Social Science & Medicine xxx (2016) 1–8

Contents lists available at ScienceDirect

Social Science & Medicine

journal homepage: www.elsevier.com/locate/socscimed

Racial bias is associated with ingroup death rate for Blacks and Whites: Insights from Project Implicit

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ARTICLE INFO

Article history:
Received 29 March 2016
Received in revised form
3 October 2016
Accepted 7 October 2016
Available online xxx

Keywords:
Prejudice
Racism
Implicit bias
Explicit bias
Minority health

ABSTRACT

Rationale: Research suggests that, among Whites, racial bias predicts negative ingroup health outcomes. However, little is known about whether racial bias predicts ingroup health outcomes among minority populations.
Objective: The aim of the current research was to understand whether racial bias predicts negative ingroup health outcomes for Blacks.
Method: We compiled racial bias responses from 250,665 Blacks and 1,391,632 Whites to generate county-level estimates of Blacks' and Whites' implicit and explicit biases towards each other. We then examined the degree to which these biases predicted ingroup death rate from circulatory-related diseases.
Results: In counties where Blacks harbored more implicit bias towards Whites, Blacks died at a higher rate. Additionally, consistent with previous research, in counties where Whites harbored more explicit bias towards Blacks, Whites died at a higher rate. These links between racial bias and ingroup death rate were independent of county-level socio-demographic characteristics, and racial biases from the outgroup in the same county.
Conclusion: Findings indicate that racial bias is related to negative ingroup health outcomes for both Blacks and Whites, though this relationship is driven by implicit bias for Blacks, and explicit bias for Whites.

1. Racial bias is associated with ingroup death rate for Blacks and Whites: insights from Project Implicit

An emerging body of work suggests that, among Whites, greater racial bias towards an outgroup predicts negative ingroup health outcomes. For instance, research at the individual-level has found that Whites who harbor negative attitudes towards Blacks demonstrate greater physiological stress reactivity during interracial interactions (Mendes et al., 2007), and are more likely to die over a 6–15 year period (Lee et al., 2015). Furthermore, community-level research suggests that Whites show higher death rates in communities where Whites report more negative attitudes towards Blacks (Kennedy et al., 1997; Lee et al., 2015; Leitner et al., 2016). Thus, evidence suggests that it is a health risk for Whites to live to in a community where members of their ingroup harbor racial biases towards Blacks.

1.1. The link between bias and ingroup health for blacks

While previous research has established a negative association between racial bias and ingroup health among Whites, surprisingly little is known about whether such a relationship exists among minority populations. A deeper understanding of whether the magnitude of the relationship between racial bias and ingroup health differs for Whites and racial minorities would be important, as it would elucidate whether this relationship reflects a general phenomenon that is not only limited to the majority group.

On the one hand, some research suggests that links between racial bias and negative ingroup health might be absent or reversed among racial minorities. Specifically, psychological phenomena frequently differ across majority-minority group boundaries (e.g., Hehman et al., 2012), and for racial minorities, negative perceptions of the outgroup (e.g., perceived discrimination by the outgroup)

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http://dx.doi.org/10.1016/j.socscimed.2016.10.007
0277-9536/

have been shown to buffer against race-based stress (Crocker and Major, 1989; Sellers and Shelton, 2003). On the other hand, research has shown that Blacks who harbor negative attitudes towards Whites are more likely to appraise ambiguous events as discriminatory (Johnson and Lecci, 2003), and perceptions of discrimination are related to heightened anger (Meyer and Baker, 2010) – a strong risk factor for circulatory-related diseases (for a meta-analysis, see Chida and Steptoe, 2009). Moreover, discrimination from the outgroup has been linked to anxiety, cardiovascular threat response, hypertension, and mortality among minorities (Barnes et al., 2008; Mendoza-Denton et al., 2002; Pascoe and Richman, 2009; Sawyer et al., 2012; Smart Richman et al, 2010; Williams and Mohammed, 2009). Thus, previous research opens multiple possibilities regarding the relationship between racial bias and ingroup health among racial minorities. Though the weight of evidence may point to greater bias as a predictor of negative ingroup health outcomes for Whites and racial minorities alike, it is an open and important question to examine.

One way to gain insight into this issue is to test whether Blacks show poorer health in communities where they harbor more racial bias towards Whites. Racial bias can be measured directly through *explicit* measures (e.g., asking participants "How warmly or coldly do you feel towards White people?") or indirectly through so-called *implicit* measures, which infer bias from the speed with which a response is made (Fazio et al., 1995; Greenwald et al., 1998). While explicit biases are thought to reflect relatively deliberate and conscious mental processes, implicit biases are thought to reflect more automatic processes that operate outside of conscious awareness (Dovidio et al., 2002; Gawronski et al., 2008). As implicit and explicit biases are independent constructs among Blacks (Livingston, 2002), they may each contribute to pathways (e.g., perceived discrimination and anger) that have negative health consequences. However, no research, to our knowledge, has examined the relative contribution of Blacks' implicit and explicit biases in predicting ingroup health outcomes at a community level.

