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**STRUCTURAL RACISM, BLACK OUT-GROUP PREFERENCE, AND MENTAL
HEALTH**

A Thesis Presented

by

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ABSTRACT

STRUCTURAL RACISM, BLACK OUT-GROUP PREFERENCE, AND MENTAL HEALTH

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Structural racism has increasingly been implicated as a root cause of racial disparities in health and well-being. Specifically, areas where White Americans hold more negative attitudes toward Black Americans have been associated with both anti-Black discrimination and poorer Black physical and mental health. However, previous research has relied on cross-sectional designs and has neglected the potential effects of Black community-level attitudes on mental health. We hypothesized that higher aggregate pro-White bias among White Americans would be associated with higher implicit out-group preference among Black residents living in the same communities, above and beyond the effects of traditional measures of structural racism, and that greater exposure to White residents would strengthen the relationship between White attitudes and Black out-group preference. We further expected that Black out-group preference would predict detrimental Black mental health outcomes. Drawing upon data from Project Implicit, the US Census Bureau, and the Behavioral Risk Factor Surveillance System, the current study utilized a series of two-level autoregressive models to test potential associations between changes in White community-level attitudes and Black implicit bias. County-level bias scores were post-stratified by age and divided into six

time periods from 2008-2019. Results indicated that increases in county-level White in-group preference were associated with more *negative* implicit out-group attitudes among Black Americans. There was no interaction between regional White bias and out-group contact, and no evidence that aversive racism (high implicit, low explicit bias among White Americans) predicted Black Americans' implicit attitudes. Sensitivity analyses supported the robustness of the associations – White implicit and explicit bias predicted Black implicit bias after controlling for traditional measures of structural racism (Black unemployment, Black educational attainment, and Black incarceration rates) and in areas with differing numbers of Black respondents. With respect to mental health, increases in regional Black out-group preference predicted a higher number of poor mental health days among Black residents, but the relationship was no longer significant after accounting for White Americans' regional implicit bias. Our results suggest that White Americans' community-level bias, particularly implicit bias, may exert unique effects on Black racial attitudes and psychological well-being, potentially contributing to intergroup polarization and diminished mental health.

TABLE OF CONTENTS

	Page
ABSTRACT	iii
LIST OF TABLES	vii
LIST OF FIGURES	ix
CHAPTER	
1. INTRODUCTION	1
How do White Attitudes Shape Black Out-group Preference?.....	4
Potential Associations of Out-group Preference with Mental Health.....	7
Study Overview and Hypotheses	8
2. METHODS	9
Measures of Community-Level Attitudes.....	10
Explicit Racial Bias.....	11
Implicit Racial Bias.....	11
Aggregation of County-Level Bias Scores Via Post-stratification	12
Traditional Measures of Structural Racism	13
Black Unemployment	13
Black Educational Attainment	13
Black Incarceration	14
Black Mental Health	14
Time-Invariant Covariates and Moderators	15
Out-group Exposure.....	15
County-Level Demographic Covariates	15
Total Population.....	16
Unemployment.....	16

	Median Income	16
	Income Inequality	16
	Educational Attainment	17
	Black Geographic Mobility.....	17
	Analytic Plan.....	17
	Sensitivity Analyses.....	19
3.	RESULTS	21
	Sample Descriptives.....	21
	Associations Between White Attitudes and Black Implicit Out-group Preference	21
	Interactions Between White Attitudes and Out-group Exposure.....	22
	Black Mental Health Outcomes	23
	Sensitivity Analyses.....	24
3.	DISCUSSION	26
	Limitations	31
	Conclusion	32
APPENDIX		
A.	Tables	34
B.	Figures	63
BIBLIOGRAPHY.....		
		64

LIST OF TABLES

	Table	Page
1.	County-Level Sample Descriptives and Correlations.....	34
2.	Metropolitan Statistical Area-Level Descriptives and Correlations	35
3.	County-Level White Implicit In-group Preference Predicting Black Implicit Out-group Preference - Main Effects Model	36
4.	County-Level White Explicit In-group Preference Predicting Black Implicit Out-group Preference - Main Effects Model	37
5.	Interactions Between County-Level White Implicit and Explicit In-group Predicting Black Implicit Out-group Preference	38
6.	Interactions Between County-Level White Implicit In-group Preference and Black-White Ratios Predicting Black Implicit Out-group Preference.....	39
7.	Interactions Between County-Level White Explicit In-group Preference and Black-White Ratios Predicting Black Implicit Out-group Preference.....	41
8.	Black Implicit Out-group Preference Predicting Poor Mental Health Days	43
9.	White Implicit In-group Preference Predicting Poor Mental Health Days	44
10.	White Implicit In-group Preference Predicting Poor Mental Health Days	45
11.	All Regional Bias Variables Predicting Poor Mental Health Days	46
12.	Structural Racism and Regional Bias Predicting Poor Mental Health Days	47
13.	Traditional Structural Racism Measures Predicting Poor Mental Health Days	49
14.	Black Unemployment Predicting Black Implicit Out-group Preference ...	50
15.	Black Educational Attainment Predicting Black Implicit Out-group Preference	51
16.	Black Jail Incarceration Predicting Black Implicit Out-group Preference	52

17.	County-Level White Implicit In-group Preference and Traditional Measures of Structural Racism Predicting Black Implicit Out-group Preference	53
18.	County-Level White Explicit In-group Preference and Traditional Measures of Structural Racism Predicting Black Implicit Out-group Preference	54
19.	County-Level White Implicit In-group Preference Predicting Black Implicit Out-group Preference in Counties Using At Least 1 Black Respondent ...	55
20.	County-Level White Implicit In-group Preference Predicting Black Implicit Out-group Preference in Counties Using At Least 25 Black Respondents	56
21.	County-Level White Implicit In-group Preference Predicting Black Implicit Out-group Preference in Counties Using At Least 50 Black Respondents	57
22.	County-Level White Explicit In-group Preference Predicting Black Implicit Out-group Preference in Counties Using At Least 1 Black Respondent ...	58
23.	County-Level White Explicit In-group Preference Predicting Black Implicit Out-group Preference in Counties Using At Least 25 Black Respondents	59
24.	County-Level White Explicit In-group Preference Predicting Black Implicit Out-group Preference in Counties Using At Least 50 Black Respondents	60
25.	Raw County-Level White Implicit In-group Preference Predicting Black Implicit Out-group Preference	61
26.	Raw County-Level White Explicit In-group Preference Predicting Black Implicit Out-group Preference	62

LIST OF FIGURES

Figure	Page
1. Autoregressive Model (County-Level White Implicit In-group Preference)	63

Introduction

Structural stigma, reflecting the “societal-level conditions, cultural norms, and institutional policies that constrain the opportunities, resources, and wellbeing of the stigmatized” (Hatzenbuehler & Link, 2014, p. 2), plays a critical role in the health of Black Americans. State- or county-level attitudes toward stigmatized groups are considered a “cultural” form of structural stigma (Hatzenbuehler & Link, 2014). Previous research has linked regional racial bias to anti-Black discrimination and violence – including higher rates of disciplinary action against Black students, disproportionate police stops of Black motorists, and disproportionate police killings of Black residents (Chin et al., 2020; Hehman et al., 2018 Riddle & Sinclair, 2019; Stelter et al., 2022). In addition, communities in which White residents harbor more negative attitudes toward Black Americans are associated with negative physical and mental health outcomes among the latter population. More specifically, greater regional anti-Black bias predicts higher rates of chronic illness (Splan et al., 2021), infection (Thomas et al., 2020), low birth weight (Orchard & Price, 2017), suicide (Gran-Ruaz et al., 2022), cardiovascular mortality (Leitner et al., 2016a; Zestcott et al., 2022), and neural correlates of stress exposure, such as hippocampal volume (Hatzenbuehler et al., 2022), among Black Americans.

Although White attitudes have been examined as potential contributors to Black physical health, to date, the role of racial attitudes within Black communities has received little attention, as has the question of whether Black community attitudes might predict Black mental health (Reid & Earnshaw, 2023). The present research aimed to address this gap in the literature by examining two related questions. First, we examined the

extent to which Black Americans' out-group favoritism might be shaped by the attitudes of White Americans in their community. Second, we analyzed whether Black Americans' out-group preference relates to their mental health.

