| RESEARCH AND PRACTICE |

Effects of Racial Prejudice on the Health of Communities: A Multilevel Survival Analysis

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Racism and prejudice negatively affect the health of those targeted.[1] Recent experimental studies suggest that prejudice may also have a negative impact on individuals who harbor prejudicial attitudes.[2–4] For instance, in one investigation, participants with high levels of racial prejudice experienced increases in the stress hormone cortisol during interactions with members of a different racial group but not interactions with individuals from their same group.[4] In another study on stressful intergroup encounters, Whites interacting with Blacks exhibited maladaptive cardiovascular responses that were indicative of physiological threat.[2]

Although these studies focused on prejudice at the individual level, community-level prejudice may also exert negative health effects among both minority and majority group members. In a cross-sectional, ecological study, researchers created a state-level measure of "collective disrespect" based on aggregate responses to a question about people's attitudes regarding why Blacks had worse jobs, incomes, and housing than Whites (e.g., because of a lack of innate ability). In states with higher levels of collective disrespect toward Blacks, age-adjusted mortality rates were higher among both Blacks and Whites.[5]

Although that study raised the intriguing possibility that community-level prejudice adversely affects the health of community members, it lacked individual-level data on mortality risk as well as on sociodemographic and behavioral risk factors for mortality, limiting the possibility of connecting prejudice to mortality at either the community or individual level. Furthermore, the researchers did not indicate the mechanisms that might explain why community-level prejudice harms health.

In this study, we extended existing research by investigating the joint effects of individual- and community-level racial prejudice on mortality among Blacks and Whites in the United States. We further assessed the role of

Objectives. We examined whether and how racial prejudice at both the individual and community levels contributes to mortality risk among majority as well as minority group members.

Methods. We used data on racial attitudes from the General Social Survey (1993–2002) prospectively linked to mortality data from the National Death Index through 2008.

Results. Whites and Blacks living in communities with higher levels of racial prejudice were at an elevated risk of mortality, independent of individual and community sociodemographic characteristics and individually held racist beliefs (odds ratio = 1.24; 95% confidence interval = 1.04, 1.49). Living in a highly prejudiced community had similar harmful effects among both Blacks and Whites. Furthermore, the interaction observed between individual- and community-level racial prejudice indicated that respondents with higher levels of racial prejudice had lower survival rates if they lived in communities with low degrees of racial prejudice. Community-level social capital explained the relationship between community racial prejudice and mortality.

Conclusions. Community-level racial prejudice may disrupt social capital, and reduced social capital is associated with increased mortality risk among both Whites and Blacks. Our results contribute to an emerging body of literature documenting the negative consequences of prejudice for population health. (*Am J Public Health.* 2015;105:2349–2355. doi:10.2105/AJPH.2015.302776)

community social capital in mediating this relationship. Social capital—the extent of one's social network and also whether norms such as trust are prevalent in a community[6]—has been subcategorized as "bonding" capital, which links similar individuals, or "bridging" capital, which connects dissimilar individuals. Whereas low levels of prejudice are associated with greater trust and diminished threat at the neighborhood level,[7] high levels of prejudice likely discourage residents from developing social capital with their neighbors, given reduced levels of trust and mutual reciprocity. In turn, low levels of social capital are associated with an increased risk of premature mortality.[8]

To address our study aims, we used a multilevel discrete-time event history methodology that included mortality data for individuals who reported their beliefs about race and lived in communities across the United States. Thus, ours is the first study, to our knowledge, to determine whether individual- and community-level racial prejudice

independently predict mortality risks among Blacks and Whites, whether the relationship between individual-level prejudice and mortality differs between high- and low-prejudice communities, and whether social capital explains elevated mortality risks in high-prejudice communities.

METHODS

We used cumulative 1993 through 2002 data from the General Social Survey (GSS) linked prospectively to mortality data from the National Death Index (NDI), which were available through 2008.[9] We restricted our data to 1993 through 2002 so that we could retain the same sampling units across the country because the National Opinion Research Center, which conducts the GSS, changes the geographic sampling frame every 10 years. In addition, our key variables for measuring racial prejudice were included in the GSS in 1993 and thereafter.

Our study was prospective in that it included data from 2 time points for each respondent: survey responses (between 1993 and 2002) from the GSS and vital status, obtained from the NDI, as of 2008. Thus, this was a follow-up study in the sense that we used prospective mortality data but not repeated data on the same respondents.