1.2. Current research

The aim of the current research was to determine whether the relationship between racial bias and negative ingroup health (previously observed among Whites) extends to Blacks. Accordingly, we compiled racial bias responses from 250,665 Blacks and 1,391,632 Whites to generate county-level estimates of Blacks' and Whites' implicit and explicit biases towards each other, and examined the degree to which these biases predicted ingroup death rate from circulatory-related diseases. We focused on circulatory-related death rate since it is the leading category of death in the U.S., and has shown Black-White disparities over time (National Center for Health Statistics, 2014). Additionally, racial bias towards an outgroup might contribute to increased stress during interracial interactions, and research shows that chronic stress degrades circulatory health (e.g., Black and Garbutt, 2002).

We adopted an analytic approach that could test whether Blacks' bias remained a predictor of Blacks' death rate when we controlled for a large set of socio-demographic characteristics and Whites' biases in the same county. Furthermore, we examined whether the magnitude of the relationship between bias and ingroup death rate differed for Blacks and Whites.

2. Method

2.1. Data sources

2.1.1. Circulatory death rate

County-level death rates for circulatory-related causes (e.g., heart disease; Internal Statistical Classification of Diseases and Related Health Problems codes I00-I99) for Blacks and Whites were obtained from the Centers for Disease Control and Prevention (CDC; http://wonder.cdc.gov/ucd-icd10.html). We compiled death rates from 2003 to 2013 to match racial bias data from this time period (see below). To account for potential age differences between counties and racial groups, we used age-adjusted death rates, as in previous work (Eichstaedt et al., 2015). Age-adjusted rates were calculated using the 2000 U.S. standard population, which is the default population provided by the National Center for Health Statistics. We compiled death rate data for Blacks from 1490 counties (death rate per 100,000: $M = 352.595$, $SD = 84.806$), and for Whites from 3110 counties (death rate per 100,000: $M = 270.477$, $SD = 54.204$). We obtained data that were aggregated across male and female deaths since gender-aggregated, as compared to gender-disaggregated, data were less likely to be suppressed by the CDC.

2.1.2. Racial bias

Blacks' county-level racial bias was assessed by compiling responses from Project Implicit (Xu et al., 2014), a research project that has collected measures of racial bias over the Internet. Within the Project Implicit dataset, we searched for Black respondents for whom county-level geographical information was available. This search yielded 250,665 Black responses from 1589 counties (# of responses per county: $M = 157.750$, $SD = 493.109$). We included data from 2003 to 2013. A map of the counties for which we obtained racial bias data for Blacks is shown in Fig. 1 (visit http://www.jordanbleitner.com/maps for an interactive version of this figure).

To determine whether Blacks' biases predicted Black death rate when controlling for Whites' biases in the same community, we incorporated data from White respondents in this dataset (1,391,632 White respondents from 1836 counties; # of responses per county: $M = 757.969$, $SD = 1766.098$). The relationships between White respondents' racial biases and death rate for Blacks and Whites are reported elsewhere (Leitner et al., 2016), though this previous study did not include data on bias from Black respondents.

Implicit bias

To measure implicit bias, respondents completed the Implicit Association Test (IAT; Greenwald et al., 1998), a speeded dual-categorization task in which respondents simultaneously categorized faces as "African American" or "European American," and words (e.g., "agony") as "Bad" or "Good" by timed computer-key press. Faster responses when Black and Bad (and White and Good) required the same key press, as compared to the reverse, reflect more anti-Black (or pro-White) implicit attitudes (Greenwald et al., 2009). Implicit bias was computed according to the *D* measure (Greenwald et al., 2003). For Black participants, implicit bias was operationalized by multiplying the *D* value by −1. For White participants, implicit bias was operationalized as the standard *D* measure. Thus, for all participants, greater implicit bias scores represented more negative associations with the outgroup (and positive associations with the ingroup), as compared to the reverse.

Explicit bias

To measure explicit bias, respondents rated how warm they felt towards European Americans and African Americans on separate 0 (*coldest feelings*) to 10 (*warmest feelings*) scales. Consistent with previous work (Karpinski and Hilton, 2001; Wittenbrink et al., 2001), we operationalized explicit bias as the difference between these responses. For all participants, greater explicit bias values represented greater warmth towards the ingroup vs. the outgroup.