Prior work on internalized stigma supports the possibility that Black Americans' out-group favoritism may reflect the racial biases of White Americans in their own communities. Internalized stigma, or self-stigma, occurs when stigmatized individuals become aware of society's devaluation of them and as a result come to adopt negative views of the self or to perceive the dominant group as superior (Bos et al., 2013; Goffman, 1963). One type of internalized stigma is internalized racism, defined as the "acceptance, by marginalized racial populations, of the negative societal beliefs and stereotypes about themselves" (Williams & Williams-Morris, 2000, p. 255). Research on internalized racism has traditionally relied on explicit self-report measures (David et al., 2019). However, self-report is vulnerable to the distortions of social desirability and impression management, and members of disadvantaged or stigmatized groups often experience social pressure to publicly display in-group pride and identification (Essien et al., 2021; Jost et al., 2004). As a result, some scholars have recommended or utilized implicit measures of out-group preference as a potential proxy for internalized stigma among Black Americans, Asian Americans, sexual minorities, and other marginalized groups (Cha et al., 2022; Chae et al., 2014; David & Okazaki, 2010; David et al., 2019; Dhabar & Deshmukh, 2021; Essien et al., 2021; Hatzenbuehler et al., 2009; Jost et al., 2004). Notably, these studies have operationalized internalized stigma in terms of higher preference for the dominant out-group relative to the in-group rather than in terms of negativity towards the in-group per se.

Given prior theorizing and empirical work framing internalized stigma as a manifestation of relative preference for majority over in-group members (e.g., David et al., 2019; Essien et al., 2021), Black Americans' responses to the Implicit Association Test (IAT; Greenwald et al., 1998) may operate in similar ways to explicit internalized racism. The IAT captures automatic associations between categories by comparing reaction times. A commonly used version of the Race IAT on the Project Implicit website measures the tendency of respondents to make positive or negative associations with Black and White faces. By contrast, Project Implicit measures explicit racial bias by an explicit preference rating and by a pair of feeling thermometers (ratings of relative warmth or coldness towards Black and White people).

Using Project Implicit data from 1998-2000, Nosek et al. (2002) found that Black participants showed a strong pro-Black explicit preference rating (reverse-scored as $d = .80$) and a slight pro-White *implicit* preference on the IAT (reverse-scored as $d = -.16$). This pattern is consistent with laboratory studies of racial bias among university students (Banaji et al., 1997; Ashburn-Nardo et al., 2003) as well as the broader literature on explicit and implicit out-group preference (Jost et al., 2004). Examining over two million Project Implicit respondents from 2007-2016, Charlesworth and Banaji (2021) subsequently found that Black respondents overall exhibited a stable yet very small pro-Black implicit preference but a strong pro-Black explicit preference; Essien et al. (2021) likewise observed that, overall, Black participants had neutral implicit bias scores and pro-Black explicit bias scores. Given the longstanding gap between Black respondents' explicit and implicit out-group attitudes, implicit measures may be better suited to capturing Black Americans' favorability towards out-group members.

How do White Attitudes Shape Black Out-group Preference?

A number of factors likely influence the extent and direction of minority out-group preference. Empirical work has lent support to the notion that individuals with greater exposure to stigmatizing attitudes and discrimination can internalize those attitudes over time (Igarashi et al., 2022; Jahn et al., 2020; Masa et al., 2022, Masuch et al., 2019; Milačić-Vidojević et al., 2020; Pérez-Garín et al., 2017; Quinn et al., 2015; Stockton et al., 2020; Szymanski & Henrichs-Beck, 2014; Turan et al., 2017; Wang et al., 2018). This occurs as the targets begin to anticipate discrimination and other stigmatizing reactions from others (Earnshaw et al., 2013; Fox et al., 2018). A longitudinal study by Vogel et al. (2013), for example, demonstrated that perceptions that others held stigmatizing attitudes led to higher internalized stigma three months later but not vice versa. Using an experience sampling method, Fazeli et al. (2017) likewise found that experiences of discrimination significantly predicted internalized stigma at both the within- and between-person levels. Research has also specifically linked exposure to racist attitudes (David & Nadal, 2013; Keum et al., 2023; Kline et al., 2021; Viswanathan & Vernachoi, 2021) and experiences of racial discrimination to internalized racism (Cénat et al., 2022; David & Okazaki, 2006; Garcia et al., 2019; Graham et al., 2016; Hipolito-Delgado, 2010; Molina & James, 2016; Vazquez et al., 2021; Wong-Padoongpatt et al., 2022).

Other studies have observed similar associations between stigma and implicit out-group preference among stigmatized minorities, including Black Americans. Livingston (2002) found that perceptions of greater pro-White implicit bias among White Americans predicted greater pro-White implicit bias among Black participants. In a more recent

study of Project Implicit respondents, Essien et al. (2021) likewise found that greater stigmatization from the dominant group amplified out-group preference among the marginalized groups at both the explicit and implicit level.

However, previous work has not examined the extent to which Black Americans' out-group preference is related to the explicit and implicit attitudes of White Americans. Although White explicit and implicit attitudes are indeed positively correlated, White Americans consistently exhibit far stronger implicit in-group favoritism than explicit in-group favoritism (Charlesworth & Banaji, 2019; Nosek et al., 2002, 2007). Perhaps the most noteworthy dissociation can be found in the phenomenon of aversive racism, in which White Americans exhibit high levels of implicit pro-White bias despite reporting low explicit bias (Dovidio & Gaertner, 1998; Pearson et al., 2009). However, research examining the impact of aversive racism on Black individuals' attitudes towards White interaction partners has yielded mixed results. While some studies have indicated that Black individuals form more negative impressions of White aversive racists (Dovidio et al., 2002; Penner et al., 2010), others have found the opposite outcome, potentially due to White individuals overcompensating in attempting to appear less biased in front of Black interaction partners (Shelton et al., 2005). As such, it is difficult to predict how aversive racism might influence overall Black racial attitudes.

As previous work has largely focused on individuals' experiences, one as yet unanswered question is whether structural stigma predicts internalized stigma – or in this case, whether and to what extent regional pro-White bias and other indicators of community-level stigma are associated with out-group preference among Black Americans living in those communities. Prior research has in fact connected racial

inequality with internalized racism. Analyzing data across 12 Eastern European countries, for instance, Bó (2019) demonstrated that both national-level structural inequality (i.e., between-group income disparities) and perceived discrimination predicted greater internalization of anti-Roma stereotypes among the Roma population. Likewise, in the United States, Cha et al. (2022) recently found increased pro-Black explicit and implicit attitudes among Black Americans in states where racial inequalities in income, unemployment, and uninsurance decreased over time. In other words, states that remained stable or decreased in structural stigma were associated with more positive attitudes towards the in-group among Black Americans. It remains to be seen whether similar associations will be found between community-level White bias and Black attitudes.

In sum, prior work indicates that both individual perceptions of racial bias and regional systemic inequalities are predictive of out-group preference among Black Americans. Ultimately, there are multiple potential models of White influence on Black racial attitudes. The first is the straightforward “internalization” of White racial attitudes by Black Americans, such that higher community-level explicit and implicit bias in-group favoritism among White Americans will be associated with greater implicit preference for Whites on the part of Black Americans. The second possibility is that aversive racism (high implicit but low explicit bias) on the part of White Americans will be associated with greater out-group preference, potentially due to being more difficult to recognize and therefore mount psychological defenses against.

Other factors may moderate the extent to which White attitudes are associated with Black implicit out-group preference. Previous research indicates that acceptance of

the dominant group's attitudes may depend not only the severity of prejudice observed or experienced (Bó, 2019; Essien et al., 2022) but on the amount of out-group exposure. After all, internalized racism is associated with higher exposure to stigmatizing attitudes and discrimination (David & Nadal, 2013; Keum et al., 2023; Kline et al., 2021; Viswanathan & Vernachoi, 2021), such that more frequent interaction with prejudiced out-group members could potentially lead to both internalization and negative mental health outcomes. There is some evidence to suggest that living in areas of higher in-group ethnic density can be protective of mental health among a variety of racial/ethnic minorities (Pickett & Wilkinson, 2008; Shaw et al., 2012; White & Lawrence, 2019) and that this effect is mediated by decreased exposure to discrimination (English et al., 2014). Consistent with this, Kellogg et al. (2023) found that community-level explicit age bias was only significantly associated with mortality in counties with younger median ages, suggesting that contact with the dominant group may be necessary for the effect to take place.

