

Gender, Race, and Perception of Environmental Health Risks

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This paper reports the results of a national survey in which perceptions of environmental health risks were measured for 1275 white and 214 nonwhite persons. The results showed that white women perceived risks to be much higher than did white men, a result that is consistent with previous studies. However, this gender difference was not true of nonwhite women and men, whose perceptions of risk were quite similar. Most striking was the finding that white males tended to differ from everyone else in their attitudes and perceptions—on average, they perceived risks as much smaller and much more acceptable than did other people. These results suggest that socio-political factors such as power, status, alienation, and trust are strong determiners of people's perception and acceptance of risks.

KEY WORDS: Gender; race; risk perception; environmental equity.

1. INTRODUCTION

Research has demonstrated that perceptions of risk are influenced by the qualities of a hazard—whether exposure to it is voluntary or controllable, whether its adverse consequences can be catastrophic, whether its benefits are distributed fairly among those who bear the risks, and so on.⁽¹⁾ Few studies, however, have examined in any detail the characteristics of the risk perceivers themselves. One exception is that sizable differences between risk perceptions of men and women have been documented in several dozens of studies. Men tend to judge risks as smaller and less problematic than do women.⁽²⁻¹³⁾

More recently, race and risk have become an issue as it has become apparent that people of color are subjected to higher levels of exposure from many toxic substances.⁽¹⁴⁾ The conditions leading to these disproportionate exposures have been labeled "environmental racism."⁽¹⁵⁾ Except for a study by Savage,⁽¹⁶⁾ there are

few data regarding how people of color perceive the risks to which they are exposed. Savage found that blacks felt more threatened than whites by each of four hazards: commercial aviation accidents, home fires, automobile accidents, and stomach cancer. Women also perceived themselves as threatened by these hazards to a greater extent than did men.

A recent survey of the American public's perceptions of risk interviewed more than 200 people of color. The present study reports the results of this survey, with particular emphasis on the relationships among race, gender, and risk perceptions.

2. METHOD

The data for the present study come from a national survey in the United States in which a random sample of 1512 English-speaking persons were interviewed by telephone. The interviews were conducted between November 21, 1992, and January 16, 1993. The response rate was 50.7%. The objective of the study was to obtain information on people's attitudes, perceptions, values,

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knowledge, and beliefs about environmental health risks. The survey instrument contained 155 items including ratings of environmental risks, attitude and opinion questions on a variety of health issues such as the riskiness of one's local environment, attitudes toward government and business, general attitudes called *worldviews*, personal risk-taking behaviors, and personal and demographic characteristics of the respondents and their households.

Race and ethnicity were combined in one question for the survey: "What is your race or ethnic background? Do you consider yourself Hispanic, white, black, Asian, or American Indian?" This procedure relies on self-definition, which as Cooper points out is the "only legal basis for racial classification" in the United States.⁽¹⁷⁾ Twenty-three persons did not answer this question while 1275 identified themselves as white and 214 selected one of the other choices. Those who did answer were distributed as shown in Table I.

The characteristics of the present sample can be compared roughly to the data from the U.S. Bureau of the Census *1990 Census of Population*, which assessed 93 million households. White households made up 86.0% of this total, blacks 11.3%, and other nonwhites 2.8%. Hispanics (who can be of any race) were 6.3% of the households. Population counts may differ from household counts because of different living arrangements and household sizes across race and ethnic categories. Therefore, population estimates for race and ethnicity are complex and inexact, especially when they are combined.^(18,19) Taking these considerations into account, our survey sample may have a slightly higher percentage of whites than the general population. Because the nonwhite respondents were required to be English-speaking persons, they may be somewhat more similar to whites than the general nonwhite population would be.

3. RESULTS

Respondents were asked to rate the public health risks associated with each of 25 hazards. These hazards included a diverse set of technologies (e.g., nuclear power, commercial air travel), lifestyle risks (e.g., cigarette smoking, drinking alcohol), and environmental conditions (e.g., ozone depletion, radon). The response scale went from "almost no health risk" to "slight health risk," "moderate health risk," and "high health risk." These response categories were coded 1-4, respectively, and the coded scores were averaged across

respondents and across hazards in the analysis reported below.