Please cite this article in press as: Leitner, J.B., et al., Racial bias is associated with ingroup death rate for Blacks and Whites: Insights from Project Implicit, Social Science & Medicine (2016), http://dx.doi.org/10.1016/j.socscimed.2016.10.007

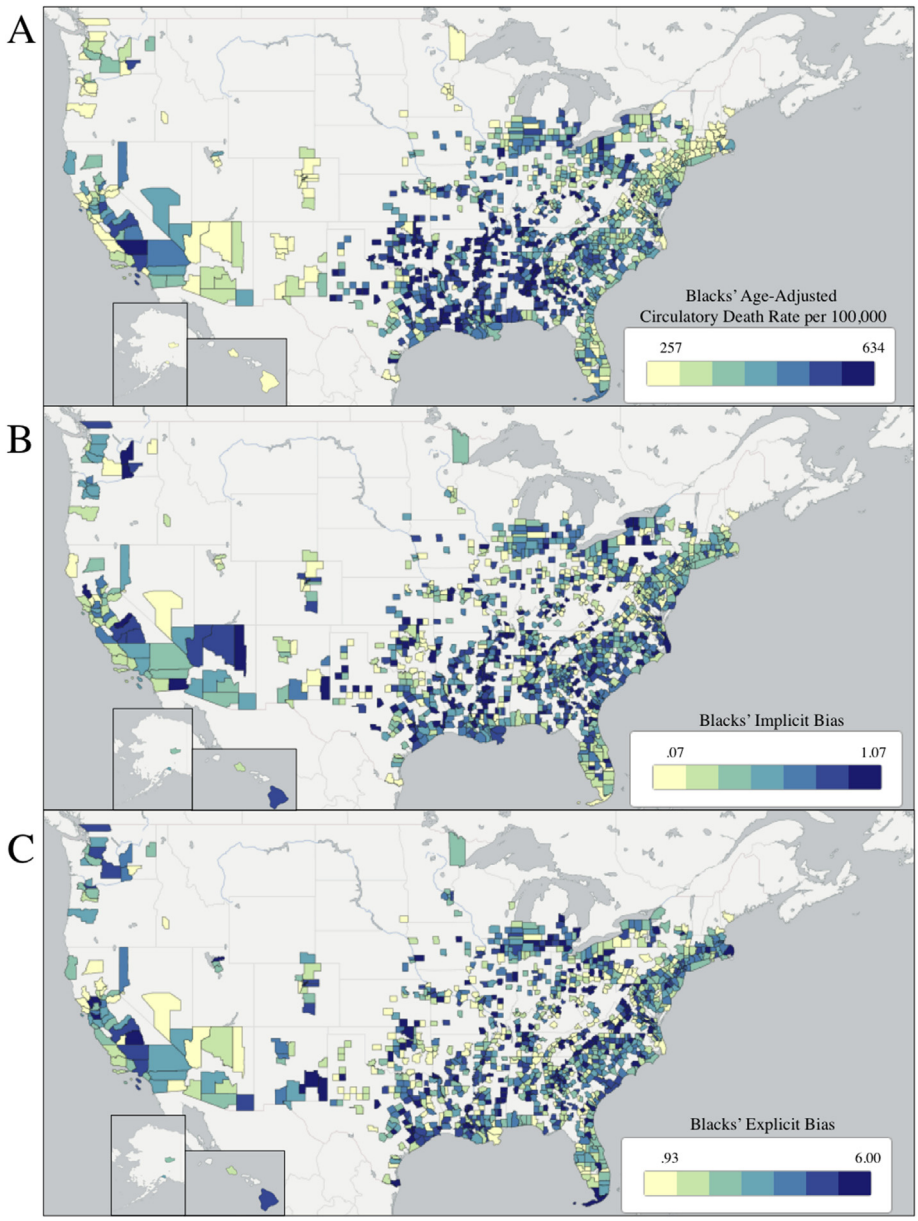

Fig. 1. Maps showing counties where we obtained both death rate and racial bias data. Color gradients show level of Blacks' circulatory death rate (A), Blacks' implicit bias (B), and Blacks' explicit bias (C). Lighter yellow colors indicate lower levels, and darker blue colors indicate higher levels of measured variable. Visit http://www.jordanbleitner.com/maps for an interactive version of this figure. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Post-stratification

While the Project Implicit dataset reflects a large number of U.S. counties, a limitation is that it may not reflect the racial bias of all individuals in a given county. One way to circumvent this limitation is to assign post-stratification weights, which account for non-response by assigning greater weight to responses that are likely to represent the community population on important dimensions (e.g., age; Lohr, 2009). Age was selected as the weighting dimension, since Project Implicit respondents might not represent the racial bias of older individuals (i.e., the median age for all Project Implicit respondents was 23, whereas the national median age was 37; factfinder.gov). We employed the following post-stratification weighting scheme. First, separately for Blacks and Whites, we computed implicit and explicit bias averages across 5 age groups in each county: 15–24, 25–34, 35–54, 55–75, and 75+. Second, we compiled data regarding the population counts of Blacks and Whites in each of these age groups in each county (2005–2009 and 2009–2013 ACS; factfinder.gov). Third, we computed county-level estimates for Blacks' implicit bias, Blacks' explicit bias, Whites' implicit bias, and Whites' explicit bias that were weighted by the population count in each age group in each county. As such, respondents were assigned a greater weight when they belonged to an age group that had a higher population count in their county. In other words, respondents who were most representative of their county on the age dimension influenced the county-level averages to a greater degree. We report findings that employ this weighting scheme, but conclusions are identical when we use unweighted county averages (see Supplementary Materials).