Despite decreases in the geographic dispersion of racial groups over the last decades of the 20th-century, the United States remains highly racially segregated (Iceland & Sharp, 2013), potentially indicating decreased Black-White contact relative to that experienced by other marginalized or stigmatized groups. In sum, there is reason to expect an interaction between degree of racial bias and likelihood of contact between Black and White Americans in a given community.

Potential Associations of Out-group Preference with Mental Health

Research at the individual level supports a potential detrimental association of minority out-group preference with health. Empirical work indicates that internalized

racism predicts poorer physical and mental health outcomes among racial minorities (Butler et al., 2002; Chambers et al., 2004; Garcia et al., 2019; Graham et al., 2016; Hughes et al., 2015; James, 2017, 2021; Keum et al., 2023; Mouzon & McLean, 2017; Sosoo et al., 2020; Tull et al., 1999, 2005; Velez et al., 2019; see James, 2020 for a review). A meta-analysis by Gale et al. (2020) found only a small correlation between internalized racism and poor physical health ($r = .11$) but a medium-sized correlation with poorer mental health ($r = .26$). Extending this work to the present context suggests that Black Americans may experience poorer mental health in communities in which Black residents exhibit greater out-group preference.

Study Overview and Hypotheses

To date, research on regional bias has focused on Whites' explicit and implicit attitudes toward Black Americans but has not considered the role of Black Americans' views of their own group as a potential source of stigma. The current study tested the effects of regional bias, including county-level White explicit and implicit bias, on Black implicit out-group preference using data from Project Implicit. The primary analyses were conducted at the county level in order to reflect the local conditions in which participants lived. Moreover, previous research on community-level bias and outcomes for Black Americans has been largely cross-sectional, and we sought to improve upon this design by estimating a six-wave autoregressive model, which allowed us to examine whether changes in White attitudes at one wave predicted changes in Black out-group preference at the next wave.

We hypothesized that higher explicit and implicit in-group preference among White Americans would be associated with implicit out-group preference among Black

Americans. We further expected that this relationship would be exacerbated by greater exposure to White Americans, such that Black Americans living in communities with greater contact between Black and White Americans would exhibit the strongest relationship between White attitudes and Black out-group preference. Given mixed findings in prior work, we also explored the potential effects of aversive racism by examining whether White explicit and implicit attitudes interacted to predict community-level Black implicit bias. Furthermore, we predicted that Black out-group preference would predict diminished Black mental health at the county level and would mediate the association between White community-level attitudes and Black mental health. Finally, we conducted a series of sensitivity analyses to examine the robustness of the associations and analyzed whether the hypothesized associations existed over and above traditional measures of structural racism, including Black unemployment rates, educational attainment, and incarceration.

Methods

Counties were selected as the geographic unit of analysis because they are the smallest geographic unit available from Project Implicit and the smallest unit generally used in research on structural racism and regional intergroup bias (e.g., Leitner et al., 2016a, 2016b; Orchard & Price, 2017; Riddle & Sinclair, 2019). Project Implicit data on attitudes toward Black Americans are available from 2003-2022. The 2003-2007 Project Implicit data were excluded from analyses due to small sample sizes; in addition, Census data for the relevant covariates were not available prior to 2008. Data after 2020 were also excluded to avoid any shifts in out-group attitudes and mental health associated with the COVID-19 pandemic. Accordingly, all analyses utilized 2008-2019 data.

Constructing a multi-wave autoregressive model required consideration of the number of years of data to include within each wave. Because there are far fewer Black than White Project Implicit respondents, the number of Black respondents per county served as the basis for this decision. Between 2008 and 2019, 377,872 Black Americans currently residing in the U.S. completed the Race IAT on the Project Implicit website, representing 2,458 counties in total. Yearly Black sample sizes per county were small (22.14 on average); larger time periods of four or five years were a concern due to alignment with national elections and other major events. To maximize geographic coverage of Black respondents in the analytic models within the most precise time frames, we created two-year scores for all variables, resulting in six waves of data: 2008-2009, 2010-2011, 2012-2013, 2014-2015, 2016-2017, and 2018-2019. On average, from 2008-2019, there were approximately 62,979 Black respondents every two years, representing an average of 1,693 of 3,143 counties and an average of 37.20 Black respondents per available county within each two-year period. We created six waves of data for each of the primary predictors and outcomes used in the models – including Black implicit out-group preference, White implicit and explicit in-group preference, Black mental health, and each of the three traditional measures of structural racism.

Measures of Community-Level Attitudes

Measures of racial bias among both White and Black Americans were captured from data provided through Project Implicit (Xu et al., 2014). On the Project Implicit website (<https://www.projectimplicit.net>), individuals can take an Implicit Association Test (IAT) as well as report explicit attitudes and relevant demographic and location information. Following previous research on regional intergroup bias (e.g., Leitner et al.,

2016a, 2016b, 2018; Riddle & Sinclair, 2019), community-level bias among White Americans was calculated using White Americans' explicit and implicit bias scores, aggregated at the county level.

Explicit Racial Bias

Following previous Project Implicit research (e.g., Leitner et al., 2016a, 2016b, 2018), explicit bias towards White and Black Americans was measured using a difference score between ratings on two feeling thermometers (White – Black), such that higher scores indicated an explicit preference for White relative to Black Americans. Specifically, Project Implicit respondents are asked to rate their feelings towards White and Black Americans each from 0 (*Extremely cold*) to 10 (*Extremely warm*).

Implicit Racial Bias

Community-level implicit bias was measured with scores on the Race IAT. In the Race IAT, respondents are asked to classify Black and White faces as well as various words as “Good” or “Bad” as quickly as possible. Faster response times (in milliseconds) when pairing White with “Good” relative to Black with “Good” indicate an automatic preference for White individuals. The IAT D-score represents the mean difference in response times between pairings, divided by the standard deviation, such that positive scores indicate pro-White bias while negative scores indicate pro-Black bias. In all analyses, explicit bias and IAT D-scores were multiplied by 100 in order to aid the interpretability of the model coefficients.

Black implicit out-group preference was captured with the IAT D-scores of Black participants, with positive scores likewise indicating greater favorability toward White Americans. Black participants were defined as those who self-identified as “Black or

African American” alone or in addition to another racial category when answering demographic questions prior to taking the IAT. To capture White respondents’ implicit attitudes, we selected participants who identified as “White” alone. White implicit attitudes also retained the original scoring, with positive scores indicating greater favorability toward White Americans.

Aggregation of County-Level Bias Scores Via Post-stratification

In order to account for the possibility that respondents to Project Implicit may not be representative of their county and consistent with prior research (Leitner et al., 2016a, 2016b; Lohr, 2009; Riddle & Sinclair, 2019), multilevel regression with post-stratification was employed. Post-stratification compensates for potential response biases by assigning greater weight to respondents who more closely match the demographics of their county. Given that post-stratification was applied to each two-year wave of data, the process was executed 18 times (six waves, three bias measures). Here age was the weighting dimension, since visitors to the Project Implicit website tend to be younger than the population average (Kastellec et al., 2010; Leitner et al., 2016b). More specifically, respondents were first grouped in four age categories (15-24, 25-34, 35-49, 50-64, and 65+). Second, data on the population counts of Americans within each age category in each county was obtained from the ACS for each year (2008-2019). Finally, bias scores were weighted such that respondents more representative of their county in terms of age received greater representation in county-level averages. Via post-stratification, we were also able to estimate Black and White implicit attitude scores in counties that did not provide any attitudinal data. All post-stratification was conducted in RStudio.

Traditional Measures of Structural Racism

A separate set of models examined the impact of traditional forms of structural racism on Black out-group preference. Following Lukachko et al. (2014), multiple additional indicators of structural racism – including Black involvement in politics, the labor market, education, and the criminal justice system – were sought out.

