SOCIAL SCIENCES

People use both heterogeneity and minority representation to evaluate diversity

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The term "diversity," although widely used, can mean different things. Diversity can refer to heterogeneity, i.e., the distribution of people across groups, or to the representation of specific minority groups. We use a conjoint experiment with a race-balanced, national sample to uncover which properties, heterogeneity or minority representation, Americans use to evaluate the extent of racial diversity a neighborhood and whether this assessment varies by participants' race. We show that perceived diversity is strongly associated with heterogeneity. This association is stronger for Whites than for Blacks, Latinos, or Asians. In addition, Blacks, Latinos, and Asians view neighborhoods where their own group is largest as more diverse. Whites vary in their tendency to associate diversity with representation, and Whites who report conservative stances on diversity-related policy issues view predominately White neighborhoods as more diverse than predominately Black neighborhoods. People can agree that diversity is desirable while disagreeing on what makes a community diverse.

INTRODUCTION

The term "diversity" is increasingly used to describe residential, educational, and professional communities (*1*, *2*). Although diversity has broad use and appeal (*3*, *4*), it can mean different things. Diversity can refer to differences along any number of dimensions, including race, gender, and class, among other factors. Nevertheless, and likely because of the link between diversity discourse and race-related policies, U.S. Americans associate diversity most consistently with racial differences. When asked to describe their experiences with diversity, for example, U.S. Americans frequently refer to cross-racial interactions (*3*). In addition, the decision to describe one's neighborhood as "diverse" is best explained by that neighborhood's racial properties (*5*). We therefore investigate the use of the term diversity in the context of racial differentiation.

As a descriptor of racial properties, diversity can be understood in two different ways. Analytically, racial diversity is synonymous with racial heterogeneity. Heterogeneity is a distributional property that depends only on the number of groups in a community and their relative sizes, not their identities. The more groups in a community and the more evenly distributed people are across them, the more diverse that community is (*6*). This analytic conception of diversity motivates the use of heterogeneity indexes in studies of diversity's effects [see discussion in (*7*)].

On the other hand, diversity can refer to representation, i.e., the presence of specific minority groups in a community, such as Blacks, Latinos, and Asians in the United States. Which racial groups might people associate with diversity? For one, U.S. Americans might associate Black people with diversity. Some of the policies that diversity has been deployed to defend, such as affirmative action, originated with the Black Civil Rights Movement. In addition, along multiple indicators, Black Americans are more disadvantaged than even Asian or Latino Americans. Black households have less wealth and lower incomes than Asian or Latino households (*8*, *9*). Black people are also more segregated from White people and less likely to intermarry with them than are Asians or Latinos (*10*, *11*). If people associate diversity with the representation of disadvantaged groups, then Black presence is a primary contender. As expected, the cross-racial interactions that White people describe when defining diversity tend to feature Black people (*3*).

Another possibility is that minorities associate diversity with their own group. When researchers asked U.S. participants which groups they tend to think of when they think about diversity, Black participants were most likely to mention Blacks, Latino participants were most likely to mention Latinos, and Asian participants were most likely to mention Asians [(*12*); see also (*13*)]. White participants, however, were least likely to mention Whites. These findings are consistent with two explanations: (i) People who think their group is disadvantaged feel a stronger drive toward recognition and representation; (ii) a White racial identity is less salient than a non-White racial identity because it is less distinctive (*14*, *15*). Alternatively, people may associate all racial minorities (Black, Latino, and Asian people) with diversity equally.

Heterogeneity and representation are not merely analytically distinct conceptions of diversity. They are occasionally orthogonal. For example, a predominately Black community might not be deemed very diverse if diversity were conceived as heterogeneity, but it might be deemed very diverse if diversity were conceived as minority representation.

The goal of this study is to elucidate the properties that U.S. Americans use to determine whether a community is diverse. This goal is premised on the intuition that diversity is not an objective, agreed-upon descriptor but rather that assessments of diversity are characterized by ambiguity, i.e., there is no single, obvious, correct answer [see (*16*)]. Hence, these assessments are informed by cognitive heuristics (*17*), individual traits (*12*, *13*, *18*), and social motives (*19*, *20*).

We focus specifically on neighborhoods, although diversity is routinely used to describe many types of communities, including schools and workplaces. Neighborhoods are a strategic research site for several reasons. First, a vast empirical literature demonstrates that people pay considerable attention to neighborhood racial characteristics when making residential choices (*21*). Second,

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residential racial segregation drives racial segregation in other settings, including schools (*22*). Third and last, people should be more likely to reach consensus on definitions of diversity in neighborhoods than in schools or workplaces, where other traits, most notably gender, are also salient. By contrast, assessments of neighborhood diversity are principally tied to race [(*5*); see also (*3*, *4*)]. In sum, if people disagree on what makes neighborhoods diverse, they probably disagree on what makes other communities diverse as well.

We use a conjoint experiment to manipulate the racial heterogeneity and representation of racial groups in hypothetical neighborhoods. We present the neighborhoods in pairs, and we ask participants to evaluate how diverse each neighborhood is and to select the neighborhood that they think is more diverse. This design allows us to answer the following: (i) Holding constant the representation of specific racial groups, does racial heterogeneity predict perceived diversity? (ii) Holding constant racial heterogeneity, does the representation of specific racial groups predict perceived diversity? With respect to heterogeneity, we fix the number of groups in each neighborhood at three and manipulate the relative sizes of the groups. With respect to representation, we examine both the identity of the largest group present (Whites, Blacks, Latinos, or Asians) and the identity of the group that is absent.

A race-balanced sample with comparable numbers of White, Black, Latino, and Asian participants allows us to explore how conceptions of diversity differ by participant race and in-group representation. Homing in on White participants, we further explore how conceptions of diversity differ by support for affirmative action and immigration, arguably the most prominent and divisive diversity-related policy issues in the United States today.

Findings indicate that U.S. participants primarily use racial heterogeneity to evaluate neighborhood diversity. In addition, heterogeneity matters more for White participants than non-White participants. Non-White participants also take into account non-White representation, as do White participants who report liberal attitudes toward diversity-related policies. Non-White participants are especially attentive to the representation of in-group members. By contrast, Whites who report conservative attitudes toward diversity-related policies associate non-White representation with less diversity. Together, the results suggest that people broadly share an analytical understanding of diversity as heterogeneity. They also take minority representation into account, but how they do so hinges on their own identities and political views.