2.1.3. Population

Population counts for Blacks and Whites in each county were derived from the U.S. Census Bureau's modified race 2010 Census

counts (factfinder.gov). We computed "total population" (the sum of Black and White population), and "Black population" (the Black-to-White ratio of the population) for each county. Total population estimates (but not Black-to-White ratio) were log transformed to yield unstandardized regression coefficients that were large enough to interpret (i.e., untransformed population counts yielded unstandardized coefficients < 0.001).

2.1.4. Education

County-level education was assessed by compiling Black and White high school graduation rates from the American Community Survey (ACS) 2013 5-year report (U.S. Census Bureau; factfinder.gov).

2.1.5. Income

County-level income was assessed by compiling median household income for Whites and Blacks from the 2009 and 2013 ACS 5-year reports. To yield interpretable unstandardized coefficients, income values were divided by 10,000.

2.1.6. Income inequality

Income inequality for each county was assessed with the Gini index from the 2013 ACS 5-year report. Larger values on this index reflect greater income inequality. We accounted for income inequality since it has been causally linked to health problems (Pickett and Wilkinson, 2015).

2.1.7. Unemployment

County-level unemployment rate was assessed by compiling unemployment rates for Blacks and Whites across the 2009 and 2013 ACS 5-year reports.

2.1.8. Poverty

County-level poverty rate was assessed by compiling poverty rates for Blacks and Whites across the 2009 and 2013 ACS 5-year reports.

2.1.9. Segregation

County-level racial segregation was indexed via dissimilarity, a measure of the proportion of non-Hispanic Whites who would have to move in order to achieve racial integration with non-Hispanic Blacks (Frey and Myers, 2005). Dissimilarity indices at the county level were based on 2000 and 2010 US census data, and were provided by J. Dewitt (personal communication, December 15, 2015). We averaged dissimilarities from 2000 to 2010, so that each county had one value of dissimilarity.

2.1.10. Geographic mobility

Importantly, a relationship between Blacks' racial bias and ingroup health could be driven by social selection forces. Specifically, rather than Blacks' racial bias affecting ingroup health, it is possible that healthier people are able to move out of high-bias communities. To account for this possibility, we compiled data from 5-year ACS reports, and summed the percentage of the Black population that moved from another county, state, or abroad (heretofore referred to as "geographic mobility"). We averaged the 2005–2009 and 2009–2013 geographic mobility estimates to yield a single geographic mobility index for each county.

2.1.11. Housing density

Housing density, the number of housing units per square mile, was assessed in order to capture the rural/urban characteristics of each county. Housing density values were averaged across the 2000 and 2010 *Population, Housing Units, Area, and Density* reports (factfinder.gov).

2.1.12. Male-to-female ratio

Previous research has suggested that males are the primary targets of negativity in intergroup contexts (Navarrete et al., 2010), and Black males who are exposed to discrimination experience a threat to masculinity (Goff et al., 2012). As such, we accounted for the male-to-female ratio of Blacks and Whites in each county in our models. These ratios were computed by averaging the male-to-female ratios from the 2009 and 2013 ACS 5-year reports. We computed separate male-to-female ratios for Blacks and Whites.

2.2. Analytic approach

Data for Blacks' and Whites' racial bias, circulatory death rate, and all covariates were available for 1130 counties. For each analysis, we applied listwise deletion (i.e., only counties with non-missing data for all modeled variables were included in analysis). All predictors and covariates were mean-centered, except for race (Black = −1, White = 1). To account for the possibility that county-level racial bias estimates were more accurate in counties with more respondents, we employed a weighted least squares approach to all analyses. Specifically, each county was weighted proportionally to the number of respondents in that county. This same weighting strategy has been used in previous research (Leitner et al., 2016).

We did not impute missing values since multiple imputation would be incongruent with our weighted least squares approach. Specifically, since analyses were weighted by the number of respondents in a county, counties with imputed data would have received a weight of zero. However, this analytic decision does not influence conclusions: In supplementary analyses, we imputed missing data, and assigned a weight of one if the county had had zero racial bias respondents. The imputed and non-imputed datasets yielded a similar pattern of results (see Supplementary Materials).

2.3. Results

To examine whether Blacks died at a higher rate in counties where Blacks harbored more bias towards Whites, we regressed county-level estimates of Blacks' circulatory death rate on county-level estimates of Blacks' implicit and explicit racial biases. Results revealed that Blacks died at a higher rate in counties where Blacks harbored more implicit bias towards Whites, $b = 395.508$, $SE = 35.223$, $\beta = 0.325$, $p < 0.0001$ (Fig. 2A). Additionally, Blacks died at a higher rate in counties where Blacks harbored more explicit bias towards Whites, $b = 14.084$, $SE = 6.018$, $\beta = 0.068$, $p = 0.0195$ (Fig. 2B). A correlation comparison test (Lee and Preacher, 2013) indicated that Blacks' death rate was more strongly related to their implicit, as compared to explicit, bias, $z = 5.479$, $p < 0.0001$. Thus, these findings indicate that, in communities where Blacks were more biased towards Whites, Blacks died at a higher rate.