Table II shows the mean scores for the total sample and for subgroups defined by race and gender. A *hazard index* was created by averaging the ratings across the 25 items. An omnibus *F* test was conducted for each hazard item to evaluate the statistical significance of differences among the four subcategories of race and gender (white male, white female, nonwhite male, and nonwhite female). As shown in Table I, those who identified themselves as Hispanic, black, Asian, or American Indian were included in the nonwhite category. For those cases where the omnibus *F* test was significant at $p < .05$, a Tukey test was conducted. The pairs of groups that differed significantly ($p < .05$) on the Tukey test are identified by code (a-f) as defined in Table II, footnote b. The means for each of the four race/gender subgroups also are presented in Fig. 1.

The data in columns 2 and 3 in Table II show the consistent difference between risk perceptions of men and women that has been documented in previous studies. Columns 4 and 5 in the table show that the nonwhite respondents had consistently higher mean ratings of perceived risk than did white respondents. This finding is similar to Savage's finding of higher perceived vulnerability to hazards among blacks.⁽¹⁶⁾ But the most striking result in these data is clear immediately from a glance at Fig. 1. White males produced mean risk-perception ratings that were consistently much lower than the means of the other three groups. Nonwhite males and females showed only one significant difference (males have lower ratings on stress). Nonwhite males often had higher mean ratings than white females (significantly higher for genetically engineered bacteria).

Nonwhite females tended to have higher mean risk ratings (significantly different statistically from white females on 10 of the items). White and nonwhite males differed significantly on 20 of the 25 items. Significant differences were observed for all 25 items between white males and white females and between white males and nonwhite females.

3.1. Risk Perception and Gender

Figure 2 provides another perspective on the gender differences by showing the percentage of men and women who rated a hazard as a "high risk." All differences are to the right of the 0% mark, indicating that the percentage of high-risk responses was greater for women on every item.

Table I. Survey Sample by Gender and Race

	Total sample				Nonwhite sample			
	Male	Female	Total		Male	Female	Total	
White	616	659	1275 (85.6%)	→	Hispanic	30	28	58 (3.9%)
Nonwhite	97	117	214 (14.4%)		Black	46	67	113 (7.6%)
					Asian	8	7	15 (1.0%)
					American Indian	13	15	28
Total	713	776			Total	97	117	214 (1.9%)

Table II. Perceived Risk to American Public by Gender and Race (Mean Scores)

Hazard	Overall ^a	Male	Female	White	Nonwhite	White		Nonwhite		Tukey post hoc paired comparison ^b
						Male	Female	Male	Female	
Street drugs	3.5	3.4	3.6	3.5	3.7	3.4	3.6	3.7	3.7	a,b,c
Cigarette smoking	3.5	3.4	3.6	3.5	3.6	3.4	3.6	3.6	3.7	a,c
AIDS	3.5	3.4	3.6	3.5	3.6	3.4	3.6	3.5	3.7	a,c
Stress	3.4	3.3	3.6	3.4	3.5	3.3	3.6	3.4	3.6	a,c,d,f
Nuclear waste	3.4	3.2	3.5	3.3	3.6	3.2	3.5	3.6	3.7	a,b,c
Chemical pollution	3.3	3.2	3.4	3.3	3.5	3.2	3.4	3.4	3.6	a,b,c,e
Suntanning	3.2	3.1	3.4	3.2	3.3	3.0	3.4	3.2	3.4	a,c
Ozone depletion	3.2	3.1	3.4	3.2	3.3	3.0	3.4	3.4	3.4	a,b,c
Drinking alcohol	3.2	3.1	3.3	3.2	3.6	3.1	3.3	3.4	3.4	a,b,c
Motor vehicle accidents	3.2	3.1	3.3	3.2	3.3	3.1	3.3	3.2	3.4	a,c
Pesticides in food	3.1	3.0	3.2	3.0	3.4	2.9	3.2	3.3	3.4	a,b,c,e
Outdoor air quality	3.0	2.9	3.1	3.0	3.1	2.9	3.1	3.2	3.1	a,b,c
Blood transfusions	2.9	2.7	3.0	2.8	3.2	2.7	3.0	3.0	3.3	a,b,c,e
Climate change	2.9	2.7	3.0	2.8	3.1	2.7	3.0	3.2	3.1	a,b,c
Nuclear power plants	2.9	2.7	3.1	2.8	3.1	2.6	3.1	3.0	3.2	a,b,c
Coal/oil plants	2.8	2.7	2.9	2.8	3.0	2.7	2.9	3.1	3.0	a,b,c
Bacteria in food	2.8	2.7	2.9	2.8	3.2	2.6	2.9	3.1	3.3	a,b,c,e
Food irradiation	2.8	2.6	2.9	2.7	3.1	2.5	2.9	3.0	3.2	a,b,c,e
Genet engr bacteria	2.7	2.6	2.9	2.6	3.1	2.5	2.8	3.1	3.2	a,b,c,d,e
Storms and floods	2.7	2.5	2.8	2.6	2.9	2.5	2.8	2.8	3.0	a,b,c,e
Hi-volt power lines	2.6	2.4	2.8	2.6	2.8	2.3	2.8	2.7	2.9	a,b,c
Radon in home	2.6	2.5	2.7	2.6	2.9	2.4	2.7	2.9	3.0	a,b,c,e
VDTs	2.5	2.4	2.6	2.5	2.7	2.3	2.6	2.7	2.7	a,b,c
Medical X-rays	2.3	2.2	2.4	2.3	2.6	2.2	2.4	2.5	2.6	a,b,c,e
Commercial air travel	2.3	2.2	2.5	2.3	2.6	2.2	2.4	2.6	2.7	a,b,c,e
Hazard index	3.0	2.9	3.1	3.0	3.2	2.8	3.1	3.1	3.3	a,b,c,e