Unfortunately, some indicators (e.g., Black voter registration) were not available at the county-level for all or most US counties. In the current study, traditional measures of structural racism were limited to Black unemployment rates, Black college graduation rates, and proportion of the Black population incarcerated in jails. This alternative model incorporates all of the same covariates except for general county-level unemployment rates (due to the inclusion of Black unemployment as a predictor, with which general unemployment is highly correlated).

Black Unemployment

Data on the proportion of the Black population ages 16-64 who were unemployed were obtained from the American Community Survey (ACS; United States Census Bureau, 2023), specifically table C23002B – Sex by Age by Employment Status for the Population 16 Years and Over (Black or African American Alone).

Black Educational Attainment

Black educational attainment was operationalized as proportion of Black residents with a bachelor's degree or higher in each county. The threshold of a bachelor's degree was selected because prior research has indicated that college graduation is a major predictor of health and longevity, and the gap between those with and without a bachelor's degree has only widened in recent decades, even as Black and White life

expectancies have converged (Case & Deaton, 2021). Estimates of the proportion of Black residents age 25 or older with a bachelor's degree were obtained through the Census API (see table C15010B).

Black Incarceration

The final alternative measure of structural racism was the proportion of the Black population incarcerated in jails in each county. Data on Black jail incarceration rates were drawn from the 2008-2018 Annual Survey of Jails and the 2019 National Jail Census, a survey of about 950 local jails across the United States administered by the Bureau of Justice Statistics (BJS, 2023).

Black Mental Health

Data on Black mental health outcomes were drawn from the Behavioral Risk Factor Surveillance System (BRFSS; Centers for Disease Control and Prevention, 2023). The BRFSS is a nationally-representative survey of American adults based on probability samples of all households with a telephone in each state. To capture mental health, participants are asked, "Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?" Response options range from 0 to 30 days, with higher numbers indicating more frequent experiences of poor mental health. Since county-level data from the BRFSS are not publicly available for the years 2008-2019, all estimates were aggregated to the level of Metropolitan Statistical Areas (MSAs) in the mental health analyses. MSAs are defined by the presence of at least one urban area with a population of at least 50,000 residents and are only included in the BRFSS dataset if they were able to obtain at least 500 respondents in that year.

Time-Invariant Covariates and Moderators

To simplify models, all covariates and moderators were time-invariant. A single county-level score was created by averaging across six waves of data (with covariates obtained for the final year of each wave). This was done for out-group exposure (Black-White ratios), total population, general unemployment, median income, income inequality (Gini index), general educational attainment (bachelor's degree or higher), and Black geographic mobility.

Out-group Exposure

Degree of out-group exposure was operationalized as the ratio of Black to White Americans, calculated by dividing the number of Black residents by the number of White residents for each county (see table DP05 – ACS Demographic and Housing Estimates). In prior work, Rae et al. (2015) not only operationalized contact with racial outgroups in this manner but also found a very strong correlation between Black-White ratios and the interaction index (indicating the probability of encountering a racial outgroup member) at the county-level.

County-Level Demographic Covariates

Covariates were drawn from the American Community Survey (ACS), which provides annual estimates of census data (United States Census Bureau, 2023). Per Census recommendations (United States Census Bureau, 2023) and prior work examining regional intergroup bias (e.g., Kellogg et al., 2023; Leitner et al., 2016b; Rae et al., 2022; Riddle & Sinclair, 2019; Vuletich et al., 2023), 5-year ACS estimates were used in order to maximize reliability and coverage. Selection of covariates was based on those

included in prior studies of regional bias using Project Implicit data (Leitner et al., 2016a, 2016b, 2018; Riddle & Sinclair, 2019).

Total Population

Following prior work on regional intergroup bias (Ekstrom et al., 2022; Leitner et al., 2016a, 2016b; Riddle & Sinclair, 2019; Zestcott et al., 2022), analyses controlled for the (log-transformed) total population of each county. Estimates were drawn from table DP05 – ACS Demographic and Housing Estimates.

Unemployment

Given that prior research has indicated an adverse impact of unemployment on physical (Norström et al., 2014) and mental health (Murphy & Athanasou, 1999; Paul & Moser, 2009), as well as that previous regional intergroup bias research has controlled for it (Hehman et al., 2018; Leitner et al., 2016a, 2016b; Orchard & Price, 2017; Riddle & Sinclair, 2019; Zestcott et al., 2022), we included county-level unemployment rates as a covariate (see table DP03 – Selected Economic Characteristics).

Median Income

Given that socioeconomic status is correlated with health and can be a confound in studies on racism (Williams et al., 2010), log-transformed median income was included as a covariate in the model. This is also consistent with previous studies on regional racial bias (Ekstrom et al., 2022; Leitner et al., 2016a; Rae et al., 2022; Riddle & Sinclair, 2019). Data on the median income level of each county was obtained from table DP03.

Income Inequality

Since area-level income inequality is associated with poorer physical (Pickett & Wilkinson, 2015) and mental health outcomes (Wilkinson & Pickett, 2009; Yu, 2018), this analysis incorporated income inequality (operationalized via the Gini Index) as a covariate. The Gini Index assesses how well income is dispersed in the county, relative to a county in which everyone earns the same amount. A score of zero represents perfect equality and one represents perfect inequality (see table B19083 – Gini Index of Inequality).

Educational Attainment

Following previous regional intergroup bias research using Project Implicit (Ekstrom et al., 2022; Hehman et al., 2018; Orchard & Price, 2017; Rae et al., 2022; Riddle & Sinclair, 2019; Thomas et al., 2020), the primary analysis incorporated the proportion of residents age 25 or older with a bachelor's degree or higher (see table DP02 – Selected Social Characteristics in the United States).

Black Geographic Mobility

Geographic mobility was calculated as the percentage of Black Americans in each county/MSA who moved into the associated county in the past 5 years, whether from within the same state, from another U.S. state, or from another country (see table S0701 – Geographic Mobility by Selected Characteristics). This was to control for the possibility that Black Americans may choose to move to locations in which structural racism or regional bias is less intense.

Analytic Plan

All analyses were conducted in Mplus version 8 (Muthén & Muthén, 2017). In response to calls for the use of analytic models allowing for greater casual inference in

regional intergroup bias research (Calanchini et al., 2022), the current study used a two-level autoregressive model. In other words, for each county across the six time periods, county-level White implicit or explicit bias scores from the previous time period were used to predict each wave of county-level Black implicit bias (see Figure 1). The model also controlled for the stability of Black implicit bias over time by including Black implicit bias from the previous wave as a predictor of subsequent Black implicit bias. Regional White implicit and explicit bias were analyzed in separate models due to high correlations between post-stratified county-level bias estimates ($r = .63$).

Because three-level models (waves nested within counties nested within states) would not converge, we ultimately estimated two-level models (waves nested within counties). To capture the role of state of residence, we removed state-level effects from all covariates by subtracting the state means. The primary predictors (e.g., lagged White implicit and explicit bias, lagged Black implicit bias) varied over time and were group-mean centered to capture level 1 associations (Enders & Tofighi, 2007), reflecting whether change in White implicit in-group preference predicted change in Black implicit out-group preference at the subsequent time point. Previous research has indicated that White explicit and implicit attitudes have been trending towards neutrality over time (Charlesworth & Banaji, 2021), so we tested whether inclusion of linear and/or quadratic time terms were significant for measures of regional bias. As these were ultimately significant, all models controlled for linear and quadratic time trends in each measure of regional bias. For each analysis, we first ran a random slopes model, and if that did not converge, attempted a random intercept model, then turned to model employing neither if

necessary. Regional White bias variables and the covariates were modeled as fixed effects.

In models testing interactions, moderators were aggregated to level 2, and the regional bias variables remained at level 1. When examining the interaction between White implicit and explicit attitudes, explicit attitudes were selected as the time-invariant moderator and aggregated to level 2. Any significant interactions were probed at one standard deviation above and below the mean of the moderators (Aiken & West, 1991).

In the mental health analyses, similar autoregressive models were estimated, with the number of poor mental health days as the outcome and Black implicit out-group preference as a predictor. Since the number of poor mental health days was only available at the MSA-level, all variables in these models were aggregated to the level of metropolitan statistical areas. All covariates remained the same and were centered within each MSA to control for MSA-level effects. Since rates of anxiety among Black Americans have been increasing over time (Goodwin et al., 2020, 2022), we also examined the need for including linear and quadratic time trends. Again, both were significant, so we controlled for these time trends in poor mental health days. Given that the outcome measure was a count variable (number of poor mental health days), data were analyzed in negative binomial models using Montecarlo integration.