2.4. Was the relationship between blacks' racial bias and ingroup death rate independent of county-level factors and whites' racial bias?

Next, we examined whether Blacks' racial bias towards Whites remained a significant predictor of Blacks' death rate when we accounted for socio-demographic factors and Whites' racial bias towards Blacks in the same county. Accordingly, we added the following mean-centered county-level covariates to the regression model described above: total population, Black population, Black income, White income, Black education rate, White education rate, Black poverty rate, White poverty rate, Black unemployment rate, White unemployment rate, segregation, housing density, geographic mobility, inequality, male-to-female ratio for Blacks,

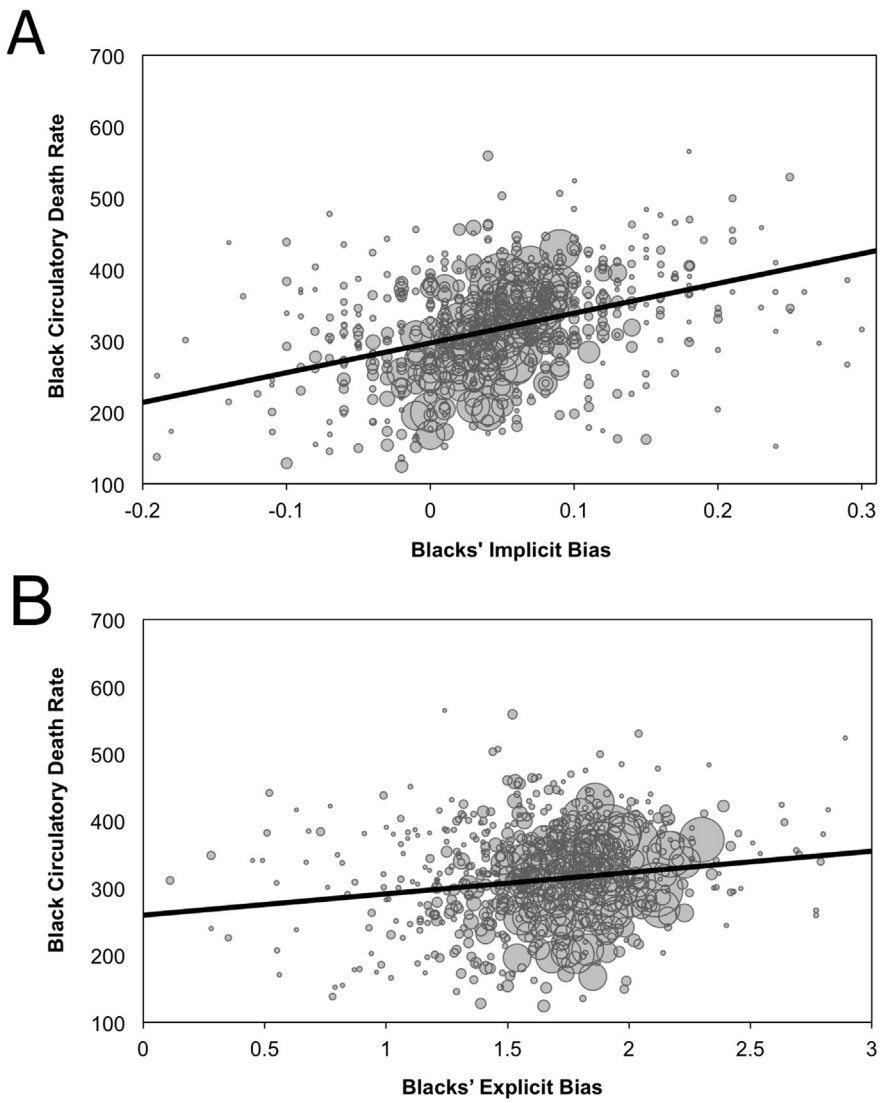

Fig. 2. Scatterplots showing relationships between (A) Blacks' implicit bias and death rate for Blacks, and (B) Blacks' explicit bias and death rate for Blacks. Each circle represents a county-level estimate. Death rate = deaths per 100,000. Size of circle is proportionate to the number of respondents in each county, and was the weighting variable in analyses. For visualization purposes only, counties with fewer than 25 responses on the racial bias measure are not shown (bubbles become too small to visualize), and values that are more than 2.5 *SD* from the mean are not shown (but see Supplementary Materials for plots that show these data).

male-to-female ratio for Whites, Whites' explicit bias, and Whites' implicit bias. In this model, the relationship between Blacks' explicit bias towards Whites and Black death rate was nonsignificant, $b = -3.142$, $SE = 5.262$, $\beta = -0.015$, $p = .5506$. However, above and beyond these covariates, Blacks' implicit bias towards Whites remained a significant predictor of Black death rate, $b = 132.932$, $SE = 29.158$, $\beta = 0.109$, $p < 0.0001$, indicating that Blacks died at a higher rate in counties where Blacks harbored more implicit racial bias towards Whites.