^a N = 1512; all other means based on N = 1489 (23 respondents for whom race not given were excluded).

^b All omnibus F tests were significant at p < .001. Tukey HSD test is at p < .05, where a = white male with white female, b = white male with nonwhite male, c = white male with nonwhite female, d = white female with nonwhite male, e = white female with nonwhite female, and f = nonwhite male with nonwhite female.

Many earlier studies have found that women see risks as higher than men for nuclear technologies: nuclear power, nuclear waste, and nuclear weapons. In the

present survey, perceptions of risk are higher for women for every hazard studied. This parallels a recent Canadian study in which women provided higher risk ratings

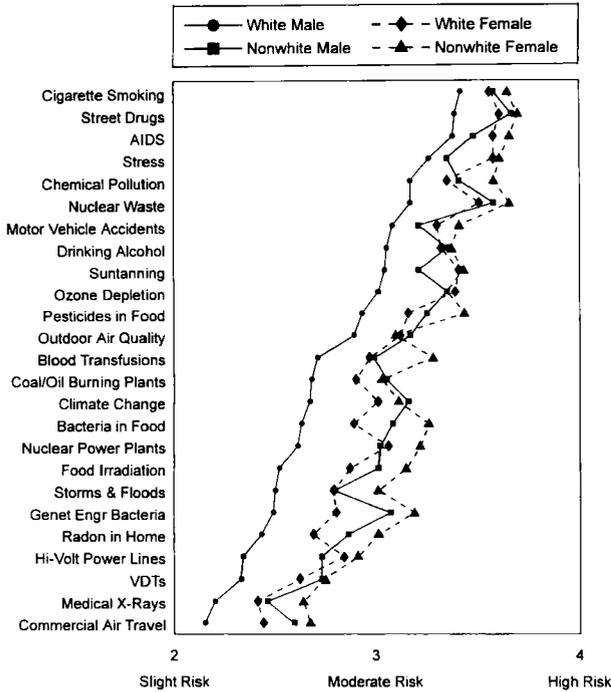


Fig. 1. Mean risk perception ratings by race and gender.

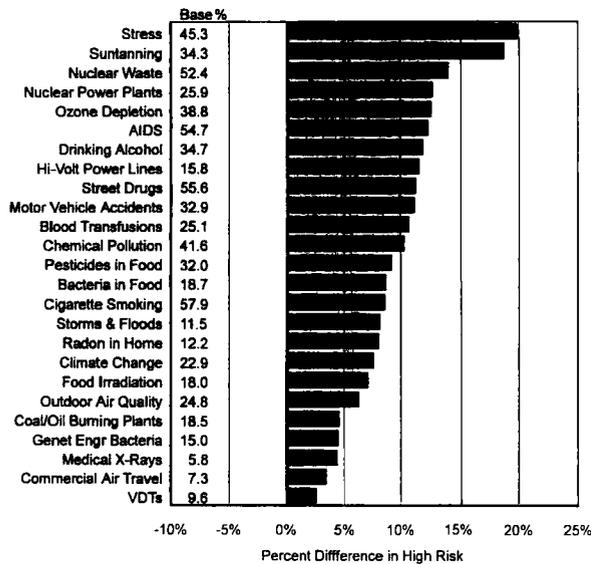


Fig. 2. Perceived health risks to American public by gender: difference between males and females. Base percentage equals male high-risk response. Percentage difference is female high-risk response minus male high-risk response.