Sensitivity Analyses

Each traditional measure of structural racism (Black unemployment, Black educational attainment, and Black incarceration) was first analyzed in a separate model as a predictor of Black out-group preference and of poor mental health. The traditional structural racism measures were group-mean centered to capture whether change in the

measure at one wave predicted Black out-group preference or mental health at a subsequent wave. In a combined model, all indicators of structural racism were included simultaneously with the regional bias variables that predicted each outcome in the primary models to demonstrate that regional bias results remained over and above these traditional measures. In order to avoid overlap, general educational attainment was removed as a covariate in models using Black educational attainment as a predictor, as was general unemployment from models using Black unemployment as a predictor. All other covariates were retained in the models predicting Black implicit out-group preference. The traditional measures of structural racism were modeled in the same manner as regional White explicit and implicit bias, aggregated into six two-year time periods and analyzed in a two-level autoregressive model.

Researchers conducting geo-spatial analyses on psychological phenomena have taken one of two approaches to address the fact that data are not truly representative and thus contain some degree of error relative to the true area mean. Some have applied multiple regression with post-stratification to the estimates (Leitner et al., 2016a, 2016b; Riddle & Sinclair, 2019). Others have limited the number of locations to those containing a pre-specified number of responses (Götz et al., 2021; Orchard & Price, 2017; Somo et al., 2020).

To provide evidence that results were robust to response rates, we re-examined the primary models including only those counties or MSAs containing a certain number of respondents. Given that the choice of minimum number of respondents per county has ranged rather widely in the literature – from 1 to 100 respondent minimums (Götz et al., 2021; Payne et al., 2019) – multiple models were run applying different selection criteria

(see Stelter et al., 2022). Analyses were conducted first using county estimates for any county with at least one Black respondent in all waves and then for counties containing at least 25 and at least 50 Black respondents, resulting in six additional models. When restricted to counties with at least 1 Black respondent for all time periods, the number of available unique counties was lowered to 971 overall; for 25 or more Black respondents for all time periods, the number of available counties was 225; and for 50 or more, there were 129 total counties. We also attempted to run these models for MSA-level analyses, with all three of the regional bias variables and covariates predicting Black mental health days. These models included only 198 MSAs and failed to converge. Results are therefore not reported.

Results

Sample Descriptives

Descriptive statistics and bivariate correlations can be found in Tables 1-2. Table 1 contains study variable means, standard deviations, and correlations with Black implicit out-group preference at the county level and Table 2 at the MSA level. Note that these scores are multiplied by 100 for both geographic levels. White respondents' mean post-stratified explicit and implicit bias scores were above zero, indicating a preference for White relative to Black Americans. For Black respondents, mean post-stratified implicit bias was just below zero, indicating a very small pro-Black preference. Black implicit out-group preference correlated negatively with both White explicit and White implicit in-group preference, indicating that regional White in-group favoritism was associated with more negative attitudes towards White Americans among Black residents.

Associations Between White Attitudes and Black Implicit Out-group Preference

We first estimated models that did not contain any covariates. Contrary to hypotheses, county-level White implicit in-group preference was significantly negatively associated with Black implicit out-group preference ($b = -0.13$, $SE = 0.02$, $p < .001$), indicating that increases in White implicit in-group preference at one wave were associated with decreased out-group favorability among Black Americans at the next wave. However, White explicit in-group preference was not significantly associated with Black implicit out-group preference ($b = -0.002$, $SE = 0.00$, $p = .592$).

After controlling for demographic covariates, increases in county-level White implicit in-group preference predicted subsequent decreases in Black implicit out-group preference. In other words, increases pro-White preference among White residents in one wave were associated with more *negative* implicit attitudes towards White Americans on the part of Black residents at the next wave (see Table 3). Controlling for demographic covariates, changes in explicit White preference among White residents were not significantly associated with changes in implicit White preference among Black residents (see Table 4).

In order to capture aversive racism, characterized by low explicit but high implicit bias among White Americans, we tested whether the association of White implicit in-group preference with Black implicit out-group preference was moderated by White explicit in-group preference. However, levels of White explicit bias did not interact with changes in White implicit bias in predicting Black implicit out-group preference. This indicates that aversive racism is not associated with Black out-group preference at the county-level (see Table 5).

Interactions Between White Attitudes and Out-group Exposure

We hypothesized that the relationship between White implicit and explicit in-group preference with Black out-group preference would be stronger in communities with greater interracial interaction, indicated by lower Black-White ratios for Black residents. However, Black-White ratios did not moderate associations between county-level White attitudes and Black implicit out-group preference. While increases in regional White implicit in-group preference continued to predict decreases in implicit White preference among Black residents, there was neither a main effect of Black-White ratios nor any significant interaction between White implicit bias and Black-White ratios (see Table 6). Likewise, while increases in White explicit in-group preference were associated with decreases in Black implicit out-group preference, there was neither a main effect of Black-White ratios nor an interaction between White explicit bias and Black-White ratios (see Table 7). These models indicate that, contrary to hypotheses, out-group exposure did not affect the relationship between changes in community-level White bias and Black implicit bias.

Black Mental Health Outcomes

In a model containing only Black implicit out-group preference and covariates, increases in Black implicit out-group preference predicted increases in the number of poor mental health days among Black residents (see Table 8). This indicates that in regions where Black out-group preference increased, Black mental health deteriorated at the subsequent wave. Likewise, increases in White implicit in-group favoritism predicted increases in the number of poor mental health days among Black residents (see Table 9). By contrast, changes in White explicit in-group preference were not associated with Black mental health (see Table 10). When analyzed in the same model, however,

increases in White implicit in-group preference remained significantly associated with increases in the number of poor mental health days, and increases in White explicit in-group preference became significantly associated with *fewer* poor mental health days, but Black implicit out-group preference was no longer a significant predictor of Black mental health (see Table 11).

When all measures of bias were analyzed alongside the traditional measures of structural racism, increases in regional White implicit in-group preference were still significantly associated with a higher number of poor mental health days and regional White explicit in-group preference with fewer poor mental health days, with Black implicit out-group preference remaining non-significant. On the other hand, higher Black unemployment was significantly associated with fewer poor mental health days, but neither Black college graduation rates nor Black jail incarceration rates had any relationship with mental health (see Table 12). The association between Black unemployment and number of poor mental health days remained when the traditional measures of structural racism were analyzed in the same model apart from regional bias (see Table 13).

Sensitivity Analyses

We first examined whether associations between county-level White attitudes and Black implicit out-group preference remained when controlling for the traditional measures of structural racism. In models examining each of the traditional structural racism measures individually, without inclusion of White community-level attitudes, changes in Black unemployment rates (see Table 14), Black college graduation rates (see

Table 15), and Black jail incarceration rates (see Table 16) did not significantly predict Black implicit out-group preference.

All traditional measures of structural racism and regional bias were then analyzed in a single model, using a random slope model for White implicit in-group preference. Notably, increases in county-level White implicit in-group preference at one wave remained associated with decreases in out-group positivity among Black residents at the subsequent wave. In this combined model, Black unemployment rates became significantly negatively associated with Black out-group preference, but changes in Black education jail incarceration rates still did not significantly predict Black implicit out-group preference (see Table 17). On the other hand, whereas White explicit in-group preference was not a significant predictor in prior models of Black implicit out-group preference, it became significant when analyzed in the same model as the traditional structural racism measures. Increases in county-level White explicit in-group preference predicted subsequent decreases in out-group positivity among Black residents. However, neither changes in Black unemployment rates, Black education rates, nor Black jail incarceration rates were associated with changes in Black implicit out-group preference (see Table 18).