Based on this model, we estimated the number of Blacks who died annually in counties where Blacks were high (+1 *SD*) vs. low (−1 *SD*) in implicit bias, and had an average Black population count (Black population average = 28,598; computed from counties for which we obtained Black death rate data). This analysis indicated that, each year, 12 more Blacks per county were predicted to die where Blacks harbored high implicit bias (100 deaths) vs. low implicit bias (88 deaths) towards Whites.

2.5. Was the relationship between racial bias and ingroup death rate different for Blacks and Whites?

The aforementioned analyses indicated that Blacks' racial bias towards Whites was related to Blacks' death rate, and previous research has reported that Whites' racial bias towards Blacks is related to Whites' death rate (Leitner et al., 2016). However, it remained an open question as to whether the magnitude of the relationship between racial bias and ingroup death rate was different for Blacks and Whites. Accordingly, we examined whether the strength of the relationship between Blacks' racial biases and Blacks' death rate was different from the relationship between Whites' racial biases and Whites' death rate. To account for the nested structure of this analysis (race nested within county), we employed generalized estimating equations (GEE), a multi-level modeling approach that makes minimal distributional assumptions, and is robust to misspecification in large samples (Ghisletta

and Spini, 2004; Hubbard et al., 2010).

We regressed circulatory death rate on: race (varying within-county), explicit bias towards the outgroup (varying within-county for Blacks and Whites), implicit bias towards the outgroup (varying within-county for Blacks and Whites), the race × explicit bias towards outgroup interaction, and the race × implicit bias towards outgroup interaction. In the context of this model, these interaction terms estimated the degree to which relationships between bias towards the outgroup and ingroup death rate differed for Blacks and Whites. To isolate the effects of bias towards outgroup, we additionally included explicit bias from the outgroup (varying within-county for Blacks and Whites) and implicit bias from the outgroup (varying within-county for Blacks and Whites). For Blacks, explicit bias from the outgroup referred to Whites' bias. For Whites, explicit bias from the outgroup referred Blacks' bias. Additionally, to model the degree to which bias from the outgroup predicted death rate to a different degree for Blacks and Whites, we included the explicit bias from outgroup × race interaction, and the implicit bias from outgroup × race interaction. Finally, we included all covariates, and covariate interactions with race (Table 1). This model explained approximately 57% of the variance in circulatory death rate.

Results revealed a significant main effect of implicit bias towards outgroup, which was qualified by the race × implicit bias towards outgroup interaction. Simple slope analyses indicated that Blacks' implicit bias towards Whites was positively related Blacks' death rate, $b = 157.239$, $SE = 34.037$, $\beta = 0.492$, $p < 0.0001$. In contrast, Whites' implicit bias towards Blacks was unrelated to Whites' death rate, $b = 23.811$, $SE = 28.102$, $\beta = 0.074$, $p = 0.3968$ (Fig. 3A). Thus, the relationship between implicit bias towards the outgroup and ingroup death rate was significantly stronger for Blacks than Whites.

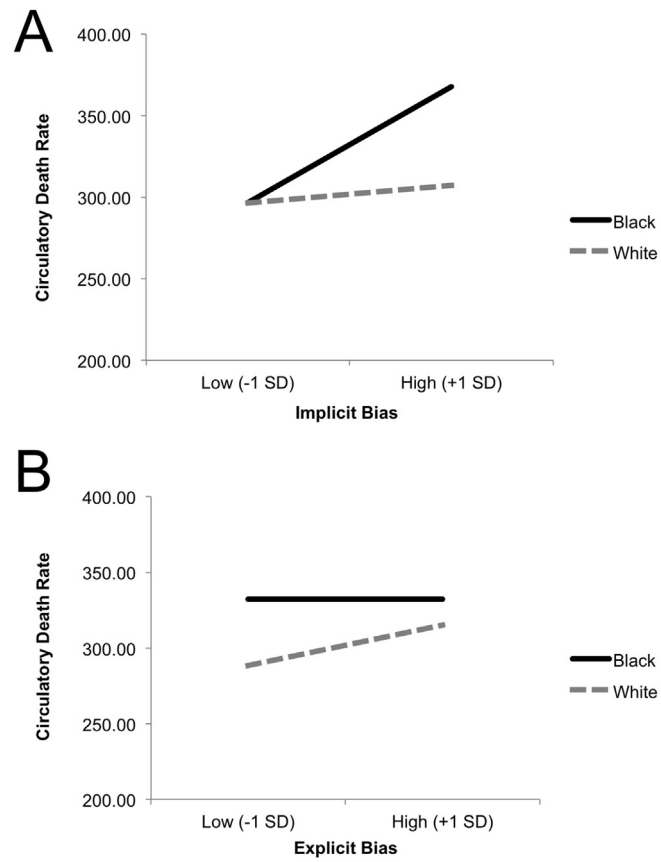

Fig. 3. Effects of implicit (A) and explicit (B) bias on ingroup circulatory death rate (deaths per 100,000) adjusting for all covariates. Black solid lines indicate relationships between Blacks' bias and Blacks' circulatory death rate. Gray dotted lines indicate relationships between Whites' bias and Whites' circulatory death rate.