for 37 of 38 hazards studied (heart pacemakers were the sole exception), including all of the items shown in Fig. 2.⁽⁹⁾

A number of hypotheses have been put forward to explain the differences in risk perception between men and women. One approach has been to focus on biological and social differences. For example, women have been characterized as more concerned about human health and safety because they give birth and are socialized to nurture and maintain life.⁽¹²⁾ They have been characterized as physically more vulnerable, for example to violence such as rape, and this may sensitize them to other risks.^(20,21) The combination of biology and social experience has been put forward as the source of a “different voice” that is distinct to women.^(22,23)

A lack of knowledge and familiarity with science and technology has also been suggested as a basis for these differences, particularly with regard to nuclear and chemical hazards. Women are discouraged from studying science, and there are relatively few women scientists and engineers.⁽²⁴⁾ Firestone⁽²⁵⁾ suggests that women may distrust what are perceived as male-dominated technologies. However, this does not explain why the difference extends to nontechnological hazards (e.g., AIDS, alcohol). Moreover, Barke *et al.*⁽²⁶⁾ have found that women physical scientists perceive risks from nuclear technologies as higher than do men physical scientists. Certainly these women scientists are knowledgeable about technology.

In general, these explanations have attempted to determine what makes women different and to understand how conditions of biology, risk experience, socialization, or psychology account for the unwillingness of women, when compared to men, to accept the levels of risk recommended by advocates and managers of technology. In this context, we note that risk-acceptance advocates are predominantly white males.

3.2. Risk Perception and Race

The practice of siting hazardous and noxious waste facilities in areas with significant or majority nonwhite population has led to concerns about environmental equity and environmental racism.^(14,15,27,28) Low income, low levels of education, and other social disadvantages tend to characterize many of these communities. Thus racial and ethnic factors are combined with economic vulnerabilities and political weakness as characteristics of communities that may be targeted as sites for facilities that are unacceptable in other locations.

The environmental and health-risk concerns expressed by people of color are not restricted to the siting of new facilities. Other important issues include pollution of residential neighborhoods and hazards in the

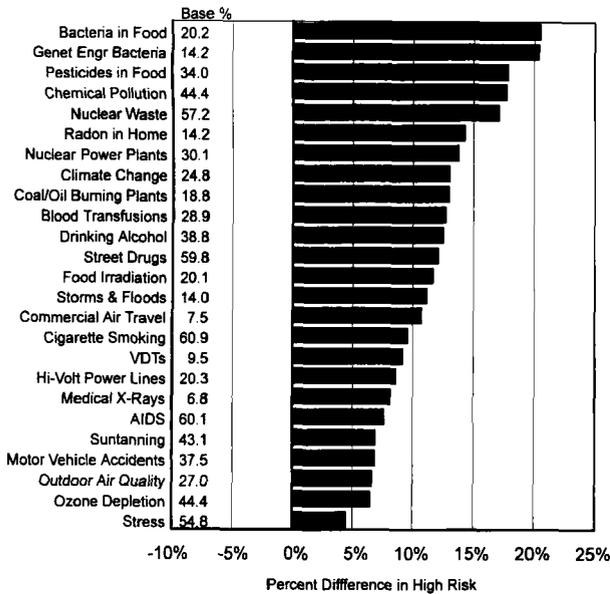


Fig. 3. Perceived health risks to American public by race: difference between whites and nonwhites. Base percentage equals white high-risk response. Percentage difference is nonwhite high-risk response minus white high-risk.