In the conclusion, we expand on the consequences of diverging evaluations of diversity. Within organizations, diverging evaluations can frustrate diversity efforts by undermining non-White members' trust in those organizations (*23*). More broadly, elision between heterogeneity and representation conceptions fuels disagreements about the consequences of diversity and, as a result, interventions that aim to mitigate or advance mixture (*24*).

Conjoint experiment

We designed and fielded a conjoint experiment with a representative, race-balanced sample of 1803 U.S. adults. Conjoint experiments have been used across the social sciences to examine people's preferences and opinions. Typically, participants are asked to choose between and evaluate profiles, presented in pairs; each profile is characterized by differing levels of manipulated attributes (*25*). Paired designs, the results of which have been validated against real-world behavior, increase engagement among participants (*26*). Conjoint experiments can be thought of as a special application of randomized factorial designs, as the manipulated attributes in the profiles are represented by factorial variables (*27*).

As part of our experiment, we asked participants to evaluate eight hypothetical neighborhoods, presented in pairs. Neighborhoods varied along two dimensions: (i) racial heterogeneity and (ii) representation (the identities and relative sizes of the groups present). In terms of heterogeneity, we varied the distribution of neighborhood residents who belonged to one of three groups present in each neighborhood. All of the neighborhoods comprised one small group with 2% of residents and two larger groups. By capping each neighborhood at three groups and fixing the size of the smallest group to just 2%, we were able to probe the effect of a specific racial group's total absence. The relative sizes of the larger groups took the values 50 and 48%, 60 and 38%, 70 and 28%, 80 and 18%, or 90 and 8%.

In terms of representation, the identity of the largest group was randomly assigned from one of four options: White, Black, Latino, and Asian. Then, the identity of the second largest group was randomly assigned, then the identity of the smallest group, and, by extension, the identity of the missing group. By fixing the number of groups at three, we can parse two distinct, but covarying, features of representation: the identity of the largest group and the identity of the missing group. These two features may have analytically distinct effects on perceived diversity, but operationally, they cannot be randomized independently; for example, a neighborhood cannot have Whites as both the largest group and the absent group. Our randomization scheme addresses this issue by randomizing across all representation scenarios and allowing the identities and relative sizes of groups to covary, making it possible to identify group predominance and group absence as two distinct features. Both aspects of representation remain orthogonal to heterogeneity. In our analyses, we model the identity of the largest group and identity of the absent group separately.

For instance, a participant might have been asked to compare "Neighborhood A, which is 70% White, 28% Black, and 2% Latino" and "Neighborhood B, which is 70% Black, 28% Latino, and 2% Asian." These two neighborhoods are the same in terms of the distribution of racial groups (heterogeneity) but different in terms of the identities of both the largest group and the missing group (representation). In another case, a participant might have been asked to compare "Neighborhood A, which is 50% White, 48% Black, and 2% Latino" and "Neighborhood B, which is 90% White, 8% Black, and 2% Latino." These two neighborhoods are different in terms of the distribution of racial groups (heterogeneity) but the same in terms of the identities of both the largest group and the missing group (representation).

Participants were asked to rate each neighborhood on a seven-point scale, ranging from 1 (the neighborhood is "not racially diverse at all") to 7 (the neighborhood is "very racially diverse"). For each pair of neighborhoods, participants were also asked to select the neighborhood that they thought was "more racially diverse." (See Figs. 4 and 5 for screenshots of these items.) Here, we report results based on the seven-point item. In the Supplementary Materials, we also report results based on the forced-choice items, using the average marginal component effect on preferences to estimate preferences net of attribute composition (*28*). We did not detect any significant carryover or profile order effects (see tables S1 and S2).

Our sample comprises roughly equal subsamples of participants who "primarily identify" as White, Black, Latino, or Asian.

Participants were recruited by a survey research company from their opt-in panel. Using the 2017 American Community Survey, we established sampling quotas based on the joint distributions of age, gender, household income, and education separately for non-Latino White, non-Latino Black, Latino (of any race), and non-Latino Asian populations. Each racial subsample thus resembles the corresponding U.S. racial group in 2017 in terms of these traits. Additional information on quotas and exclusions is included in Materials and Methods and the Supplementary Materials. Descriptive statistics are provided in table S6.

RESULTS

Heterogeneity, identity of the largest group, and identity of absent group

How do racial heterogeneity, identity of the largest group, and identity of the absent group affect the perceived diversity of a neighborhood? Figure 1 shows that participants perceive more heterogeneous neighborhoods as more diverse, regardless of which groups are largest or absent ($P < 0.01$). Heterogeneity has a larger marginal effect on perceived diversity than the identity of the largest group or the identity of the absent group (tables S7 and S8). On average, the most heterogeneous neighborhoods, with 50, 48, and 2% distributions, are rated about 1.06 points more diverse (on a seven-point scale) than the most homogeneous neighborhoods, with 90, 8, and 2% distributions.

Although racial heterogeneity has a larger effect, the representation of non-White groups also affects perceived diversity. Participants rate neighborhoods where Latinos, Asians, or Blacks are the largest group as more diverse than neighborhoods where Whites are the largest group (Fig. 1, left) by 0.23 points, 0.18 points, and 0.15 points, respectively ($P < 0.001$ for all). Relatedly, participants perceive neighborhoods where Latinos, Asians, or Blacks are absent as less diverse than neighborhoods where Whites are absent (Fig. 1, right) by 0.16 points, 0.08 points, and 0.10 points, respectively ($P < 0.05$ for all). The effects of the largest group's identity and the absent group's identity on perceived diversity are not symmetrical (although the effect sizes look more similar in the analyses of the forced-choice items; see figs. S3 to S7). The increase in perceived diversity that neighborhoods receive as a result of having a non-White group as the largest group is greater than the increase in perceived diversity that neighborhoods receive from having Whites as the absent group. In the rest of our analyses, we focus primarily on the identity of the largest group.

