher tax and higher prices, respectively (Cronbach's alpha: 0.93). The willingness to pay measure is also the policy preferences measure. Policy instruments, either pollution tax, or technical or performance-based standards, or pollution cleanup programs would increase the cost of final products and/or government spending. The third factor—**group participation and contribution**—comprises of two items that measure the intention to join or contribute time and money to relevant groups (Cronbach's alpha: 0.87). The fourth factor—**political activities**—consists of three items that measure the willingness to sign petition, contact government officials, and participate in protest (Cronbach's alpha: 0.83).

For all the concepts used in the analysis that include more than one items, I calculate the scale for them by averaging the scores of all items of the respective concept (with reverse coding adjusted). Since all the items/questions are answered in 5-point Likert scales, this approach allows the concepts to have the same range (1–5) as the original items/questions.

Table 1 reports the summary statistics. Minorities on average perceive their communities to have higher risk. The pattern is also illustrated in the density plot of risk perception (Fig. 2). Compared with Minorities, a larger share of Whites perceive their communities to have low risk. In addition, there are large clusters around the middle point for both groups (but there are only 3 respondents in the sample that choose exact 50). It is unsurprising as individuals often have the tendency to perceive themselves to be in the middle. For example, a disproportionately large share of the population believes themselves to be in the midclass (Shenker-Osorio, 2013). Another possible reason is that people who do not have strong belief in their risk perception may randomly pick some points in the middle. This creates noise in our model estimates but does not bias them. Lastly, both groups underestimate the relative risk of their zip codes compared with the actual risk (Table 1).

Whites and Minorities also differ significantly in other traits and environmental attitudes. In terms of SES, White respondents are more likely to have college degree, have higher income, be male, and be slightly older. Regarding civic orientation, political trust and political efficacy are low and similar between Whites and Minorities, but Whites have higher interest in politics. When it comes to political orientation, Minorities are more likely to be Democrats and less likely to be conservatives. They also have much stronger group consciousness. Regarding social connectedness, all groups have pretty low and similar

Table 1
Summary statistics.

	Mean (White)	Mean (Minority)	Mean (Overall)	S.D. (Overall)	Range (Overall)
Perception					
Perception of risk	39.43	48.27	42.65	23.11	0–100
Actual risk	65.05	66.08	65.43	25.45	1–100
Social Economic Status (SES)					
Has college degree	0.34	0.23	0.30	0.46	0 or 1
Income (>60k)	0.56	0.45	0.52	0.50	0 or 1
Age (years)	50.98	44.93	48.77	17.34	19–90
Female	0.49	0.59	0.53	0.50	0 or 1
Civic Orientation					
Political efficacy	2.81	2.81	2.81	0.84	1–5
Political trust	2.48	2.55	2.51	0.91	1–5
Political interest	0.57	0.33	0.48	0.50	0 or 1
Political Orientation					
Democrat	0.34	0.49	0.39	0.49	0 or 1
Conservative	0.45	0.21	0.36	0.48	0 or 1
Group					
Consciousness	2.43	3.34	2.76	1.14	1–5
Social					
Connectedness	0.74	0.54	0.67	0.47	0 or 1
Community involvement	2.03	2.03	2.03	1.08	1–5
Envi. Concern and Behav. Intentions					
Concern for self and family	2.84	3.29	3.00	1.15	1–5
Concern for the country	3.48	3.60	3.52	1.17	1–5
Consumer behaviors	3.13	3.19	3.15	1.21	1–5
Policy support/Willingness to pay	2.75	2.91	2.81	1.28	1–5
Group participation and contribution	2.48	2.66	2.55	1.11	1–5
Political activities	3.22	3.25	3.23	1.24	1–5
N	318	182	500	500	500

levels of community involvement, but Whites are more likely to own homes. Across the categories of environmental concern and participatory intentions, racial minorities have slightly higher scores than Whites, except for concern for self and family, for which Minorities have significantly higher scores.