The second sensitivity analysis examined whether associations between White and Black community-level attitudes remained significant at different thresholds of Black Project Implicit respondents. As expected, the associations of White in-group preference with Black implicit bias were robust to the number of Black respondents in each county. When analyses were constrained to counties that contained at least 1 respondent at each wave, White implicit in-group preference remained a significant predictor of Black

implicit bias (see Table 19). This was also true in counties that contained 25 or more Black respondents (see Table 20) as well as those containing 50 or more Black respondents (see Table 21). The consistency of these models using all possible counties versus only those counties in which Black respondents contributed data suggests that the results were not meaningfully affected by our decision to include all counties the analyses. It should be noted that the quadratic time trends in Black implicit out-group preference were no longer significant at thresholds of at least 25 and 50 Black respondents per county. In contrast to the initial models in which White explicit in-group preference did not predict Black implicit bias, when analyses were constrained to counties that contained at least 1 respondent at each wave, increases in White explicit in-group preference significantly predicted decreases in Black implicit out-group preference (see Table 22). This relationship remained when analyses were constrained to counties that contained at least 25 respondents (see Table 23) and at least 50 respondents (see Table 24) at each wave. These results suggest that White explicit in-group preference predicts Black views in counties with more Black respondents, allowing for more accurate estimates of Black implicit out-group preference. Results from models using raw bias scores can be found in Tables 25-26. As a reminder, the Black mental health models constraining analyses to MSAs with 1, 25, and 50 Black IAT respondents did not converge and are therefore not reported.

Discussion

The current study examined whether regional bias, structural racism, and out-group exposure were predictive of Black implicit out-group preference and Black mental health. Contrary to hypotheses, however, changes in regional bias and structural racism

were not associated with the development of pro-White bias among Black Americans. In fact, after accounting for time trends and demographic covariates, changes in county-level White implicit but not explicit in-group predicted *decreased* implicit out-group preference among Black Americans. There was no evidence for an association between community-level aversive racism and Black implicit attitudes given that the relationship between White implicit and Black implicit bias was not moderated by varying levels of White explicit bias. In addition, traditional measures of structural racism (including Black unemployment, educational attainment, and jail incarceration rates) were not significantly associated with Black implicit attitudes, suggesting that the association between regional White implicit attitudes and Black implicit attitudes may be unique to regional bias rather than a feature of structural racism more broadly.

Given that previous research has demonstrated associations between regional intergroup bias and diminished minority health (Calanchini et al., 2022; Leitner et al., 2016a; Michaels et al., 2022; Orchard & Price, 2017) as well as associations between Black out-group preference and poorer mental health at the individual-level (Gale et al., 2020), understanding potential links between structural racism and Black racial attitudes can provide insight into health disparities. Furthermore, given that previous research on regional intergroup bias has relied almost entirely on cross-sectional designs (see Calanchini et al., 2022 for a review), we sought to provide support for directional inferences with the use of an autoregressive model incorporating six time periods and controlling for linear and quadratic changes in bias over the years of data collection.

Notably, our results appear to contradict those of Livingston et al. (2002), who found that at the individual-level, Black participants who perceived stronger implicit in-

group preference on the part of White Americans tended to exhibit greater implicit out-group preference themselves. This may reflect differences at the individual versus the regional level of analysis – studies of regional age bias, for example, have reported findings at the state- and county-level that point in the opposite direction of individual-level findings about the effects of perceived ageism on older adult well-being (Giasson & Chopik, 2023; Kellogg et al., 2023). Another possibility is that cultural shifts have altered the ways in which Black participants respond to perceived out-group negativity. It is also worth considering, however, that the current study analyzed real-world variation in White implicit attitudes rather than Black participants' *perceptions* of White attitudes, so there remains the possibility that other factors affecting the perception of the biases of the local White population might relate out-group preference in a way that differs from the more direct impacts of regional White implicit bias. Future research could investigate factors influencing the perception of local White attitudes as well as the extent to which the effects of perceived White attitudes and externally-measured White attitudes might vary.

Furthermore, the predicted interaction between aggregate White bias and out-group exposure was not supported by the results. When analyzed in the same model as White implicit or White explicit in-group preference, Black-White ratios were not associated with variation in Black implicit bias, nor did they moderate the association between White implicit in-group preference and Black implicit out-group preference. It may be the case that the relationship between White and Black implicit attitudes is contingent on Black residents' awareness of the attitudes of the local White population rather than on interactions per se. Given that explicit bias has been more strongly

associated with anti-Black discriminatory behavior and policies in other studies (e.g., Jimenez et al., 2022; Riddle & Sinclair, 2019; Stelter et al., 2022) and that the association between White explicit bias and Black implicit appeared at best weak and inconsistent in the current study, it may be the case that experiences of enacted stigma are not required for the perceived implicit attitudes of the out-group to have an impact on out-group preference.

As expected, and consistent with previous research on internalized racism at the individual-level (Gale et al., 2020) and aggregate White bias at the state-level (Gran-Ruaz et al., 2022), this study found that greater White implicit in-group preference and Black implicit out-group preference were both independently associated with poorer Black mental health outcomes. At the same time, however, the effects of Black implicit out-group preference on Black mental health were rendered non-significant after accounting for regional White in-group preference. This indicates that the racial biases of White Americans play a larger role in shaping Black mental health than Black out-group preference. Moreover, the finding that only White *implicit* but not explicit in-group preference predicted diminished Black mental health appears to contradict other Project Implicit studies of regional intergroup bias, in which *explicit* but not implicit anti-Black bias was associated with poorer Black physical health outcomes when analyzed in the same model (Leitner et al., 2016a; Orchard & Price, 2017) or in which both were significant but explicit bias exerted a stronger effect than implicit bias (Zestcott et al., 2022). The reasons behind these divergences are unclear, although differences in the analytic models – particularly the current study’s incorporation of time trends, in contrast to the cross-sectional designs of previous studies – may have played a role.

On the other hand, our results support the possibility that White implicit bias exerts unique adverse effects on minority mental health. Indeed, a recent study by Gran-Ruaz et al. (2022) found that state-level pro-White implicit bias was associated with higher rates of mental health-related mortality (suicide, alcohol-induced mortality, and drug-induced mortality) among Black residents, while state-level explicit bias was either negatively associated with Black mental health-related mortality or non-significant when analyzed in the same model. One possible reason may lie in the automaticity and subtlety of implicit bias. Previous research on interracial interactions indicates that while explicit bias is communicated primarily through verbal behavior, implicit bias is communicated primarily through non-verbal behaviors such as eye contact (Dovidio et al., 2002). Furthermore, among White Americans low in explicit racial bias, implicit bias in decision-making is typically expressed in ambiguous contexts in which individual decisions favoring other Whites can be rationalized in terms of non-racial factors (Pearson et al., 2009). There is some evidence suggesting that subtle or ambiguous incidents of racial discrimination can be more stressful than blatant incidents, given that attributional ambiguity may itself serve as a stressor (Stetler et al., 2006; Williams & Mohammed, 2009). In addition, since attributing negative feedback or insults to prejudice can protect self-esteem (Crocker & Major, 1989), subtle bias might elude the usual methods of responding to and coping with prejudice. Thus while community-level explicit bias may be primarily associated with poorer physical health, community-level implicit bias may be primarily associated with poorer mental health.

Initially, we had hypothesized that Black implicit out-group preference would mediate associations between regional bias and diminished Black mental health. Given

that neither county-level White implicit in-group preference nor alternative measures of structural racism were associated with greater pro-White attitudes among Black residents, the proposed mediational model would be inappropriate. It is not apparent, however, why both regional White in-group preference and Black out-group preference would be associated with poorer Black mental health when greater regional White in-group preference is associated with decreased Black out-group preference.

It also remains unclear what factors may be shaping Black out-group preference. Other scholars have implicated intrafamilial processes in contributing to or protecting against the internalization of racial prejudice (e.g., Constantine & Blackmon, 2002), something which would not have been captured in the current study's geographic analysis. Future research might explore potential interactions between community-level stigma and individual-level factors such as perceived peer and family support and racial socialization in the development of out-group preference.