The GSS sampling frame between 1993 and 2002 included 14 513 individuals aged 18 years or older in 100 primary sampling units (PSUs) across the United States. PSUs are composed of either metropolitan statistical areas or rural counties and serve as a "life space" proxy that includes places of residence and work.[10] The sample was restricted to Black and White respondents, given that most research on racial attitudes has specifically focused on these 2 groups; furthermore, during the survey period, only 5.5% of respondents were not White or Black.

A total of 796 people from other racial backgrounds were dropped from our mortality analyses. Furthermore, 1609 respondents who were missing data on age (n = 8), education (n = 19), income (n = 1528), marital status (n = 3), or residential mobility (n = 51) were excluded. Respondents with missing data on our racial prejudice index (described subsequently) were excluded as well (n = 1158). The final sample included 10 950 White and Black respondents distributed across 100 PSUs.

Measures

Predictor: individual racial prejudice. Racial prejudice was based on data from 5 items (which have also been used in previous research[11]) included in the 1993 through 2002 versions of the GSS:

1. "On the average, negroes/blacks/African-Americans have worse jobs, income, and housing than white people. Do you think these differences are caused by the fact that most negroes/blacks/African-Americans have less in-born ability to learn?"
2. "Do you think these differences are because most negroes/blacks/African-Americans just don't have the motivation or willpower to pull themselves up out of poverty?"
3. "Do blacks tend to be unintelligent or tend to be intelligent?" (and "Do whites tend to be unintelligent or tend to be intelligent?")
4. "Do blacks tend to be hard working or lazy?" (and "Do whites tend to be hard working or lazy?")
5. "Do you think there should be laws against marriages between Negroes/Blacks/African-Americans and whites?"

Response options for questions 1, 2, and 5 were dichotomous (yes or no).

In the case of the third and fourth items, responses were selected on a 7-level Likert scale ranging from lazy to hardworking and from unintelligent to intelligent, respectively. For these 2 items, the sum of ratings of Whites was subtracted from the sum of the ratings of Blacks to quantify unfavorable feelings against Blacks relative to Whites.[12] Therefore, a positive score indicated anti-Black prejudice (i.e., Whites are perceived as more intelligent and less lazy than Blacks), a score of zero indicated that there was no perceived difference between Blacks and Whites with respect to intelligence and laziness, and a negative score indicated pro-Black bias (Blacks are perceived as more intelligent and less lazy than Whites). The ratings for these 2 items were dichotomized with the zero score (neutral attitude) as the cutoff point; zero and negative scores were considered together.

In preliminary analyses, we generated the prejudice score in several different ways, including through dichotomizing the 5 items and summing them and through standardizing and averaging the items. The internal reliability was stronger for the dichotomous approach; in fact, the reliability was lower than recommended when the variables were standardized and averaged (0.50). Thus, we decided to use the dichotomous approach. However, model comparisons suggested that the different constructions of racial prejudice yielded identical patterns of results (data are available on request).

Thus, these 5 prejudice items were averaged to create a continuous scale (range = 0–1), with higher scores indicating more prejudice against Blacks (Whites: mean score = 0.26; SD = 0.32; Blacks: mean score = 0.17; SD = 0.27). Because the 5 prejudice items were not included each year in the GSS survey, we estimated the mean level of all prejudice items that each respondent completed (e.g., if only 3 prejudice items were included in a given year, we estimated an average score based on those 3 items). We conducted a series of sensitivity analyses and found that the planned missing data design did not affect the direction or magnitude of our results (data available on request). The prejudice variable was nonnormally distributed (skewness = 1.03; mean = 0.25; SD = 0.3); therefore, it was log-transformed and examined as a continuous variable.

The reliability of the scale, calculated via Cronbach alpha, was 0.67 (Whites: 0.67; Blacks: 0.57), providing evidence of adequate internal consistency reliability. When an exploratory factor analysis was performed, the 5 variables loaded strongly on a single factor (individual factor loadings were above 0.5), providing an added level of confidence in the scale's construct validity.

Community-level racial prejudice. To devise our index of community-level racial prejudice, we aggregated residents' self-rated scores on the racial prejudice items within PSUs, such that each community (i.e., PSU) had an average prejudice score during the period in which the GSS interview was conducted. We used all community residents' scores on the racial prejudice items to create the PSU-level racial prejudice variable because it was important to capture the extent to which the community as a whole endorsed prejudicial attitudes toward Blacks. Thus, although the 796 respondents who were neither White nor Black were excluded from the analyses of mortality data, they were included in the models used to create the PSU-level racial prejudice variable. The PSU samples were nationally representative households. Thus, aggregated individual responses were representative of respondents' area of residence.[13]

We standardized PSU-level data centered on the survey years according to standard procedures.[14] PSU-level racial prejudice scores ranged from −0.74 to 0.91, indicating substantial variation across communities. PSU-level racial prejudice was examined as a continuous variable. Estimates for the community-level prejudice variable were based on within-unit samples that averaged about 31 respondents per survey year.