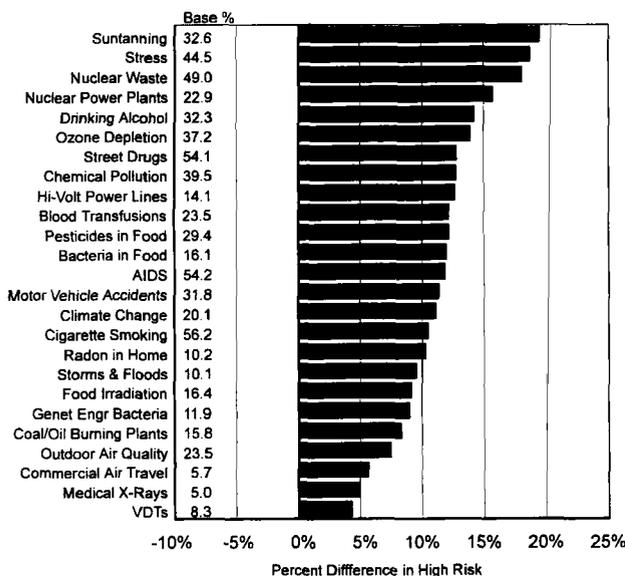


Fig. 4. Perceived health risks to American public by white males: difference between white males and all others. Base percentage equals white male high-risk response. Percentage difference is others high-risk response minus white male high-risk response.

workplace, for example, pesticide exposures to agricultural workers.⁽²⁹⁾ Exposure to lead and the incidence of lead poisoning have been called one of the nation's most serious health threats to children and one that is much

more common for children of color than for white children.⁽³⁰⁾ Federal programs to clean up existing Superfund sites may favor white communities in preference to addressing the problems in communities with large nonwhite populations.⁽³¹⁾ In response to one statement in the present survey, "There are serious environmental health problems where I live," 45% of the white respondents agreed or strongly agreed. The rate of agreement for nonwhites was 20.5% higher. The difference between whites and blacks was even greater, 25.8%. Hispanics agreed 4.4% more frequently than blacks and 30.2% more frequently than whites.

Researchers active in the study of environmental justice have viewed the forced physical association by people of color with a wide range of environmental hazards as evidence of structural racism.⁽¹⁵⁾ The dangers of violence, drugs, alcohol, and lower socioeconomic status compound the risks, leading to considerably higher mortality for nonwhites.⁽³²⁾

The concern about technological and environmental health risks shown by people of color is clearly documented in the present survey data. Figure 3 shows the difference between white people and people of color in rating the hazard items as "high health risks" to the American public. The percentage of high-risk responses is greater among people of color on every item. Nonwhites were particularly more concerned about bacteria in food, genetically engineered bacteria, pesticides in food, and pollution from chemical and nuclear wastes. The differences were smaller for stress, ozone depletion, and outdoor air quality. The differences between white and nonwhite respondents might have been even greater if nonwhites had been asked to rate the risks to people like themselves, rather than to the American public as a whole.

3.3. Risk Perception Among White Males

The difference between white males and all other respondents in use of the high-risk response is shown in Fig. 4. White males were always less likely to rate a hazard as posing a "high risk." This was particularly true for suntanning, stress, nuclear power plants, nuclear waste, drinking alcohol, and ozone depletion. This tendency was smallest for video display terminals and medical X-rays.

Whereas Fig. 4 reflects high-risk responses, we have shown earlier in Fig. 2 that white males have substantially lower mean responses on the risk-perception questions—both for individual items and for the 25-item hazard index. When we examined the entire distribution

Table III. Standardized Regression Coefficients for Prediction of the Hazard Index

Predictor	Single variable regression	Multiple regression ^a
Sex ^b	-.29*	-.27*
Race ^c	.18*	.15*
White males vs others ^d	.33*	.31*

^a The following variables were forced into the regression before sex or race or white male/others were entered into the analysis: education, income, perceived control over health risks, perceived importance of high technology for social well-being, political orientation (liberal-conservative), age, presence of children under 18 in household, and either sex or race.

^b Females were coded as 0, men as 1.

^c Whites were coded as 0, nonwhite as 1.

^d White males were coded as 0; all other respondents as 1.

* $p < .001$.

of scores on the hazard index, we observed that white males accounted for more than two-thirds of the respondents in the lower quartile of that distribution but that some white males were also found in the high-risk perception portion of the distribution. This prompted us to ask, "What differentiates those white males who are most responsible for the 'white-male effect' from the rest of the sample, including other white males who see risks as relatively serious?"

To answer this question, we selected a subgroup of 246 white males at the low-risk end of the hazard index to compare with the 370 other white males and the 873 females and nonwhite males in the sample. The number 246 was arrived at by starting with the lowest-scoring white male on the hazard index and moving up the distribution, adding white males until the mean score on the hazard index for the remaining white males matched the mean score for all other persons (all females and all nonwhite males) in the sample. This occurred when 246 white males were selected for the low-risk perception white male subgroup.