Variation by participant race

How do participants from different racial backgrounds evaluate diversity? Effects in Fig. 2 show that heterogeneity affects perceived

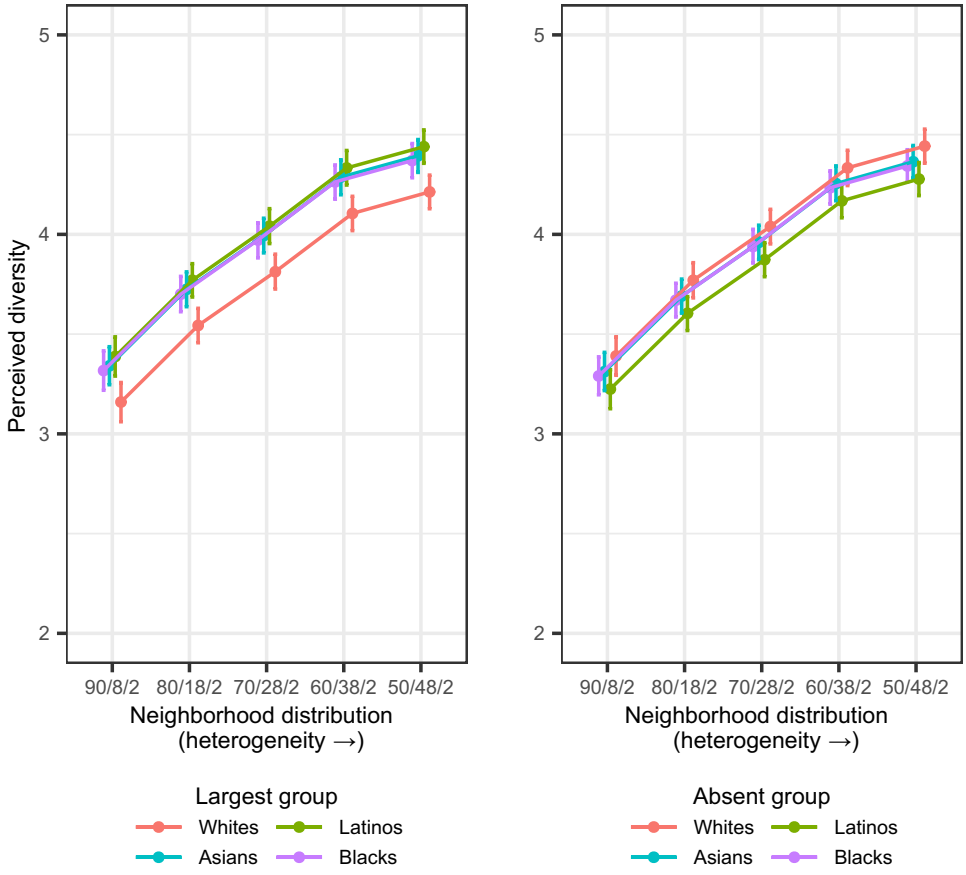

Fig. 1. Effects of heterogeneity and group representation on perceived diversity (all participants). Neighborhoods with more heterogeneous distributions (e.g., 50%/48%/2%) are perceived as more diverse. Neighborhoods with non-Whites as the largest group (left), and neighborhoods with Whites as the absent group (right) also seem more diverse. Expected values (means of 10,000 simulations based on model 1 in table S7 and model 1 in table S8) are shown with 95% confidence intervals, with clustered SEs.

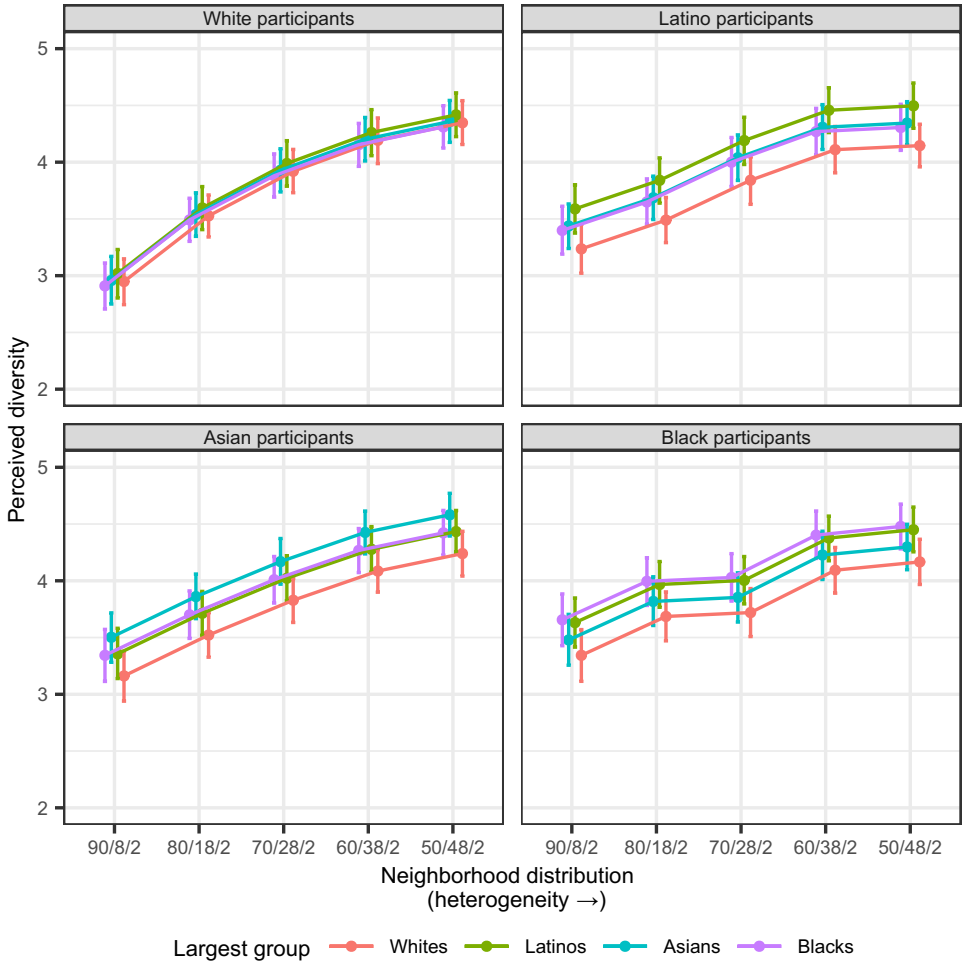

Fig. 2. Effects of heterogeneity and identity of the largest group on perceived diversity by participant race. All participants perceive more heterogeneous neighborhoods as more diverse, but the effect is larger for White participants (top left). Latino, Asian, and Black participants perceive neighborhoods where their own group is the largest as more diverse than neighborhoods where Whites are the largest group. The identity of the largest group does not affect perceived diversity for White participants. Expected values are simulated from model 2 in table S9 and shown with 95% confidence intervals, with clustered SEs. Continuous control variables are held at their within-race medians, and categorical control variables are held at their within-race modes.