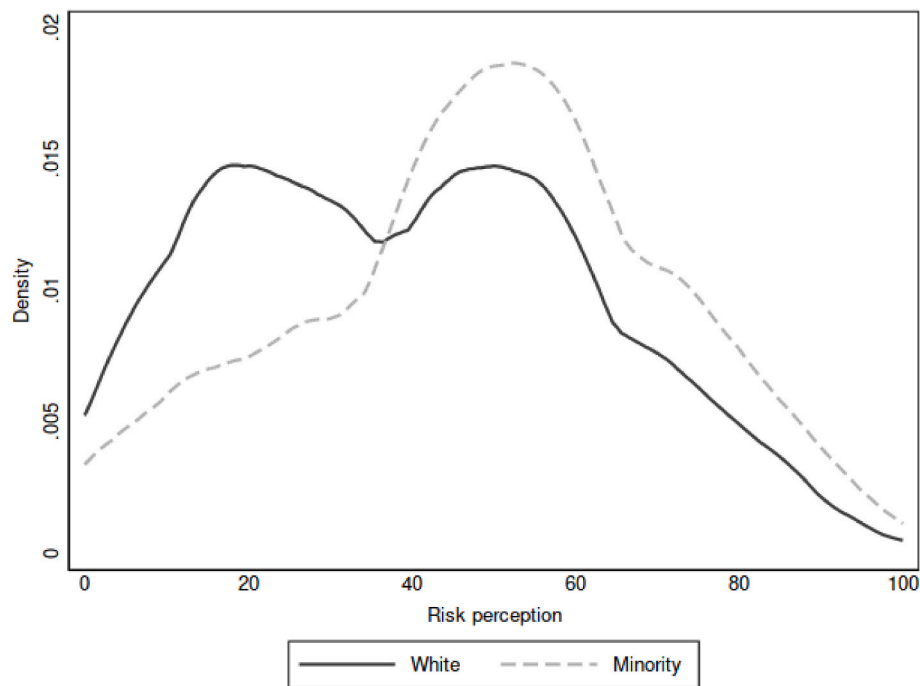


Fig. 2. Density of risk perception.

4. Model

I estimate OLS regressions with environmental concern and participatory intentions as the dependent variables and risk perception and variables associated with other theories as the explanatory variables, separately for Whites and Minorities. The analysis has a few limitations. First, it is based on a relatively small sample size, which may not have enough power to detect some relationships. However, as the results will show later, most of the key conclusions of this study are derived from strong and statistically significant relationships despite of a small sample. A larger sample would probably add more statistical strength to the conclusions.

Second, the analysis combines minority subgroups. Ideally, I would want to conduct analyses separately for subgroups of Minorities, as different minority groups may have different experience and manifest different patterns of environmental attitudes. But the relatively small sample size limits my ability to do that. In appendix C, as a robustness check, I focus on Blacks and Hispanics and separately compare them with Whites, since the minority group (respondents: 182) consists mostly of the two subgroups (Blacks: 58, Hispanics: 74). While this would further stretch the small sample, the separate results for Blacks and Hispanics are substantively similar with the results when they are combined, alleviating some concerns that the approach with a combined minority group may mask important subgroup patterns.

Third, the OLS regressions treat the dependent variables as continuous instead of ordinal. I choose the OLS regressions because many of the dependent variables are comprised of multiple questions, which has changed the 5-point ordinal scale. As a robustness check, I include, in Appendix D, results from ordered logit models with answer to each of the individual questions that are used to measure environmental attitudes as the dependent variable. The ordered logit models also account for the potential nonlinearity of the relationships between the outcome and explanatory variables. The results are substantively the same as the OLS results.

Much of the previous research pools together observations from Whites and Minorities and adds race dummies to account for the differences among racial groups. Insignificant coefficients on the race dummies indicate there is no differences in racial concern and

participation patterns after variables from relevant theories are controlled for. That is, the racial differences in the outcome variables are results of differences in the levels of SES, civic orientation, etc. This approach makes a questionable implicit assumption that the population parameters are the same for all racial groups (Leighley and Vedlitz, 1999). The parameters, however, could differ significantly across groups, as is shown by Melissa (2001). For example, racial groups can have different levels of sensitivity to the perception of risk. In this paper, an F-test shows that a model with each explanatory variable interacted with the race indicator is significantly different from the traditional model with only explanatory variables and the race indicator. To investigate and account for such differences, I estimate regressions separately for Whites and Minorities, which is equivalent to a fully interacted model.

One challenge of estimating separate models is that I cannot directly compare the racial differences in environmental concern and participatory intentions after accounting for the contribution of the included theories. The coefficients for the constants are the predictions for racial groups when all explanatory variables are set to zero, which is unrealistic. When the explanatory variables are set to more realistic and the same values for all groups, I will need to consider the racial differences in the coefficients of the explanatory variables as well. Thus, to illustrate the racial differences in environmental attitudes, I compare the predicted environmental attitudes of Whites and Minorities when Minorities have the same values for the explanatory variables as Whites. I start with the baseline predictions for both groups when the values of all explanatory variables are set to respective group means, and then calculate adjusted predictions for Minorities by gradually changing the values of the explanatory variables associated with each theory to the group means of Whites. This approach allows me to compare the attitudes of Minorities with Whites if they had the same perception of risk, SES, civic orientation, etc., as Whites. It also shows the contribution of each theory to the explanation of the racial differences.