Mediator: community social capital. In previous studies,[15–17] researchers have recommended the use of objective indicators of social

capital because social capital measured via self-report questionnaires can be partially biased by the subjective perceptions of interviewees (e.g., response and recall bias), which could also have been correlated with our exposure (i.e., racial prejudice). Thus, we used an objective indicator of social capital to minimize this opportunity for confounding.

Specifically, we used a previously established social capital index[18] that combines a number of social capital measures based on Putnam's[6] research. The index estimates the number of each of 11 social capital establishments per 10 000 people in a county: bowling centers, public golf courses, physical fitness facilities, and sports facilities (both sports clubs and recreational clubs), as well as several organizations, including civic and social, political, religious, labor, business, and professional organizations. The index includes 3 additional social capital measures as well: percentage of residents voting in presidential elections, county-level response rate to the Census Bureau's decennial census, and number of tax-exempt nonprofit organizations (derived from National Center for Charitable Statistics data).

Rupasingha et al.[18] used a principal-components analysis to combine these measures into one social capital index. In our study, each of the social capital measures was standardized, and the mean of the standardized variables was used to create the composite index of social capital (range = −0.86 to 1.04). Because data from the index were available at the county level, we used geocodes to link the index to the GSS PSUs. To do so, we initially identified which counties were part of each PSU (PSUs are mainly composed of multi-county areas). We aggregated the data from all constituent counties in the PSU to create the PSU-level social capital variable. The counties were the same across the time periods we examined. The social capital variable was assessed in 1997, the midpoint of the GSS years assessed in our analyses. However, we conducted sensitivity analyses with social capital data from different years (1990 and 2005), and the results remained robust when these alternate years were used.

Outcome: all-cause mortality. Information on all-cause mortality was obtained from the NDI. The GSS/NDI data set was validated in part against the NDI/Third National Health and

Nutrition Examination Survey data set, and the mortality and age of death distributions in the 2 data sources were nearly identical.[9] In our models, respondents who had died by 2008 were coded as 1, and those who survived the study period were coded as 0.

Individual-level covariates. We controlled for key sociodemographic characteristics and socioeconomic status (SES). Sociodemographic and socioeconomic variables included race (White, Black), gender, age at the time of the interview (continuous variable), marital status (married, single, formerly married), household income (logged continuous variable), and educational attainment (<high school, high school, college, >college). Household income was adjusted to constant 2002 dollars.[19]

Community-level covariates. At the community level, PSU covariates included 3 PSU-level indicators of SES: average number of people living below the federal poverty line (adjusted for family size and survey year), median income, and average years of educational attainment. In addition, we controlled for the percentage of Blacks living in a given PSU, whether the PSU was located in the South, the PSU-level political affiliation index, and the PSU's dissimilarity index,[20] a measure of the level of racial segregation on a scale ranging from 0 (complete integration) to 1 (complete segregation).

All PSU-level covariates were chosen because they were significantly correlated with racial prejudice in bivariate models and therefore could be potential confounders of the relationship between racial prejudice and mortality risk. The PSU covariates related to SES and racial composition were derived from the 1990 US decennial census; geocoded data were used to match county-level information with each PSU. We aggregated political affiliation to the PSU level on the basis of the following GSS question: "Generally speaking, do you usually think of yourself as a Republican, Democrat, Independent, or what?" Scores ranged from 0 (strong Democrat) to 6 (strong Republican).

Statistical Analysis

We combined a discrete-time event history model with a multilevel modeling approach to predict differences in mortality risks among residents of communities with higher versus lower levels of racial prejudice. The model

estimated odds ratios (ORs) and 95% confidence intervals (CIs) for mortality during the follow-up period (1993–2008), and the multilevel survival analysis addressed possible errors resulting from differential exposure to risk and censoring (i.e., the fact that there were no mortality data for some participants because they were still alive at the end of the study).[21]

We developed a multilevel model to address the probability of an event (i.e., death) experienced by individual i at time t in neighborhood k given that this event had not occurred in an earlier period.[22] We constructed a 3-level structure with contextual variables at level 3 (i.e., PSU-level prejudice, PSU-level covariates), time-invariant individual-level variables at level 2 (e.g., individual racial prejudice, race), and time-variant variables addressing the baseline hazard at level 1 (i.e., varying numbers of years after the interview). We added a random effect for each PSU to control for unobserved heterogeneity in the outcome at the cluster (i.e., PSU) level, conditional on the relationships between odds of mortality and the individual predictors. This enabled us to evaluate the degree to which the intercept for mortality varied across PSUs and to determine what factors may have accounted for this variation.