diversity for participants of all racial backgrounds, even after taking the identity of the largest group into account ($P < 0.01$). However, heterogeneity has a larger effect on White participants' assessments. White participants (top left panel) make bigger distinctions between each of the five possible distributions than Latino, Asian, and Black participants do, and they also perceive a larger difference between the most homogeneous neighborhood and the most heterogeneous neighborhood (table S9). Although the expected values for White and non-White participants' ratings of the most heterogeneous neighborhoods are similar (on average, between 4.32 and 4.42 points for all groups), White participants view the most homogeneous neighborhoods as less diverse than non-White participants do (2.96 points for White participants, 3.42 points for Latino participants, 3.34 points for Asian participants, and 3.53 points for Black participants, averaging across identity of the largest group).

White and non-White participants also respond differently to the representation of non-White groups. For White participants, the identity of the largest group in a neighborhood does not affect their assessments of racial diversity. On average, they do not perceive neighborhoods where Latinos, Asians, or Blacks are the largest group to be any more or less diverse than neighborhoods where Whites are the largest group. The sample-wide associations between the identity of the largest group and perceived diversity are primarily driven by Latino, Asian, and Black participants, who together make up three-quarters of our race-balanced sample.

The relationship between non-White representation and perceived diversity is largely attributable to non-White participants' valuation of in-group representation. Across all levels of neighborhood heterogeneity, Latino, Asian, and Black participants perceive neighborhoods where their own group is the largest group as more diverse than neighborhoods where Whites are the largest group. The in-group effect is about 0.28 points for Latino participants, 0.33 points for Asian participants, and 0.35 points for Black participants ($P < 0.01$ for all in table S9). Non-White participants also perceive a neighborhood to be more diverse if other non-White groups (besides their own) are the largest group, but these effects are smaller

and not consistently statistically significant (0.12 to 0.22 points; $P < 0.05$ for Asian participants' ratings of predominately Black neighborhoods and Black participants' ratings of predominately Latino neighborhoods).

Diversity-related policy views matter for Whites

White participants' evaluations of diversity seem to hinge solely on heterogeneity; the identity of the largest group in a neighborhood does not affect their evaluations. As members of the dominant majority group, Whites should be less likely to consider race-based stigma and in-group representation when judging diversity (*13*). However, a subgroup of Whites, such as those with progressive attitudes toward diversity-related policies, might be more sensitive to these issues. Here, we explore whether Whites' evaluations of diversity vary by their attitudes toward affirmative action and immigration. Figure 3 illustrates White participants' perceptions of diversity as a function of the identity of the largest group and participants' attitudes toward affirmative action and immigration. (See tables S15 and S16 for replication with continuous measures of these attitudes.)

Similar to non-White participants, White participants who strongly favor affirmative action or who think immigration should be increased view neighborhoods where Blacks are the largest group, and, to a lesser extent, those where Latinos or Asians are the largest group, as more diverse than neighborhoods where Whites are the largest group (tables S11 and S12; $P < 0.05$ when Blacks are the largest group). By contrast, White participants who oppose affirmative action or who think immigration should be decreased view neighborhoods where Blacks are the largest group as less diverse than neighborhoods where Whites are the largest group. In sum, White participants who report liberal attitudes toward diversity-related policies resemble non-White participants more in their tendency to associate diversity with non-White representation. On the other hand, White participants who report conservative attitudes on these issues resemble non-White participants in their tendency to associate diversity with in-group representation. The result is that Whites who hold conservative views are the only group that does not think greater non-White representation translates into greater racial diversity.

Whites who oppose affirmative action and immigration describe a neighborhood as less diverse when non-Whites are the largest group, but is this because they are more likely than other Whites to benchmark diversity to the composition of the U.S. population? If so, then these participants may reasonably evaluate a neighborhood where non-Whites are the largest group to be further from the national ideal than one in which Whites are the largest group. To explore this, we turn to the results of an earlier data collection in which we asked an online convenience sample of U.S. adults, 457 of whom identified as White, to report the percentage of Whites, Blacks, Latinos, and Asians in the "most