5. Results

5.1. Bivariate correlations between environmental attitudes and perceived and actual risk

I start by demonstrating the bivariate correlations between environmental attitudes and the perceived risk and actual risk, respectively. Table 2 presents the correlations, and it shows that environmental attitudes are strongly and positively correlated with the perceived risk while they are not correlated with the actual risk. It also shows a positive, yet relatively weak correlation between the perceived and actual risk, which reflects respondents' lack of knowledge about the relative risk in their communities.

As I have not considered any other factors in the bivariate analysis, the strong correlations between environmental attitudes and the perceived risk could partially be attributed to omitted variables and reverse causality. Nonetheless, the contrast with the null correlations between attitudes and the actual risk suggests that the perceived risk is a more relevant factor for environmental attitudes than the actual risk.

5.2. Explanations of racial groups' environmental attitudes

Next, I move to multivariate analysis to test the theories laid out earlier, respectively for Whites and Minorities. Regression results are presented in Fig. 3 in the main text and Tables B2 and B3 in Appendix B. For each outcome variable, Fig. 3 reports the regression coefficients for Whites and Minorities, respectively. While some results differ across the outcome variables, a few patterns stand out.

First, risk perception plays important roles in explaining environmental concern and participatory intentions of both groups. Risk perception has positive correlations with most measures of attitudes for both Whites and Minorities, despite the fact that the magnitudes and significance of the correlations vary between racial groups and across outcome variables.

Second, another clear pattern is the importance of group consciousness for Minorities' environmental concern and participatory intentions. Group consciousness is strongly and positively correlated with all outcome variables for Minorities. However, for Whites, the positive correlations are much smaller and become insignificant for many of the outcome measures.

Third, in addition to group consciousness, many other theories of environmental attitudes also apply differently to Whites and Minorities. Political interest, partisan affiliation, ideology, and community involvement are strong predictors of environmental attitudes for Whites, as is suggested by the theories. However, the results are not as clear for Minorities.

Fourth, the explaining power of the theories also depends on specific measures of attitudes. The explanatory variables have stronger predicting power for attitudes that are directly relevant. For example, political interest has strong correlations with political behaviors; community involvement has strong correlations with group participation and contribution; political trust has strong correlations with policy support.

Lastly, similar to many previous studies (e.g., Mohai and Bryant, 1998), the results show that SES variables are not strong predictors of environmental attitudes for both groups, with many of the coefficients insignificant and having opposite directions between racial groups and across measures of attitudes.

Table 2
Bivariate correlation.

	Actual Risk	Concern (Self)	Concern (Nation)	Consumer behaviors	Willingness to pay	Group participation	Political activities
Perceived risk	0.11*	0.44*	0.25*	0.15*	0.24*	0.26*	0.23*
Actual risk		0.04	0.01	-0.02	0.02	0.01	0.03

Notes: * significant at 0.05 level.

5.3. Racial differences in environmental attitudes

In the previous section, I find that theories of environmental attitudes apply to racial groups differently. The racial differences in environmental attitudes are results of not only the differences in the importance of the various theories for different racial groups, but also the racial differences in the levels of the explanatory variables associated with each theory. In this part, I will explore how the different levels of risk perception, SES, civic and political orientation, group consciousness, and social connectedness across racial group can explain the racial differences in environmental attitudes.

To do so, based on the above regression models, I first calculate the predicted environmental attitudes for Whites and Minorities, respectively, when all variables take the respective group means. I call these predictions the baseline predictions. From the baseline predictions, for Minorities, I then gradually change the values of the variables in their models to the levels of those of Whites and calculate the adjusted predictions. When all adjustments are made, the adjusted predictions for Minorities are based on the assumption that they have the same levels of SES, civic orientation, political orientation, group consciousness, social connectedness, and risk perception as Whites.

Fig. 4 presents the predictions/adjusted predictions. In all the graphs, the first bar is the baseline prediction for Whites and the second bar is the baseline prediction for Minorities. The bars that follow are accumulatively adjusted predictions for Minorities when values of variables associated with a specific theory are changed to the levels of Whites.