To determine how to fit the shape of the baseline logit-hazard curve,[23] we examined the hazard for individual i in neighborhood k at age t on the basis of a set of dummy age variables over time. The observed logit-hazard curve indicated that the quadratic function estimated with continuous time variables fit the shape of the curve of the data. In models that included racial prejudice at the individual level, this variable was set to be orthogonal to its PSU mean value to minimize potential collinearity caused by variable aggregation. We used hierarchical linear modeling with maximum likelihood approximation in fitting models.[24] Because the amount of missing data for each variable was less than 10%, listwise deletion was used to address missing data[25] (no level 2 data were missing).

RESULTS

Table 1 lists the basic demographic characteristics of the participants from the analytic sample. Approximately 15% of the respondents

TABLE 1—Demographic Characteristics of Respondents in the 1993–2008 General Social Survey/National Death Index Data Set: United States

Characteristic	Sample (n = 10 950 individuals; n = 100 PSUs)
Level 1: individuals	
Mortality status, no. (%)	
Dead	1 651 (15.1)
Alive	9 299 (84.9)
Age, y, mean (SD)	45.2 (16.6)
Gender, no. (%)	
Male	4 912 (44.9)
Female	6 038 (55.1)
Race, no. (%)	
White	9 386 (85.7)
Black	1 564 (14.3)
Educational attainment, no. (%)	
< high school	1 818 (16.6)
High school	3 292 (30.1)
College	2 972 (27.1)
> college	2 868 (26.2)
Annual household income,[a] $, mean (SD)	46 711.2 (37 198.4)
Racial prejudice score, mean (SD)	0.25 (0.3)
Level 2: primary sampling units	
Prejudice score,[b] mean (SD)	0.30 (0.07)
No. of people in poverty,[b] mean (SD)	66 930.2 (119 349.3)
Median income, $ (SD)	34 907.03 (6 738.2)
Educational attainment, y, mean (SD)	13.2 (0.9)
% Black,[b] mean (SD)	11.9 (12.0)
Racial dissimilarity index score, mean (SD)	0.46 (0.1)
Political affiliation index score,[b] mean (SD)	2.85 (0.4)
PSUs in South, no. (%)	42 (42.0)
Social capital index score,[b] mean (SD)	0.01 (0.4)

Note. PSU = primary sampling unit.
[a]Presented in original units but was log-transformed for analyses.
[b]Presented in original units, but standardized values over time were used for analyses.

had died by 2008. The mean age of the cohort was 45 years (range = 18–89 years). Fifty-five percent of the participants were female, 85.7% were White, and 14.3% were Black.

Racial Prejudice and Mortality

Table 2 presents the odds ratio estimates from the multilevel survival models. Model 1 was designed to test the basic individual-level associations between sociodemographic characteristics, individual-level racial prejudice, and mortality risk. The results show that, in the GSS/NDI linked cohort, higher risk of mortality was associated with gender (male), older age at the time of the interview, race (Black), marital status (divorced or widowed), and lower SES. After control for other covariates, respondents reporting higher levels of anti-Black prejudice at baseline had a 1.11-fold higher mortality risk (OR = 1.11; 95% CI = 1.01, 1.22). Race and prejudice did not interact in predicting mortality (data not shown but available on request), indicating that individual-level prejudice is harmful for the health of both Blacks and Whites.

When community-level prejudice was added (model 2), the results indicated that living in a community with higher levels of anti-Black prejudice increased participants' odds of death by 31% (OR = 1.31; 95% CI = 1.16, 1.49).

The association between individual-level racial prejudice and mortality risk was marginally significant in this model. When community-level confounders were simultaneously controlled (model 3), community-level racial prejudice remained associated with significantly increased odds of mortality (OR = 1.24; 95% CI = 1.04, 1.49). In model 3, we also added an interaction term between race and community-level prejudice. The interaction between these variables was not statistically significant (data not shown but available on request), indicating that the relationship between community-level prejudice and mortality risk did not differ between Blacks and Whites.

Cross-Level Interactions Between Individual and Community Prejudice

In model 4, we examined cross-level interactions between community- and individual-level prejudice. The statistically significant interaction effect observed (OR = 0.74; 95% CI = 0.58, 0.95) indicates that individuals low in racial prejudice but living in higher-prejudice communities had the highest level of mortality risk. Conversely, living in higher-prejudice communities appeared to be less harmful for individuals reporting high levels of anti-Black prejudice (Figure 1).