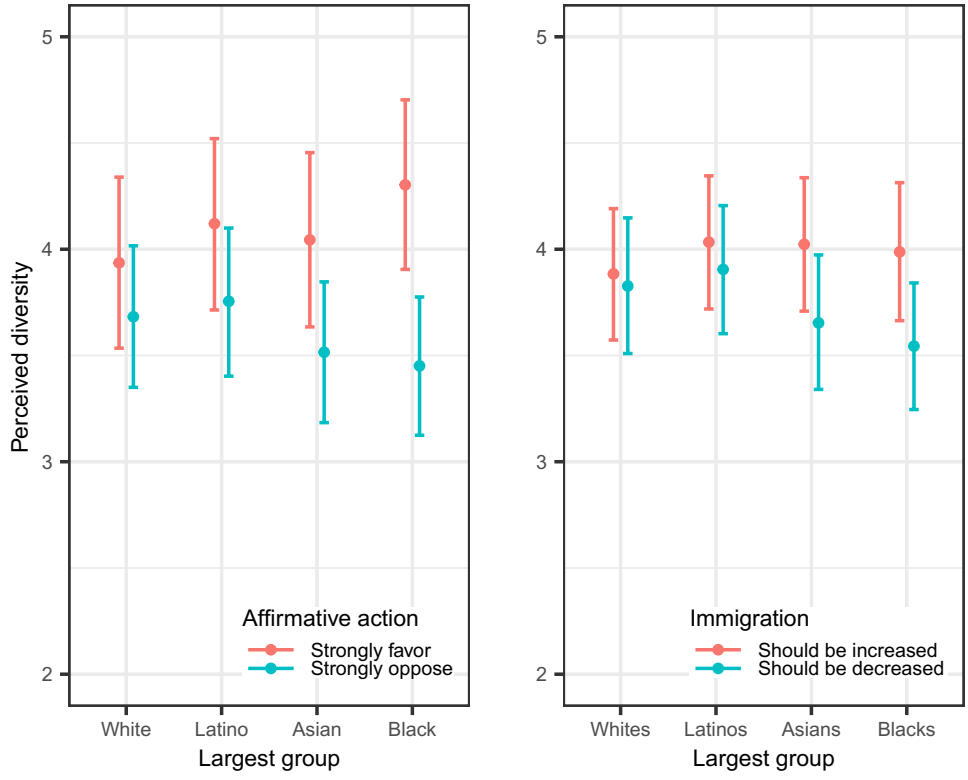

Fig. 3. Effects of heterogeneity, identity of the largest group, and racial policy preferences on perceived diversity (White participants). White participants who strongly favor affirmative action (left) or think that immigration should be increased (right) view neighborhoods where non-Whites are the largest group as more diverse than those where Whites are the largest group. White participants who strongly oppose affirmative action (left) or think that immigration should be decreased (right) view neighborhoods where non-Whites are the largest group as less diverse than those where Whites are the largest group. Expected values are simulated from model 2 in table S11 and model 2 in table S12 and shown with 95% confidence intervals, with clustered SEs. Continuous control variables are held to their medians, and categorical control variables are held to their modes. Heterogeneity is held at 70, 28, and 2%.

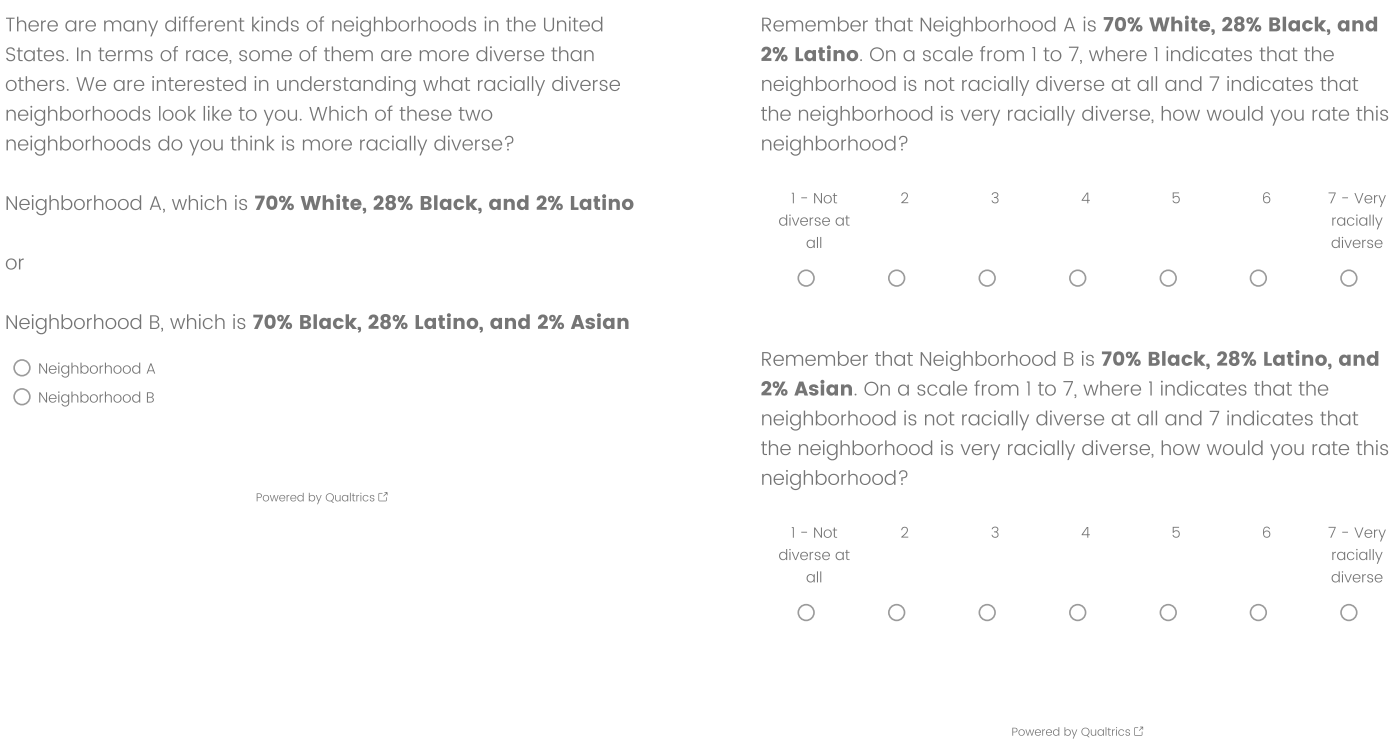

Fig. 4. Sample items for two neighborhoods that are the same in terms of the distribution of racial groups (heterogeneity) but different in terms of the representation of specific racial groups. Note that in this example, the identity of the largest group and the identity of the absent group in each profile are different.

racially diverse neighborhood" they can imagine and (separately) in the U.S. population overall.

For each participant, we quantified the distance between the composition of their "most diverse neighborhood" and (i) the composition of a neighborhood where all four groups are evenly represented (25% Whites, 25% Blacks, 25% Latinos, and 25% Asians) and (ii) the composition of the U.S. population as perceived by the participant (see section S5 for more details). On the basis of this, we classified participants as using a heterogeneity benchmark or a U.S. composition benchmark to evaluate diversity.

Were White participants with conservative views toward diversity policies relatively more likely to adopt a U.S. composition benchmark than a heterogeneity benchmark? White participants who strongly oppose affirmative action were neither more nor less likely than other participants to use a U.S. composition benchmark as opposed to a heterogeneity benchmark (table S13). Similarly, White participants who support decreasing immigration were neither more nor less likely than other participants to use a U.S. composition benchmark as opposed to a heterogeneity benchmark (table S14). In sum, we cannot attribute these Whites' tendency to describe majority–non-White neighborhood as less diverse to their using a different yardstick to evaluate diversity.