We next compared the attitudes of these 246 white males with the attitudes of the 1243 other respondents in our sample. This comparison group of other respondents included 101 white females, 16 nonwhite males, and 7 nonwhite females with scores on the hazard index that were lower than the score of the highest-scoring person in the subgroup of 246 white males. The comparisons reported below are statistically significant at $p < .01$.

The group of white males with the lower risk-perception scores were better educated (42.7% college or postgraduate degree, vs 26.3% in the other group), had

higher household incomes (32.1% above \$50,000, vs 21.0%), and were politically more conservative (48.0% conservative, vs 33.2% in the other group). There was no difference between this white male subgroup and the others with regard to age.

Turning to attitudes, the low-risk perception subgroup of white males was *more likely* than the others to

- agree that future generations can take care of themselves when facing risks imposed on them from today's technologies (64.2 vs 46.9%).
- agree that if a risk is very small it is OK for society to impose that risk on individuals without their consent (31.7 vs 20.8%).
- agree that science can settle differences of opinion about the risks from nuclear power (61.8 vs 50.4%).
- agree that government and industry can be trusted with making the proper decisions to manage the risks from technology (48.0 vs 31.1%).
- agree that we can trust the experts and engineers who build, operate, and regulate nuclear power plants (62.6 vs 39.7%).
- agree that we have gone too far in pushing equal rights in this country (42.7 vs 30.9%).
- agree with the use of capital punishment (88.2 vs 70.5%).
- disagree that technological development is destroying nature (56.9 vs 32.8%).
- disagree that they have very little control over risks to their health (73.6 vs 63.1%).
- disagree that the world needs a more equal distribution of wealth (42.7 vs 31.3%).
- disagree that local residents should have the authority to close a nuclear power plant if they think it is not run properly (50.4 vs 25.1%).
- disagree that the public should vote to decide on issues such as nuclear power (28.5 vs 16.7%).

In sum, the subgroup of white males who perceive risks to be quite low can be characterized by trust in institutions and authorities and a disinclination toward giving decision-making power to citizens in areas of risk management.

3.4. Analysis of Other Social and Demographic Variables

Gender and race are correlated with other variables such as income, education, perceived control over health risks, political orientation, and so on. Can the observed association among race, gender, and risk perception be

explained by these other variables? To answer this question, we conducted a number of stepwise multiple regression analyses in which these other variables, plus age, perceived importance of technology, and the presence of children in the household, were forced into the equation to predict the hazard index before either gender, race, or "white male" were put into the equation. The results are shown in Table III.

Gender, race, and "white male" remained highly significant predictors of the hazard index, even when all of these other variables were controlled statistically. Moreover, the standardized regression coefficients for gender, race, and "white male" were reduced very little by the inclusion of the other variables into the prediction equation. To the extent that this analysis adequately controlled for factors such as income, education, and so on, these results show that these factors do not account for the observed effects of race and gender on perceived risks.

4. DISCUSSION

There are two new and important results in these data. First, nonwhite males and females are much more similar in their perceptions of risk than are white males and females. Second, white males stand out from everyone else in their perceptions and attitudes regarding risk. These results raise new questions. What does it mean for the explanations of gender differences when we see that the sizable differences between white males and white females do not exist for nonwhite males and nonwhite females? Why does a substantial percentage of white males see the world as so much less risky than everyone else sees it?

Obviously, the salience of biology is reduced by these data on risk perception and race. Biological factors should apply to nonwhite men and women as well as to white people. The present data thus move us away from gender and toward sociopolitical explanations. Perhaps white males see less risk in the world because they create, manage, control, and benefit from so much of it. Perhaps women and nonwhite men see the world as more dangerous because in many ways they are more vulnerable, because they benefit less from many of its technologies and institutions, and because they have less power and control. However, our survey data do not allow us to fully test these alternative explanations. Further research is needed, focusing on the role of power, status, alienation, trust, and other sociopolitical factors, in determining perception and acceptance of risk.

Inasmuch as these sociopolitical factors shape public perception of risks, we can see why traditional attempts to make people see the world as white males do, by showing them statistics and risk assessments, are unlikely to succeed. The problem of risk conflict and controversy goes beyond science. It is deeply rooted in the social and political fabric of our society. Our analysis points to the need for a fairer and more equitable society, as well as for fairer processes for managing risk. If we create such a society, environmental racism will give way to environmental equity.

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