To explore whether social capital might partially explain this finding, we examined mean reported levels of social capital (measured according to the amount of time individuals reported spending with neighbors) in 4 different groups: (1) individuals reporting low levels of racial prejudice and living in communities with low levels of racial prejudice (congruent), (2) individuals reporting high levels of racial prejudice and living in communities with high levels of racial prejudice (congruent), (3) individuals reporting low levels of racial prejudice but living in communities with high levels of racial prejudice (incongruent), and (4) individuals reporting high levels of racial prejudice but living in communities with low levels of racial prejudice (incongruent).

The results showed that social capital was lower in incongruent communities ($\chi^2 = 40.34$; $P < .01$). Specifically, social capital scores were lowest among individuals who reported low levels of racial prejudice but lived in communities with high levels of racial prejudice (mean = 3.36; SD = 1.99), and they were

TABLE 2—Relationships Between Individual- and Community-Level Racial Prejudice and Mortality: 1993–2008 General Social Survey/National Death Index Data Set, United States

Fixed Parameter	Model 1, OR (95% CI)	Model 2, OR (95% CI)	Model 3, OR (95% CI)	Model 4, OR (95% CI)	Model 5, OR (95% CI)
Constant	0.00 (0.00, 0.00)	0.03 (0.02, 0.05)	0.01 (0.01, 0.05)	0.01 (0.01, 0.05)	0.01 (0.01, 0.05)
Individual characteristics					
Gender					
Male (Ref)	1.00	1.00	1.00	1.00	1.00
Female	0.71 (0.67, 0.76)	0.71 (0.65, 0.77)	0.71 (0.67, 0.76)	0.71 (0.65, 0.78)	0.71 (0.67, 0.76)
Race					
White (Ref)	1.00	1.00	1.00	1.00	1.00
Black	1.39 (1.25, 1.55)	1.38 (1.24, 1.53)	1.43 (1.29, 1.59)	1.43 (1.29, 1.58)	1.43 (1.29, 1.58)
Marital status					
Married (Ref)	1.00	1.00	1.00	1.00	1.00
Formerly married	1.21 (1.13, 1.31)	1.21 (1.12, 1.30)	1.20 (1.12, 1.29)	1.20 (1.12, 1.29)	1.20 (1.12, 1.29)
Single	1.14 (1.03, 1.26)	1.11 (1.00, 1.22)	1.15 (1.04, 1.27)	1.15 (1.05, 1.27)	1.15 (1.05, 1.27)
Educational attainment					
< high school	1.14 (1.05, 1.23)	1.13 (1.05, 1.22)	1.13 (1.04, 1.22)	1.14 (1.01, 1.29)	1.13 (1.04, 1.22)
High school (Ref)	1.00	1.00	1.00	1.00	1.00
College	1.06 (0.97, 1.15)	1.05 (0.96, 1.14)	1.06 (0.98, 1.15)	1.07 (0.99, 1.15)	1.06 (0.98, 1.15)
> college	0.79 (0.70, 0.90)	0.79 (0.70, 0.90)	0.80 (0.71, 0.91)	0.82 (0.72, 0.91)	0.80 (0.71, 0.91)
Annual household income (logged)	0.90 (0.87, 0.93)	0.89 (0.86, 0.92)	0.89 (0.86, 0.92)	0.89 (0.86, 0.92)	0.89 (0.86, 0.92)
Prejudice					
Individual-level prejudice	1.11 (1.01, 1.22)	1.10 (1.00, 1.21)	1.10 (1.00, 1.21)	1.12 (1.03, 1.22)	1.10 (1.01, 1.21)
PSU-level prejudice		1.31 (1.16, 1.49)	1.24 (1.04, 1.49)	1.27 (1.07, 1.51)	1.17 (0.97, 1.41)
PSU-level characteristics					
Average no. of people in poverty			1.01 (1.00, 1.02)	1.01 (1.00, 1.02)	1.00 (0.99, 1.01)
Median income			1.05 (1.00, 1.12)	1.05 (1.00, 1.11)	1.06 (1.00, 1.12)
% Black			0.97 (0.92, 1.03)	0.97 (0.92, 1.03)	0.96 (0.91, 1.02)
Racial segregation index			0.77 (0.59, 1.01)	0.78 (0.60, 1.01)	0.81 (0.62, 1.04)
Political affiliation			0.92 (0.81, 1.05)	0.92 (0.82, 1.05)	0.93 (0.82, 1.05)
PSUs in South			1.12 (1.02, 1.24)	1.12 (1.02, 1.24)	1.06 (0.96, 1.17)
Average years of educational attainment			0.51 (0.30, 0.88)	0.51 (0.31, 0.86)	0.52 (0.31, 0.88)
Social capital index					0.83 (0.74, 0.93)
PSU prejudice by individual prejudice cross-level interaction				0.74 (0.58, 0.95)	