Limitations

Given that the study design is non-experimental, causal conclusions cannot be drawn from these analyses. Individual-level conclusions also cannot be drawn from aggregate regional data. Furthermore, the Project Implicit sample is not random or nationally representative, even though post-stratification allows for the reduction of bias relative to raw scores when generating estimates. Project Implicit respondents tend to be younger and more highly educated than the population average, with early samples consisting primarily of college students. Whether time trends in the data reflect genuine shifts in racial attitudes across the nation over time or are simply due to differences in selection (namely, the type of respondents opting to participate in Project Implicit)

remains unclear. The analysis controlled for linear and quadratic time trends in post-stratified bias scores in part in order to reduce this potential confound. In contrast to the generally cross-sectional designs of prior geospatial Project Implicit analyses, the longitudinal autoregressive models used in the present study enabled inferences about the direction of effects. In addition, a difference score between explicit warmth toward White Americans and warmth towards Black Americans was used to capture explicit pro-White bias. We found few associations of White explicit in-group preference with outcomes, and it is possible that use of the difference score masked results. However, White Americans' explicit bias as a difference score has been used in a number of prior regional bias studies, and these typically observe stronger associations of explicit bias than implicit bias with Black physical health outcomes (e.g., Leitner et al., 2016a, 2016b; Orchard & Price, 2017). It therefore seems unlikely that use of a difference score has meaningfully affected the present results. Finally, it is possible that results reflect the influence of an unmeasured confound. Despite these limitations, however, this work represents a novel examination of the relationship between majority-group and minority-group bias as well as a contribution to the emerging literature on the relationship between structural racism and Black mental health (Acker et al., 2023; Gran-Ruaz et al., 2022; Hatzenbuehler et al., 2022).

Conclusion

In light of persistent racial disparities in health and well-being, as well as conflicts over addressing historical racial stratification, it is crucial to examine how structural racism influences Black attitudes and health outcomes. The present study indicates that although internalization of racial prejudice may not be a likely consequence of structural

racism, White Americans' racial biases may be contributing to intergroup polarization and exerting a detrimental impact on Black mental health. Continued examination of the potential unique effects of regional implicit bias may also be necessary to yield a comprehensive picture of the effects of social context on minority well-being.

Appendix

Table 1

County-Level Sample Descriptives and Correlations

Variable	County-Level Descriptives		Correlations (<i>r</i>):	
	Mean	<i>SD</i>	Black Implicit	<i>p</i>
Black Implicit Out-group Preference	-2.62	5.47	--	--
White Implicit In-group Preference	39.03	3.73	-0.35	< .001
White Explicit In-group Preference	61.50	27.66	-0.51	< .001
Black-White Ratio	0.17	0.43	-0.26	< .001
Black Unemployment	0.14	0.17	-0.12	< .001
Black Education	0.08	0.11	0.06	< .001
Black Jail Incarceration	0.10	1.01	-0.03	< .001
Total Population	10.26	1.48	0.06	< .001
Income Inequality	0.44	0.04	-0.15	< .001
Education	0.20	0.09	0.24	< .001
Median Income	10.73	1.48	0.42	< .001
General Unemployment	0.04	0.02	-0.43	< .001
Black Geographic Mobility	0.15	0.18	0.60	0.016

Table 2*Metropolitan Statistical Area-Level Descriptives and Correlations*

Variable	County-Level Descriptives		Correlations (<i>r</i>):	
	Mean	<i>SD</i>	Black Implicit	<i>p</i>
Black Mental Health	5.20	3.46	--	--
Black Implicit Out-Group Preference	-1.81	3.73	0.10	0.002
White Implicit In-Group Preference	38.55	3.12	-0.07	0.026
White Explicit In-Group Preference	55.53	30.04	-0.33	< .001
Black-White Ratio	0.15	0.24	0.00	0.979
Black Unemployment	0.12	0.07	-0.11	0.001
Black Education	0.11	0.06	0.02	0.566
Black Jail Incarceration	0.05	0.25	-0.11	0.101
Total Population	11.62	1.25	0.04	0.205
Income Inequality	0.44	0.03	0.04	0.203
Education	0.27	0.08	0.04	0.188
Median Income	10.90	0.21	0.14	< .001
General Unemployment	0.04	0.01	-0.26	< .001
Black Geographic Mobility	0.12	0.08	-0.02	0.554

Table 3*County-Level White Implicit In-group Preference Predicting Black Implicit Out-group**Preference – Main Effects Model*

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	-8.88	0.15	< .001	
White Implicit In-group Preference (Lagged)	-0.80	0.02	< .001	
Black Implicit Out-group Preference (Lagged)	-0.01	0.01	.261	
Time (Linear)	3.67	0.12	< .001	
Time (Quadratic)	-0.39	0.02	< .001	
Total Population	0.54	0.04	< .001	
Income Inequality	-2.99	2.15	.163	
Education	-4.80	0.91	< .001	
Median Income	3.67	0.39	< .001	
Unemployment	-63.75	3.58	< .001	
Black Geographic Mobility	19.83	0.34	< .001	

Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	2.51	0.13	18.93	< .001
τ_{10}	0.06	0.04	1.58	.114
τ_{11}	0.13	0.02	6.28	< .001
Residual	12.75	0.18	70.55	< .001

Table 4*County-Level White Explicit In-group Preference Predicting Black Implicit Out-group**Preference – Main Effects Model*

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	-10.19	0.15	< .001	
White Explicit In-group Preference (Lagged)	-0.00	0.00	.517	
Black Implicit Out-group Preference (Lagged)	-0.01	0.01	.307	
Time (Linear)	14.04	0.13	< .001	
Time (Quadratic)	-0.31	0.03	< .001	
Total Population	0.56	0.04	< .001	
Income Inequality	-3.25	2.14	.129	
Education	-4.30	0.87	< .001	
Median Income	3.57	0.39	< .001	
Unemployment	-64.18	3.58	< .001	
Black Geographic Mobility	19.81	0.34	< .001	

Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
t ₀₀	2.03	0.13	16.96	< .001
t ₁₀	--	--	--	--
t ₁₁	--	--	--	--
Residual	15.17	0.19	79.08	< .001

Table 5*Interactions Between County-Level White Implicit and Explicit In-group Preference**Predicting Black Implicit Out-group Preference*

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	-8.59	0.14	< .001	
White Implicit In-group Preference (Lagged)	-0.87	0.02	< .001	
White Implicit * White Explicit	0.03	0.03	.355	
Black Implicit Out-group Preference (Lagged)	-0.05	0.01	< .001	
Time (Linear)	3.29	0.12	< .001	
Time (Quadratic)	-0.31	0.02	< .001	
Total Population	0.56	0.04	< .001	
Income Inequality	-3.14	2.14	.143	
Education	-4.25	0.87	< .001	
Median Income	3.54	0.39	< .001	
Unemployment	-63.55	3.66	< .001	
Black Geographic Mobility	19.79	0.34	< .001	

Random Effects				
Variances	Estimate	SE	<i>z</i>	<i>p</i>
τ_{00}	2.61	0.13	19.73	< .001
τ_{10}	0.01	0.03	0.40	< .001
τ_{11}	0.00	0.02	0.11	.909
Residual	12.27	0.17	72.11	< .001

Note. White explicit bias has been aggregated across time periods in this model.

Table 6

Interactions Between County-Level White Implicit In-group Preference and Black-White Ratios Predicting Black Implicit Out-group Preference

Variable	Fixed Effects		
	<i>b</i>	<i>SE</i>	<i>p</i>
Intercept	-8.59	0.14	< .001
White Implicit In-group Preference (Lagged)	-0.87	0.02	< .001
Black-White Ratios	-0.09	0.13	.482
White Implicit * Black-White Ratios	0.03	0.03	.355
Black Implicit Out-group Preference (Lagged)	-0.05	0.01	< .001
Time (Linear)	3.29	0.12	< .001
Time (Quadratic)	-0.31	0.02	< .001
Total Population	0.56	0.04	< .001
Income Inequality	-3.14	2.14	.143
Education	-4.25	0.87	< .001
Median Income	3.54	0.39	< .001
Unemployment	-63.55	3.66	< .001
Black Geographic Mobility	19.79	0.34	< .001

Random Effects				
Variiances	Estimate	SE	<i>z</i>	<i>p</i>
τ_{00}	2.61	0.13	19.73	< .001
τ_{10}	0.01	0.03	0.40	.692
τ_{11}	0.00	0.02	0.11	.909
Residual	12.27	0.17	72.11	< .001

Table 7

Interactions Between County-Level White Explicit In-group Preference and Black-White Ratios Predicting Black Implicit Out-group Preference