Table 1
Model effects related to circulatory death rate (deaths per 100,000).

Effects	*b*	*SE*	Beta	*p*
Intercept	317.095	8.377	0.175	<0.0001
Race (Black = −1; White = 1)	−15.209	6.516	−0.210	0.0196
Explicit bias towards outgroup	9.524	4.101	0.093	0.0202
Implicit bias towards outgroup	90.525	21.854	0.283	0.0000
Race x Explicit bias towards outgroup	9.519	3.846	0.093	0.0133
Race x Implicit bias towards outgroup	−66.714	22.283	−0.209	0.0028
Explicit bias from outgroup	14.794	5.077	0.144	0.0036
Implicit bias from outgroup	24.171	25.107	0.076	0.3357
Total population	−2.787	2.602	−0.046	0.2842
Black population	22.109	4.339	0.125	<0.0001
Median household income	−7.639	2.547	−0.173	0.0027
High school completion rate	−92.576	35.573	−0.098	0.0093
Poverty rate	1.080	0.499	0.170	0.0306
Unemployment rate	2.676	0.682	0.198	0.0001
Segregation	17.517	8.070	0.131	0.0300
Housing density	<0.001	<0.001	0.002	0.7964
Geographic mobility	−1.570	0.365	−0.153	<0.0001
Inequality	−114.963	59.238	−0.052	0.0523
Male-to-female ratio	−46.129	15.779	−0.478	0.0035
Race × Explicit bias from outgroup	−18.831	5.024	−0.183	0.0002
Race × Implicit bias from outgroup	14.482	25.817	0.045	0.5748
Race × Total population	−1.229	2.038	−0.020	0.5466
Race × Black population	3.778	3.253	0.021	0.2455
Race × Median household income	3.008	2.204	0.068	0.1724
Race × High school completion rate	−97.201	35.683	−0.103	0.0064
Race × Poverty rate	0.294	0.414	0.046	0.4771
Race × Unemployment rate	1.025	0.479	0.076	0.0324
Race × Segregation	3.869	3.166	0.029	0.2216
Race × Housing density	0.002	0.000	0.028	0.0002
Race × Geographic mobility	0.665	0.297	0.065	0.0253
Race × Income inequality	−178.814	49.695	−0.081	0.0003
Race × Male-to-female ratio	−39.082	15.163	−0.405	0.0100

Note. *b* = unstandardized coefficient. Beta = standardized coefficient. All predictors were entered into the model simultaneously.

Additionally, results revealed a main effect of explicit bias towards the outgroup that was moderated by race (Fig. 3B). Simple slope analyses indicated that Whites' explicit bias towards Blacks was positively related to Whites' death rate, $b = 19.043$, $SE = 4.975$, $\beta = 0.185$, $p = 0.0001$, whereas Blacks' explicit bias towards Whites was unrelated to Blacks' death rate, $b = 0.005$, $SE = 6.202$, $\beta < 0.001$, $p = 0.9994$. Thus, the relationship between explicit bias towards the outgroup and death rate was significantly stronger for Whites than Blacks. Simple slopes for covariate interactions are reported in Supplemented Materials.

Additional models that tested for higher-order interactions revealed that neither the explicit bias towards outgroup × implicit bias towards outgroup nor the explicit bias towards outgroup × implicit bias towards outgroup × race interactions were significant, *ps* > 0.0581. Accordingly, we dropped these interaction terms from the final model.

3. Discussion

Though previous research has suggested that racial bias is related to negative ingroup health outcomes for Whites (Kennedy et al., 1997; Lee et al., 2015; Leitner et al., 2016), it has remained unknown as to whether this relationship would exist among a minority population. The current findings suggest that the relationship between racial bias and negative ingroup health outcomes extends to Blacks. In communities where Blacks harbored more bias towards Whites, Blacks died at a higher rate from circulatory

diseases, the leading category of death in the U.S. The relationship between Blacks' implicit bias towards Whites and Blacks' death rate was independent of county-level socio-demographic characteristics, and Whites' explicit/implicit biases towards Blacks in the same community. Furthermore, by harnessing data from multiple large databases, we demonstrated this relationship between Blacks' bias and death rate on a national scale.