DISCUSSION

Scholars attribute the rise of "diversity discourse," in part, to the term's ambiguity, which has allowed it to salvage controversial race-related policies and practices. In higher education, for example, diversity has become the legally acceptable rationale for race-based affirmative action (*29*). Paradoxically, the use of diversity in legal and policy domains assumes that diversity can operate as an agreed-upon descriptor of objective properties. Instead, we find that people use multiple, and potentially conflicting, criteria to assess diversity.

On the one hand and regardless of racial background, U.S. Americans associate diversity with racial heterogeneity: The more evenly distributed racial groups are in a community, the more diverse it is thought to be. Notably, this tendency is more pronounced among White Americans than Black, Latino, or Asian Americans.

Black, Latino, and Asian Americans, moreover, also use a second criterion, the identity of the largest group, to evaluate a neighborhood's diversity. Non-White Americans see neighborhoods where their own group is the largest as more diverse than neighborhoods where another group is the largest. Moreover, Black, Latino, and Asian Americans' assessments of neighborhood diversity are not solely explained by a preference for in-group representation. Holding heterogeneity constant, non-Whites also perceive neighborhoods where another non-White group is the largest as more diverse than neighborhoods where Whites are the largest group although to a lesser extent than neighborhoods where their own group is the largest. This is especially pronounced for neighborhoods where Blacks are the largest group. These patterns are consistent with the framing of Civil Rights era policies and practices in terms of diversity and with the unique disadvantages faced by Black people in the United States.

For White Americans, the effect of the largest group's identity hinges on their attitudes toward diversity-related policy issues, specifically affirmative action and immigration. Similar to non-White participants, White participants who report liberal attitudes toward these issues are more likely to associate non-White representation, and especially Black representation, with greater diversity. This could

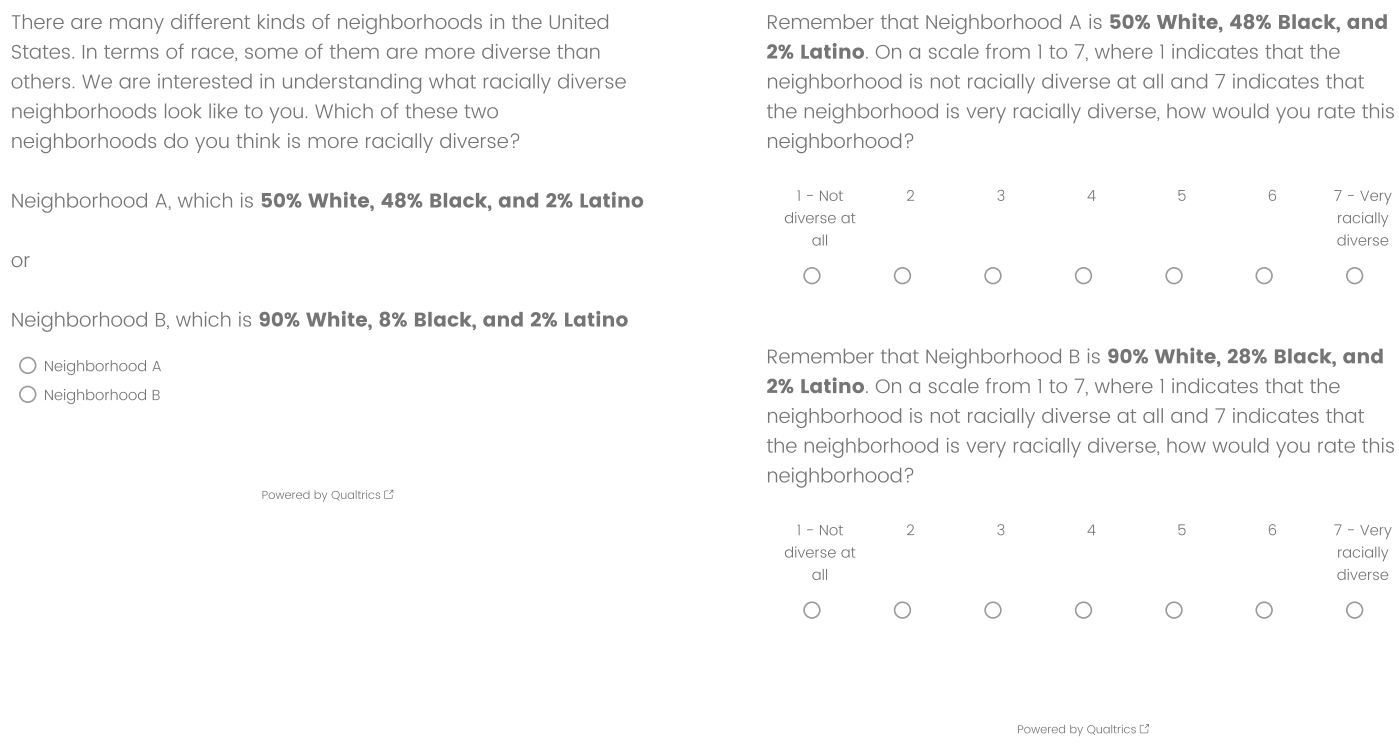

Fig. 5. Sample items for two neighborhoods that are different in terms of the distribution of racial groups (heterogeneity) but the same in terms of the representation of specific racial groups. Note that in this example, the identity of the largest group and the identity of the absent group are the same.

be because rationales for pro-diversity policies such as affirmative action tend to emphasize White people's relative advantage and do not portray White racial identity as a compelling impetus for recognition. Diversity initiatives in schools and workplaces typically strive to increase the representation of non-Whites.

By contrast, Whites who report conservative attitudes on affirmative action and immigration view a neighborhood as less diverse if Blacks (and, to a lesser extent, Latinos and Asians) are the largest group, as opposed to Whites. We cannot attribute this to a special tendency, among these Whites, to benchmark diversity to the composition of the country overall. Ironically, by associating White representation with greater diversity, Whites who oppose affirmative action and immigration resemble non-Whites in their tendency to associate diversity with in-group representation.