Note. CI = confidence interval; OR = odds ratio; PSU = primary sampling unit. Each model includes age and age-squared.

highest among individuals who reported low levels of racial prejudice and lived in communities with low levels of racial prejudice (mean = 3.44; SD = 1.98).

Social Capital as a Mediator

In model 5, the social capital index was added to model 3 to assess whether social capital mediated the relationship between community-level prejudice and mortality. Social capital was inversely related to community-level prejudice ($r = -0.41$; $P < .01$), indicating that communities with higher levels of prejudice had lower levels of social capital. Furthermore, in a model adjusted for all covariates other than PSU-level racial prejudice, higher levels of social capital were associated with a decreased risk of mortality (OR = 0.83; 95% CI = 0.74, 0.99; data not shown). Finally, when social capital was controlled in the fully adjusted model, PSU-level racial prejudice was no longer significantly associated with mortality (Table 2, model 5).

DISCUSSION

This study extends previous work on racism and health[5] by assessing the effects of racial prejudice at both the individual and community levels on mortality rates among Blacks and Whites. Community-level racial prejudice independently increased one's risk of all-cause mortality beyond individual sociodemographic characteristics and one's individually held racist beliefs. Strikingly, community-level racial prejudice was a stronger predictor of mortality than several established risk factors at the community level, including SES and racial residential segregation, suggesting that community-level prejudice is a robust determinant of population health that warrants greater attention.

Furthermore, living in a highly prejudiced community was harmful for both Blacks and
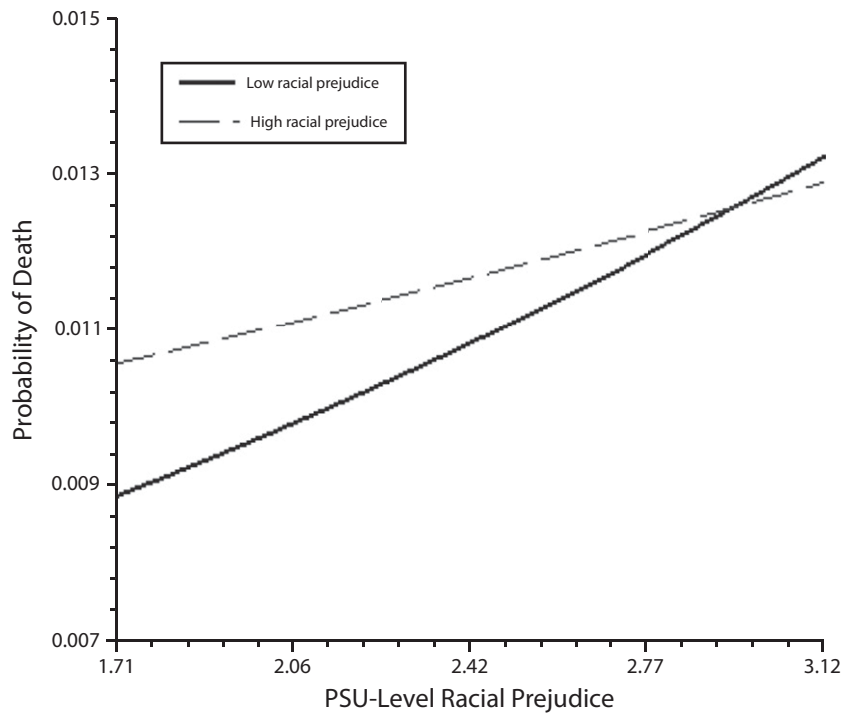
Note. PSU = primary sampling unit. Each line represents the individual-level probability of death as a function of community-level racial prejudice (individual n = 10 950; PSU n = 100). Results are shown for individuals high (upper quartile of racial prejudice index) and low (lowest quartile of racial prejudice index) in racial prejudice. PSU-level prejudice was standardized.

FIGURE 1—Interactions between individual- and community-level prejudice in predicting mortality: 1993–2002 General Social Survey/National Death Index data set, United States.