Although racial bias was associated with ingroup death rate for both Blacks and Whites, the type of bias driving these effects was different for Blacks and Whites. Specifically, the relationship between *implicit* bias and ingroup death rate was more robust for Blacks than Whites. In contrast, the relationship between *explicit* bias and ingroup death rate was more robust for Whites than Blacks. Why would implicit bias be a more robust predictor of ingroup mortality for Blacks than Whites? One potential explanation centers on Blacks' and Whites' ability to avoid interracial interactions, should they desire to. Because Blacks are a numerical minority in the U.S., interracial interactions may be relatively unavoidable. During these interactions, Blacks' implicit bias towards Whites may become activated, which in turn may evoke negative affect that has negative health implications. Consistent with this interpretation, greater implicit bias has been linked to greater distress during interracial interactions (Mendes et al., 2007), and stress is a known risk factor for cardiovascular disease (Black and Garbutt, 2002). Additionally, high implicit bias that is activated in interracial interactions may contribute to anger and hostility, and feelings of anger and hostility have been linked to poorer circulatory health (Chida and Steptoe, 2009). In contrast, as Whites are a numerical majority, they may be able to construct social spheres that avoid interracial interactions with minorities, should they desire to. Consequently, for Whites', implicit biases towards Blacks may be activated less frequently, and thus show a weaker link to health outcomes.

Why would explicit bias towards the outgroup be a more robust predictor of ingroup mortality for Whites than Blacks? One potential explanation for this finding centers on the degree to which Whites and Blacks are subject to norms of appearing egalitarian. For Whites in the U.S., there exists a cultural norm to appear egalitarian (Dovidio and Gaertner, 2004; Plant and Devine, 1998), and the risk of appearing prejudiced elicits a threat response (Richeson and Trawalter, 2008; Shelton et al., 2010). As such, Whites in explicitly biased communities may experience threat that their biases violate national principles of egalitarianism, and this threat may degrade health over time. In contrast, as Blacks feel more justified in expressing negative attitudes towards Whites (Plant, 2004), Blacks may not experience as much stress in openly expressing bias regarding Whites, or living in an explicitly biased community.

3.1. Limitations

One question raised by the current findings is: what community factors fuel racial bias among Blacks and Whites? We speculate that one important factor is the perceived racial bias of the outgroup. Specifically, when people perceive that they are the target of racial bias, they may respond by harboring more racial bias against the outgroup. Consistent with this possibility, in counties where Whites showed more implicit bias against Blacks, Blacks showed more implicit bias against Whites, $b = 0.169$, $SE = 0.065$, $\beta = 0.066$, $p = .0099$. As such, communities with strained race relations (e.g., frequent violent confrontations between White police and Black citizens) may be most likely to show racial bias among both Whites and Blacks. However, a limitation of the current research is that we did not have data on perceived discrimination. Thus, future research might explore whether people who perceive more racial discrimination develop more racial bias against the outgroup.

Another limitation of this research is that respondents who completed the racial bias measures might not have been representative of their county on all dimensions. For example, respondents might not represent older community members who lack the motivation to complete racial bias measures, or do not have Internet access. While we employed a post-stratification weighting strategy to circumvent this limitation, and available evidence suggests that Project Implicit respondents show similar patterns of bias as nationally representative samples (Pinkston, 2015), future research might examine if the current findings replicate when bias is measured with full probability sampling.

We interpret higher implicit bias to reflect more negative associations with the outgroup. This conceptualization is consistent with research showing that greater implicit bias predicts negative behavior towards the outgroup (e.g., McConnell & Leibold, 2001). However, a limitation of this methodology is that it leaves ambiguity about the degree to which an implicit bias score is driven by negative associations with the outgroup or positive associations with the ingroup. Thus, future research might explore the degree to which implicit and explicit bias, as operationalized here, are predictive of outgroup derogation or ingroup favoritism. Addressing this question is important, given that it could shed light on whether the link between Blacks' implicit bias score and ingroup death rate was driven by Blacks' negative associations with the outgroup or positive associations with the ingroup.

Since the relationship between environmental stress and disease is cumulative and emerges over time (Dube et al., 2009; McEwen and Stellar, 1993), one question is whether it is plausible that racial bias measured contemporaneously with death rates would predict those death rates. Critically, however, previous research indicates that community-level racial bias is highly stable over time (Leitner et al., 2016; Schmidt and Nosek, 2010), suggesting that community-level bias estimates aggregated across 2003–2013 likely captured community-level bias that predated 2003. Based on this temporal stability, it is plausible that racial bias predating 2003 contributed to ingroup death rate in the 2003–2013 window. Nevertheless, a limitation of the current work is that we did not establish the direction of causality between racial bias and death rate over time within counties. With more data from a larger time window, future research might assess whether, within counties, increases in racial bias predicted downstream increases in ingroup death rate.

3.2. Conclusion

Though the current research cannot establish that bias towards the outgroup caused changes in ingroup death rate, it does establish that the relationship between bias towards the outgroup and ingroup death rate exists for both Blacks and Whites, independent of a large set of county-level socio-demographic characteristics, and independent of the bias from the outgroup. Future research might build upon this research to elucidate the psychological, physiological, and structural pathways underlying relationships between racial bias and health.

Author note

We are grateful to Doc Edge for providing insight into our statistical analyses. This research was supported by the National Science Foundation under Award Numbers 1306709 (to R. Mendoza-Denton and O. Ayduk) and 1514510 (to O. Ayduk and J. B. Leitner), and by a Social Sciences and Human Research Council Insight Development Grant (430-2016-00094) to EH.

Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.socscimed.2016.10.007.

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