The first graph in Fig. 4 shows that compared with Whites, Minorities have much higher concern for self and family. The largest adjustment is group consciousness, which significantly decreases Minorities' concern for self and family. This is because the coefficient on group consciousness for Minorities is very large and Minorities also have much higher levels of group consciousness than Whites. The impacts of other adjustments are small, but after all the adjustments, Minorities' predicted concern for self and family is not statistically different from that of Whites. For other measures of attitudes, the baseline differences between Whites and Minorities are often smaller, but the adjustments have similar patterns, with group consciousness having the largest influence. After all adjustments, most of the predicted attitudes of Minorities are similar with those of Whites (with the exception of concern for the nation).

6. Conclusion and discussion

In this study, I examine the racial differences in environmental concern and participatory intentions, with a special focus on the roles of individuals' risk perception and group consciousness. The analysis shows that risk perception matters in the explanation of environmental attitudes: the perception of higher risk is associated with higher levels of concern and participatory intentions. The results also show that the environmental attitudes of Whites and Minorities are driven by different factors, as many theories of environmental attitudes have different applications to Whites and Minorities. While many theories such as political orientation, civic orientation (political interest), and social connectedness are supported by the analysis on Whites, the results are less clear for Minorities. In contrast, group consciousness plays very important roles in explaining the environmental attitudes of Minorities. Minorities with stronger group consciousness are much more concerned