Whites. This finding is consistent with the results of several recent studies documenting that subordination of low-status groups harms not only minority, but also majority, group members.[26,27] Our results therefore highlight the potentially far-reaching consequences for population health of community-level racial prejudice.

There was a convergence of mortality risk as community-level prejudice increased (Figure 1). That is, individual-level prejudice predicts mortality in low-prejudice communities but not in high-prejudice communities. One explanation may be that bridging social capital (relationships between different groups) matters in a community where levels of prejudice are low. In the GSS, levels of racial homogeneity in low-prejudice communities were similar to those in high-prejudice communities. Thus, individuals living in communities with low levels of racial prejudice may have a reasonably high likelihood of fostering social networks

across different racial groups. Moreover, the salutary effect of low-prejudice communities is more pronounced among those with less racial prejudice.

Conversely, when there are high levels of racial prejudice within a community, bonding social capital (relationships among members of a similar group) may matter, given that racial prejudice may contribute to increasing internal solidarity within a group, which could explain why living in higher-prejudice communities appeared to be relatively less harmful for individuals reporting high (versus low) levels of anti-Black prejudice. However, both lines trend upward toward higher mortality, indicating that racial prejudice at the community level harms survival irrespective of individual-level prejudice.

Finally, community racial prejudice disrupted social capital, which mediated the relationship between community-level racial prejudice and mortality among both Whites and Blacks.

Communities with less racial prejudice may promote egalitarian political support, resulting in implementation of policies enhancing the welfare of all community members. Future studies should identify additional pathways through which community racial prejudice influences health outcomes and determine whether these pathways differ according to majority or minority group status. One possibility is that racial prejudice exaggerates intergroup tension, resulting in violence and thereby harming health at the community level. Studies with larger data sets should further explore causes of death, which can provide additional information on potential mechanisms linking racial prejudice to health.

Limitations and Strengths

Several cautions are warranted in interpreting our findings. The reliability of the prejudice scale among Black respondents was low, perhaps owing to the higher dimensionality of the scale (i.e., heterogeneity of the racial prejudice items) among Black relative to White respondents. Furthermore, it is difficult to measure racial attitudes because of social desirability bias. To the extent that social desirability is more pronounced among more educated individuals (among whom mortality risks are also lower), this measurement bias may have led to an exaggeration of the association between racial prejudice and mortality.

In addition, the prejudice scale may not have captured all of the relevant dimensions of racial prejudice. Although we controlled for numerous risk factors at both the individual and community levels, the relationship between racial prejudice and mortality could have been confounded by unmeasured covariates that were not available in the GSS data set, including diet, tobacco use, and heavy alcohol use. However, intergroup interactions create stress for highly prejudiced individuals,[4] and this stress is associated with health risk behaviors.[28] As such, these health behaviors are likely mechanisms linking racial prejudice to mortality, and it would be inappropriate to control for them. Finally, because this was not a longitudinal panel study, we were unable to examine whether reductions in racial prejudice at the community level improve health.

Despite these limitations, our study involved several methodological strengths, including

the use of multilevel survival models that estimated the independent and joint effects of individual- and community-level racial prejudice on mortality risk over time simultaneously.

Conclusions

This study is the first, to our knowledge, to document that community-level prejudice increases mortality risk among Blacks and Whites net of individual-level prejudice and that this relationship is explained, in part, by disruptions in community social capital. As such, our study significantly contributes to an emerging body of literature documenting the negative health consequences of prejudice for both minority and majority group members and extends this work by identifying particular mechanisms linking community racial prejudice to mortality. ∎

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Contributors

Y. Lee initiated the study and conducted the data analysis. P. Muennig created the General Social Survey/ National Death Index data set. I. Kawachi was involved in the initial conceptualization of the study. M. L. Hatzenbuehler led the writing and supervised the data analysis. All of the authors contributed original ideas and edited drafts of the article.

Human Participant Protection

No protocol approval was needed for this study because no human participants were involved.

References

1. Williams DR, Mohammed SA. Discrimination and racial disparities in health: evidence and needed research. *J Behav Med.* 2009;32(1):20–47.

2. Blascovich J, Mendes WB, Hunter SB, Lickel B, Kowai-Bell N. Perceiver threat in social interactions with stigmatized others. *J Pers Soc Psychol.* 2001;80(2):253–267.

3. Mendes WB, Gray HM, Mendoza-Denton R, Major B, Epel ES. Why egalitarianism might be good for your health: physiological thriving during stressful intergroup encounters. *Psychol Sci.* 2007;18(11):991–998.