The moderating role of policy views merits further investigation, and it is consistent with at least two explanations. Regarding the first explanation, diversity has come to assume normative connotations: People want to be able to describe the communities to which they belong as diverse or, at the very least, they think others do (*1*). In addition, although U.S. Americans occasionally use diversity as a euphemism for undesirable properties, such as crime [e.g., (*4*)], more commonly, they describe diversity as a desirable and beneficial quality (*3*). In light of this, the way to express opposition to Black representation, and non-White representation more generally, is not to express opposition to diversity but to deny that non-White people in makes a community more diverse.

Regarding the second explanation, the preponderance of non-White people in a community has been shown to heighten the salience of a White racial identity, drawing Whites to its defense [e.g., (*30*, *31*)]. White racial identity may be especially salient to White people with conservative views, who are also more likely to view White people as disadvantaged and therefore worthy of protection in their own right (*32*, *33*). Salience and perceived disadvantage, in turn, may fuel the drive for in-group representation.

An outstanding question is whether the criteria used to evaluate the diversity of real-world neighborhoods resemble those at work in a survey experiment. In evaluating real-world neighborhoods, people may not have access to accurate statistics about demographic composition. Demographic composition should nevertheless correlate with on-the-ground interactions, which, alongside neighborhood reputation, likely drive evaluations of real-world neighborhoods. In addition, in line with this study's findings, recent research shows that the decision to describe Chicago area neighborhoods as diverse is correlated with their objective racial attributes, in terms of both heterogeneity and minority group shares (*5*).

Together, variation within White people's assessments and between White and non-White people's assessments suggests a difficult road ahead for the policies and practices that diversity has been mobilized to defend. The "diversity defense" assumes that diversity can be objectively assessed or, at the very least, that assessments do not differ systematically across people with different stances on and stakes in diversity-related policies. Instead, we find that people use multiple, occasionally conflicting criteria to determine whether a community is diverse. More concerning is the fact that people with different stances on and stakes in diversity-related policies put different weight on the qualities that make a community diverse. Disagreement regarding the desirability of diversity may lead to disagreements regarding what makes a community diverse and vice versa.

More immediately, disagreements about the meaning of diversity may perpetuate the underrepresentation of minorities in some settings. In recent research, Black and Latino people expressed stronger concerns about fitting in and lower self-evaluations of performance in organizations that they believe are inaccurately representing themselves as diverse (*23*). "Diversity dishonesty" may stem from conscious, if well-intentioned, efforts to recruit and retain non-White members. However, our findings suggest that diversity dishonesty may also stem from unrecognized disagreements by race in terms of what makes a community diverse.

What are the implications of our findings for empirical research on diversity? Even researchers use multiple, contradictory criteria to define diversity. Most notably, elision between heterogeneity and representation has led many scholars to interpret correlations with minority share as evidence of diversity's (purportedly negative) effects [(*34*); for a review, (*24*)]. Their findings are received, in turn, by an audience that associates diversity more closely with racial heterogeneity than with minority share. The result is both ironic and deeply troubling: Findings that stem from the disadvantages faced by minority communities are mobilized to challenge integration in educational, residential, and other contexts [e.g., (*35*, *36*)].

MATERIALS AND METHODS

The study was reviewed and approved by the Institutional Review Boards of Princeton University (11041), Columbia University (AAAS1825), and New York University (2019-3604). We registered our research questions and hypotheses before fielding through Experiments in Governance and Politics (20190116AA).

Data collection

The survey was fielded between 13 October and 17 December 2019. Participants were recruited by Qualtrics, a survey research company, from their opt-in panel. We used the 2017 American Community Survey to establish sampling quotas based on the joint distributions of gender, age, education, and household income separately for non-Latino White adults, non-Latino Black adults, Latino adults (of any race), and non-Latino Asian adults. Qualtrics first screened prospective participants by gender, age, education, and household income. Once the targeted quota for each cell was filled, additional participants who fell in that cell were not allowed to complete the survey. In sum, each racial subsample resembles the adult population in each of the four racial groups in 2017 in terms of these characteristics.

Qualtrics also excluded participants on the basis of a standard set of criteria meant to identify duplicate or low-quality responses. This includes, for example, participants who completed the survey in less than one-third of the median completion time. In addition, Qualtrics identified and replaced 196 participants who gave the same diversity rating for all eight neighborhoods. The analyses reported in this paper exclude these participants, hereafter referred to as "straightliners." We also replicated the main analyses with a larger sample that includes straightliners (section S8).

The median time to completion among all participants (including straightliners) was 6 min and 46 s. On average, participants received about $2.00 for completing the survey. Compensation was set by Qualtrics and benchmarked to academic surveys of similar length. Some participants were offered more or less depending on the demographic targets for the final sample.

Example of materials

Screenshots of the survey instrument are shown in Figs. 4 and 5. Note that the ratings questions were shown on a different page than the forced-choice questions.

Statistical analyses

Sample descriptive statistics can be found in section S2. We did not perform any transformations on the outcome variable or participants' self-reported race. We kept the attitudes toward affirmative action and immigration as categorical variables. A robustness check using the continuous version of these attitudinal variables can be found in section S7. The continuous version of the affirmative action variable was recoded into a 0 to 4 scale, with 0 equaling "strongly oppose." The continuous version of the immigration variable was recoded into a 0 to 2 scale, with 0 equaling "immigration should be decreased."

The regression results were estimated from ordinary least squares with SEs adjusted for clustering within participants (because each participant rated eight profiles). The full regression tables are reported in section S4. In addition to asking participants to rate each neighborhood profile, we also asked participants to select the more diverse profile from each pair. We analyzed these binary forced-choice responses as a robustness check (section S6).