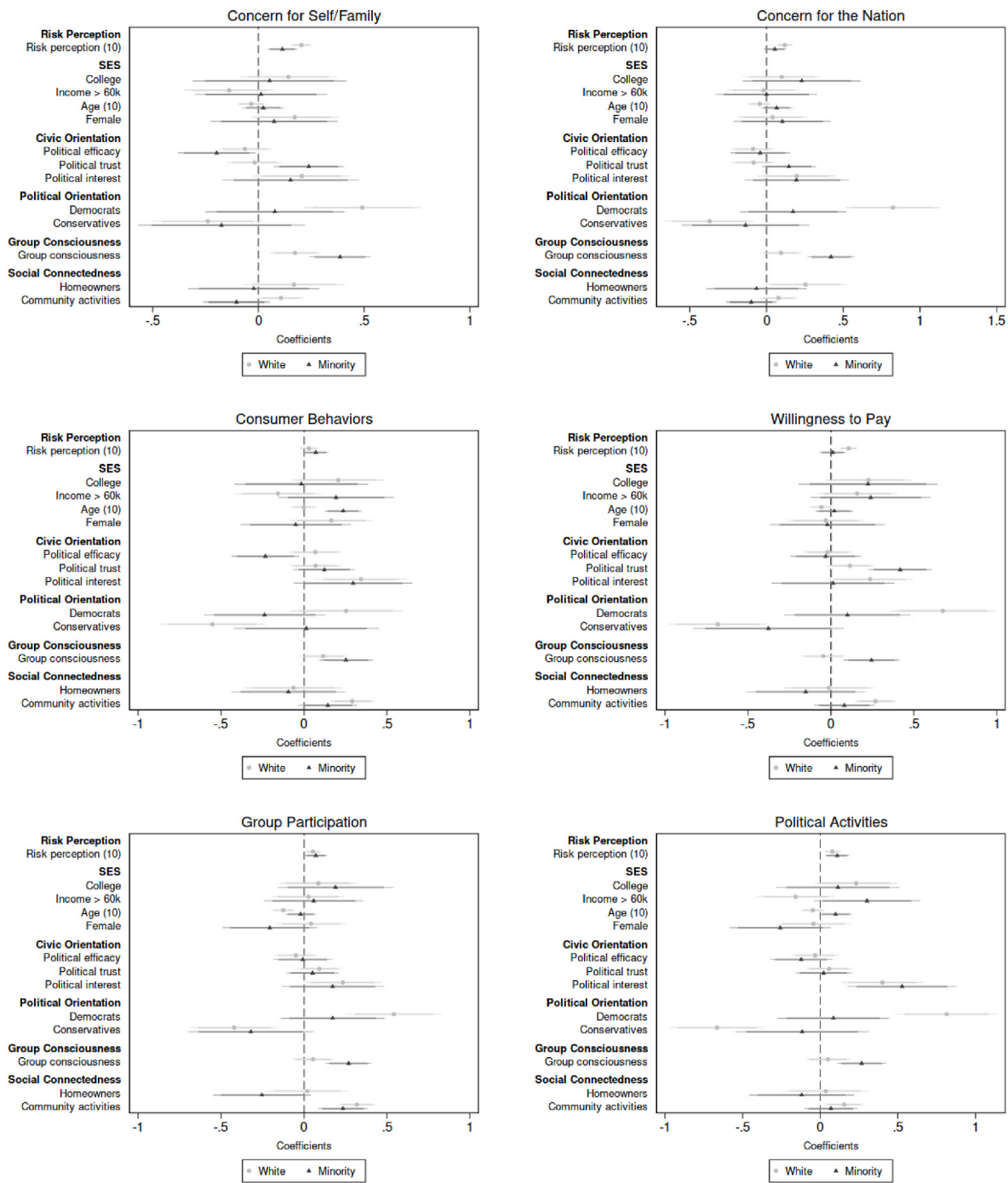


Fig. 3. Regression Coefficients.

Notes: 1. Results are from separate regressions for Whites (318) and Minorities (182). 2. Behavioral intentions are measured continuously from 1 to 5 with a range of four. 3. Markers represent point estimates; thin (long) bars show 95% confidence intervals; thick (short) bars show 90% confidence intervals.

about the environment and have stronger intentions to act.

Minorities' higher levels of group consciousness can also account for much of their higher levels of environmental concern and participatory intentions. If I replace their levels of risk perception, SES, civic and political orientation, group consciousness, and social connectedness with those of Whites, the predicted environmental attitudes of Minorities will largely be of no significant difference from those of Whites, and the changes are largely driven by the adjustments associated with group consciousness.

When interpreting the results, it is important to note some caveats. First, the analysis is not causal. The relationships that I test in the model

build on an extensive set of established theories, but I cannot rule out all potential omitted variables. In addition, while theories suggest risk perception is an important determinant of environmental attitudes, the correlations observed in the analysis is also likely to be affected by reverse causality to some level. Second, this study uses behavioral and participatory intentions, instead of actual actions, as the dependent variables. Despite the fact that intentions are precursors for actual actions, other factors, including many that have been considered in the model, could potentially be critical to explain actual actions. For instance, SES may not be important factors in determining concern and intentions to act but could play important roles in overcoming the