4. Page-Gould E, Mendoza-Denton R, Tropp LR. With a little help from my cross-group friend: reducing anxiety in intergroup contexts through cross-group friendship. *J Pers Soc Psychol.* 2008;95(5):1080–1094.

5. Kennedy BP, Kawachi I, Lochner K, Jones C, Prothrow-Stith D. (Dis)respect and black mortality. *Ethn Dis.* 1997;7(3):207–214.

6. Putnam RD. *Bowling Alone: The Collapse and Revival of American Community.* New York, NY: Simon & Schuster; 2001.

7. Schmid K, Al Ramiah A, Hewstone M. Neighborhood ethnic diversity and trust: the role of intergroup contact and perceived threat. *Psychol Sci.* 2014; 25(3):665–674.

8. Muennig P, Cohen AK, Palmer A, Zhu W. The relationship between five different measures of structural social capital, medical examination outcomes, and mortality. *Soc Sci Med.* 2013;85:18–26.

9. Muennig P, Johnson G, Kim J, Smith TW, Rosen Z. The General Social Survey-National Death Index: an innovative new dataset for the social sciences. *BMC Res Notes.* 2011;4(1):385–391.

10. Gibson JL. The political freedom of African-Americans: a contextual analysis of racial attitudes, political tolerance, and individual liberty. *Polit Geogr.* 1995;14(6):571–599.

11. Hatzenbuehler ML, Bellatorre A, Muennig P. Anti-gay prejudice and all-cause mortality among heterosexuals in the United States. *Am J Public Health.* 2014; 104(2):332–337.

12. Hutchings VL. Change or more of the same? Evaluating racial attitudes in the Obama era. *Public Opin Q.* 2009;73(5):917–942.

13. Davis JA, Smith TW. *General Social Surveys (GSS), 1972–2002.* Storrs, CT: The Roper Center for Public Opinion Research; 2004.

14. Baumer EP, Messner SF, Rosenfeld R. Explaining spatial variation in support for capital punishment: a multilevel analysis. *Am J Sociol.* 2003;108(4):844–875.

15. Sampson RJ, Raudenbush SW, Earls F. Neighborhoods and violent crime: a multilevel study of collective efficacy. *Science.* 1997;277(5328):918–924.

16. Kawachi I, Subramanian S. Measuring and modeling the social and geographic context of trauma: a multilevel modeling approach. *J Trauma Stress.* 2006;19(2):195–203.

17. Lee C-J, Kim D. A comparative analysis of the validity of US state- and county-level social capital measures and their associations with population health. *Soc Indic Res.* 2013;111(1):307–326.

18. Rupasingha A, Goetz SJ, Freshwater D. The production of social capital in US counties. *J Socio-Economics.* 2006;35(1):83–101.

19. Hout M. Getting the most out of the GSS income measures. Available at: http://publicdata.norc.org: 41000/gss/documents/reports/methodological_reports/ MR101.pdf. Accessed May 25, 2015.

20. Iceland J, Sharp G. White residential segregation in US metropolitan areas: conceptual issues, patterns, and trends from the US census, 1980 to 2010. *Popul Res Policy Rev.* 2013;32(5):663–686.

21. Allison PD. *Event History Analysis: Regression for Longitudinal Event Data.* Newbury Park, CA: Sage Publications; 1984.

22. Singer JD, Willett JB. *Applied Longitudinal Data Analysis: Modeling Change and Event Occurrence.* Oxford, England: Oxford University Press; 2003.

23. Reardon SF, Brennan RT, Buka SL. Estimating multi-level discrete-time hazard models using cross-sectional data: neighborhood effects on the onset of adolescent cigarette use. *Multivar Behav Res.* 2002; 37(3):297–330.

24. Guo S. Analyzing grouped data with hierarchical linear modeling. *Child Youth Serv Rev.* 2005;27(6): 637–652.

25. Allison PD. *Missing Data.* CA: Thousand Oaks, CA: Sage Publications; 2000.

26. Stanistreet D, Bambra C, Scott-Samuel A. Is patriarchy the source of men's higher mortality? *J Epidemiol Community Health.* 2005;59(10):873–876.

27. Hatzenbuehler ML, Bellatorre A, Lee Y, Finch BK, Muennig P, Fiscella K. Structural stigma and all-cause mortality in sexual minority populations. *Soc Sci Med.* 2014;103:33–41.

28. Keyes KM, Hatzenbuehler ML, Hasin DS. Stressful life experiences, alcohol consumption, and alcohol use disorders: the epidemiologic evidence for four main types of stressors. *Psychopharmacology (Berl).* 2011;218(1): 1–17.