SUPPLEMENTARY MATERIALS

Supplementary material for this article is available at http://advances.sciencemag.org/cgi/content/full/7/11/eabf2507/DC1

REFERENCES AND NOTES

1. E. Berrey, The Enigma of Diversity: *The Language of Race and the Limits of Racial Justice* (University of Chicago Press, 2015).
2. L. B. Edelman, S. R. Fuller, I. Mara-Drita, Diversity rhetoric and the managerialization of law. *Am. J. Sociol.* **106**, 1589–1641 (2001).
3. J. M. Bell, D. Hartmann, Diversity in everyday discourse: The cultural ambiguities and consequences of "Happy Talk". *Am. Sociol. Rev.* **72**, 895–914 (2007).
4. E. Hoekstra, J. Gerteis, The civic side of diversity: Ambivalence and belonging at the neighborhood level. *City Community* **18**, 195–212 (2019).
5. M. Abascal, F. Ganter, Know it when you see it? The qualities of the communities people describe as "diverse" (or not) (2020); https://osf.io/preprints/socarxiv/rvfjw/.
6. P. M. Blau, A macrosociological theory of social structure. *Am. J. Sociol.* **83**, 26–54 (1977).
7. M. Abascal, D. Baldassarri, Love thy neighbor? Ethnoracial diversity and trust reexamined. *Am. J. Sociol.* **121**, 722–782 (2015).
8. L. J. Dettling, J. W. Hsu, L. Jacobs, K. B. Moore, J. P. Thompson, "Recent trends in wealth-holding by race and ethnicity: Evidence from the survey of consumer finances" (Technical Report, Federal Reserve 2017).
9. US Census Bureau, Real median household income by race and Hispanic origin: 1967 to 2017 (Technical Report, American Community Survey 2019).
10. J. R. Logan, B. J. Stults, The persistence of segregation in the metropolis: New findings from the 2010 census (2011).
11. Z. Qian, D. T. Lichter, Social boundaries and marital assimilation: Interpreting trends in racial and ethnic intermarriage. *Am. Sociol. Rev.* **72**, 68–72 (2007).
12. M. Unzueta, K. Binning, Which racial groups are associated with diversity? *Cultur. Divers. Ethnic Minor. Psychol.* **16**, 443–446 (2010).
13. C. W. Bauman, S. Trawalter, M. M. Unzueta, Diverse according to whom? Racial group membership and concerns about discrimination shape diversity judgments. *Pers. Soc. Psychol. Bull.* **40**, 1354–1372 (2014).
14. G. J. Leonardelli, M. B. Brewer, Minority and majority discrimination: When and why. *J. Exp. Soc. Psychol.* **37**, 468–485 (2001).
15. M. B. Brewer, The social self: On being the same and different at the same time. *Pers. Soc. Psychol. Bull.* **17**, 475–482 (1991).
16. E. Bruch, F. Feinberg, Decision-making processes in social contexts. *Annu. Rev. Sociol.* **43**, 207–227 (2017).
17. J. Xu, Making meaning out of numbers: Demographic knowledge and evaluations of racial diversity (2020); https://osf.io/preprints/socarxiv/b235s/.

18. M. M. Unzueta, K. R. Binning, Diversity Is in the eye of the beholder: How concern for the in-group affects perceptions of racial diversity. *Pers. Soc. Psychol. Bull.* **38**, 26–38 (2012).
19. M. M. Unzueta, E. D. Knowles, G. C. Ho, Diversity is what you want it to be: How social-dominance motives affect construals of diversity. *Psychol. Sci.* **23**, 303–309 (2012).
20. E. H. Chang, K. L. Milkman, D. Chugh, M. Akinola, Diversity thresholds: How social norms, visibility, and scrutiny relate to group composition. *Acad. Manage. J.* **62**, 144–171 (2019).
21. M. Krysan, K. Crowder, *Cycle of Segregation: Social Processes and Residential Stratification* (Russell Sage Foundation, 2017).
22. S. F. Reardon, A. Owens, 60 Years After *Brown*: Trends and consequences of school segregation. *Annu. Rev. Sociol.* **40**, 199–218 (2014).
23. L. S. Wilton, A. N. Bell, M. Vahradyan, C. R. Kaiser, Show don't tell: Diversity dishonesty harms racial/ethnic minorities at work. *Pers. Soc. Psychol. Bull.* **46**, 1171–1185 (2020).
24. D. Baldassarri, M. Abascal, Diversity and prosocial behavior. *Science* **369**, 1183–1187 (2020).
25. J. Hainmueller, D. J. Hopkins, T. Yamamoto, Causal inference in conjoint analysis: Understanding multidimensional choices via stated preference experiments. *Polit. Anal.* **22**, 1–30 (2014).
26. J. Hainmueller, D. Hangartner, T. Yamomoto, Validating vignette and conjoint survey experiments against real-world behavior. *Proc. Natl. Acad. Sci. U.S.A.* **112**, 2395–2400 (2015).
27. N. Egami, K. Imai, Causal interaction in factorial experiments: Application to conjoint analysis. *J. Am. Stat. Assoc.* **114**, 529–540 (2019).
28. F. Ganter, Revisiting causal inference in forced-choice conjoint analysis: Identifying preferences net of compositional effects (2019); https://osf.io/preprints/socarxiv/e638u/.
29. D. Hirschman, E. Berrey, F. Rose-Greenland, Dequantifying diversity: Affirmative action and admissions at the University of Michigan. *Theory Soc.* **45**, 265–301 (2016).
30. M. Abascal, Contraction as a response to group threat: Demographic decline and Whites' classification of people who are ambiguously White. *Am. Sociol. Rev.* **85**, 298–322 (2020).
31. M. A. Craig, J. M. Rucker, J. A. Richeson, Racial and political dynamics of an approaching "majority-minority" United States. *Ann. Am. Acad. Pol. Soc. Sci.* **677**, 204–214 (2018).
32. A. R. Hochschild, *Strangers in their Own Land: Anger and Mourning on the American Right* (The New Press, 2017).
33. Pew Research Center, Sharp rise in the share of Americans saying Jews face discrimination (Technical Report, 2019).
34. P. T. Dinesen, M. Schaeffer, K. M. Sønderskov, Ethnic diversity and social trust: A narrative and meta-analytical review. *Annu. Rev. Polit. Sci.* **23**, 441–465 (2020).
35. A. Thernstrom, S. Thernstrom, A. K. Nagai, R. Nieli, Brief in support of petitioners as amici curiae, Fisher v. University of Texas, U.S. 11–345 (2012).
36. J. Richwine, A smart solution to the diversity dilemma (2009).
37. S. F. Reardon, G. Firebaugh, 2. Measures of multigroup segregation. *Sociol. Methodol.* **32**, 33–67 (2002).
38. E. Roberto, The divergence index: A decomposable measure of segregation and inequality. arXiv:1508.01167 [stat.ME] (2016); https://arxiv.org/abs/1508.01167.

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