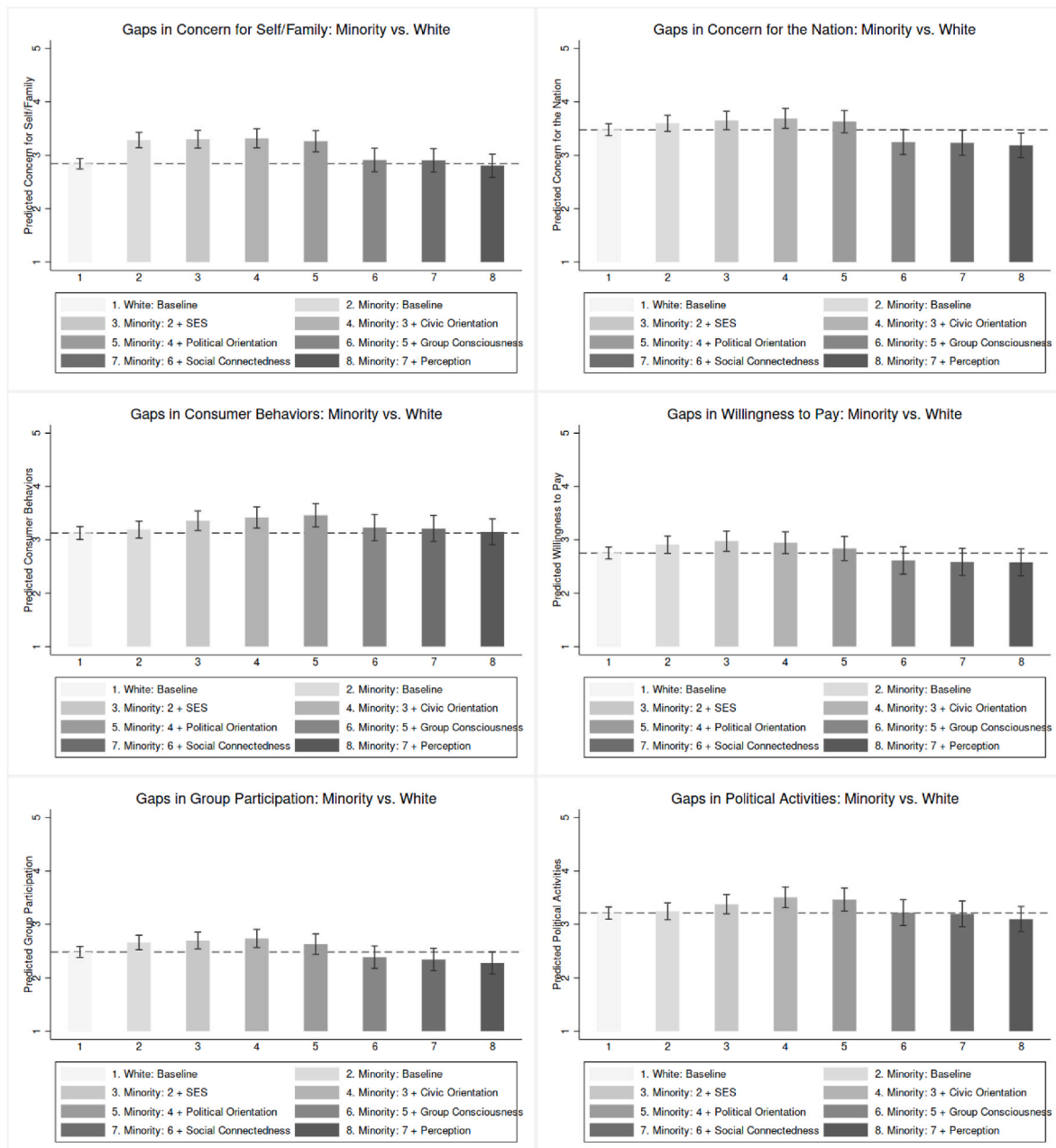


Fig. 4. Racial Differences in Environmental Attitudes.

Notes: 1. Baseline predictions are calculated when all variables take respective group means. 2. Adjusted predictions for Minorities are calculated by replacing their group means with those of Whites. 3. Adjustments are accumulative. 4. Dash lines are the baseline predictions of Whites (same as the height of the first bars).

barrier of moving from intentions to actions. Third, the risk perception is based on a comparative measure. While social comparison is common and makes the risk more intuitive to the respondents, its relationship with attitudes could be moderated by individuals' knowledge/understanding of potential environmental health impact of a certain risk level. Other more tangible risk perception measures, such as health outcomes, could have different (probably much stronger) relationship with environmental attitudes. Lastly, this study is based on a relatively small sample, which may not have enough power to detect some relationships. Especially, the small sample size of minority respondents prevents me from exploring the pattern separately for each minority subgroup. Future studies with bigger sample size or oversampling of minorities are needed.

Despite the limitations, this study offers a more comprehensive understanding of racial groups' environmental attitudes by incorporating

risk perception and group consciousness as explanations, given the critical importance of the two factors shown by the results. In addition, the study helps to clarify the racial differences in the environmental attitudes by demonstrating that the environmental attitudes of Whites and Minorities can be driven by very different factors.

The findings also have important implications for public policy and the environmental and social justice movement. First, the results that perception of environmental risk matters and the weak correlation between the perceived and actual risk suggest that efforts to educate and inform people of pollution and environmental risk, such as information disclosure and risk education programs, have the potential to be effective instruments to change attitudes and behaviors. While my analysis focuses on risk from toxic emissions in the US, the results could be relevant for other environmental issues, such as climate change. The increased knowledge of the negative impact of climate change on local

communities may change individuals' attitudes and prompt them to act.

Second, the results on group consciousness highlight the importance of environmental and social justice movements to mobilize the participation of minorities. Group based messaging has long been used to stimulate general political participation of racial minorities. The results here suggest that group consciousness, which echoes the theme of environmental and social justice movements, could also be used to boost racial minorities' environmental participation. With social justice movements, such as the Black Lives Matter, sweeping across the globe, society's enhanced attention to racial justice issues may further increase the group consciousness of minority groups and, as a result, their environmental attitudes and participation.

Third, while this study is in the US context, many of the findings have important implications for other countries. In many parts of the world, the environmental conditions can be much worse than the US. The awareness of severe local environmental risk may lead to larger changes in environmental attitudes and actions in those places. In addition, while the role of group consciousness may differ across countries depending on the salience of racial and class issues, I expect similar results in countries with high levels of racial justice awareness.

Credit author statement

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jenvman.2021.113616>.

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