Variable	Fixed Effects		
	<i>b</i>	<i>SE</i>	<i>p</i>
Intercept	-10.12	0.15	< .001
White Explicit In-group Preference (Lagged)	-0.03	0.00	< .001
Black-White Ratios	-0.00	0.00	.483
White Explicit * Black-White Ratios	0.00	0.00	.562
Black Implicit Out-group Preference (Lagged)	-0.05	0.01	< .001
Time (Linear)	3.98	0.13	< .001
Time (Quadratic)	-0.36	0.03	< .001
Total Population	0.56	0.04	< .001
Income Inequality	-3.17	2.14	.140
Education	-4.24	0.87	< .001
Median Income	3.53	0.39	< .001
Unemployment	-63.60	3.66	< .001
Black Geographic Mobility	19.79	.034	< .001

Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
t ₀₀	2.25	0.13	16.96	< .001
t ₁₀	--	--	--	--
t ₁₁	--	--	--	--
Residual	14.07	0.18	79.13	< .001

Table 8*Black Implicit Out-group Preference Predicting Poor Mental Health Days*

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	1.78	0.06	< .001	
Black Implicit Out-group Preference (Lagged)	0.03	0.01	.030	
Mental Health (Lagged)	-0.03	0.01	.002	
Time (Linear)	-0.32	0.05	< .001	
Time (Quadratic)	0.08	0.01	< .001	
Total Population	0.08	0.03	.003	
Income Inequality	-0.54	1.21	.657	
Education	-0.70	0.47	.140	
Median Income	-0.13	0.20	.517	
Unemployment	-1.95	2.67	.464	
Black Geographic Mobility	0.24	0.35	.493	

Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	0.03	0.01	4.13	< .001
τ_{10}	--	--	--	--
τ_{11}	--	--	--	--

Table 9*White Implicit In-group Preference Predicting Poor Mental Health Days*

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	1.74	0.06	< .001	
White Implicit In-group Preference (Lagged)	0.07	0.01	< .001	
Mental Health (Lagged)	-0.04	0.01	.001	
Time (Linear)	-0.43	0.03	< .001	
Time (Quadratic)	0.12	0.01	< .001	
Total Population	0.07	0.03	.004	
Income Inequality	-0.34	1.20	.779	
Education	-0.77	0.47	.105	
Median Income	-0.09	0.20	.638	
Unemployment	-1.34	2.65	.613	
Black Geographic Mobility	0.27	0.35	.445	

Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	0.03	0.01	4.22	< .001
τ_{10}	--	--	--	--
τ_{11}	--	--	--	--

Table 10*White Explicit In-group Preference Predicting Poor Mental Health Days*

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	1.83	0.07	< .001	
White Explicit In-group Preference (Lagged)	-0.00	0.00	.486	
Mental Health (Lagged)	-0.03	0.01	.002	
Time (Linear)	-0.38	0.05	< .001	
Time (Quadratic)	0.10	0.01	< .001	
Total Population	0.07	0.03	.003	
Income Inequality	-0.57	1.20	.637	
Education	-0.70	0.47	.137	
Median Income	-0.13	0.20	.519	
Unemployment	-1.91	2.65	.471	
Black Geographic Mobility	0.25	0.35	.475	

Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	0.02	0.01	4.07	< .001
τ_{10}	--	--	--	--
τ_{11}	--	--	--	--

Table 11*All Regional Bias Variables Predicting Poor Mental Health Days*

Fixed Effects				
Variable	<i>b</i>	SE	<i>p</i>	
Intercept	1.47	0.02	< .001	
Black Implicit Out-group Preference (Lagged)	0.00	0.01	.986	
White Implicit In-group Preference (Lagged)	0.10	0.01	< .001	
White Explicit In-group Preference (Lagged)	-0.02	0.00	< .001	
Mental Health (Lagged)	-0.05	0.01	< .001	
Time (Linear)	-0.27	0.06	< .001	
Time (Quadratic)	0.07	0.02	< .001	
Total Population	0.07	0.03	.013	
Income Inequality	-0.05	1.29	.967	
Education	-0.97	0.48	.042	
Median Income	0.02	0.21	.921	
Unemployment	-1.19	2.85	.677	
Black Geographic Mobility	0.22	0.38	.562	

Random Effects				
Variances	Estimate	SE	<i>z</i>	<i>p</i>
τ_{00}	0.03	0.01	4.66	< .001
τ_{10}	--	--	--	--
τ_{11}	--	--	--	--

Table 12*Structural Racism and Regional Bias Predicting Poor Mental Health Days*

Variable	Fixed Effects		
	<i>b</i>	<i>SE</i>	<i>p</i>
Intercept	1.83	0.07	< .001
Black Unemployment (Lagged)	-1.41	0.47	.002
Black Education (Lagged)	-1.06	0.74	.149
Black Incarceration (Lagged)	-0.07	0.30	.819
Black Implicit Out-group Preference (Lagged)	0.01	0.01	.519
White Implicit In-group Preference (Lagged)	0.10	0.01	< .001
White Explicit In-group Preference (Lagged)	-0.01	0.00	< .001
Mental Health (Lagged)	-0.04	0.01	< .001
Time (Linear)	-0.24	0.06	< .001
Time (Quadratic)	-0.24	0.06	< .001
Total Population	0.04	0.02	.039
Income Inequality	-0.96	1.00	.333
Median Income	-0.22	0.12	.069
Black Geographic Mobility	-0.04	0.31	.907

Random Effects				
Variiances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	0.02	0.00	4.67	< .001
τ_{10}	--	--	--	--
τ_{11}	--	--	--	--

Table 13*Traditional Structural Racism Measures Predicting Poor Mental Health Days*

Variable	Fixed Effects		
	<i>b</i>	<i>SE</i>	<i>p</i>
Intercept	1.76	0.07	< .001
Black Unemployment (Lagged)	-1.28	0.56	.023
Black Education (Lagged)	-0.17	0.77	.828
Black Incarceration (Lagged)	-0.32	0.34	.351
Mental Health (Lagged)	-0.03	0.01	.002
Time (Linear)	-0.36	0.04	< .001
Time (Quadratic)	0.10	0.01	< .001
Total Population	0.06	0.02	.003
Income Inequality	-1.26	1.00	.207
Median Income	-0.30	0.12	.014
Black Geographic Mobility	0.10	0.33	.756

Variances	Random Effects			
	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	0.02	0.01	3.96	< .001
τ_{10}	--	--	--	--
τ_{11}	--	--	--	--

Table 14*Black Unemployment Predicting Black Implicit Out-group Preference*

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	-10.23	0.15	< .001	
Black Unemployment (Lagged)	-0.54	0.31	.084	
Black Implicit Out-group Preference (Lagged)	-0.01	0.01	.388	
Time (Linear)	3.82	0.13	< .001	
Time (Quadratic)	-0.30	0.02	< .001	
Total Population	0.29	0.04	< .001	
Income Inequality	-4.06	2.25	.071	
Education	-2.66	0.91	.003	
Median Income	5.02	0.40	< .001	
Black Geographic Mobility	20.31	0.36	< .001	

Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	2.55	0.15	17.44	< .001
τ_{10}	--	--	--	--
τ_{11}	--	--	--	--
Residual	15.19	0.19	79.27	< .001

Table 15*Black Educational Attainment Predicting Black Implicit Out-group Preference*

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	-10.20	0.15	< .001	
Black Education (Lagged)	-0.33	0.48	.492	
Black Implicit Out-group Preference (Lagged)	-0.01	0.01	.385	
Time (Linear)	3.78	0.12	< .001	
Time (Quadratic)	-0.30	0.02	< .001	
Total Population	0.52	0.04	< .001	
Income Inequality	-9.32	1.76	< .001	
Median Income	2.28	0.29	< .001	
Unemployment	-62.30	3.57	< .001	
Black Geographic Mobility	19.69	0.34	< .001	

Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	2.06	0.13	15.36	< .001
τ_{10}	--	--	--	--
τ_{11}	--	--	--	--
Residual	15.20	0.19	79.27	< .001

Table 16*Black Jail Incarceration Predicting Black Implicit Out-group Preference*

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	-10.20	0.15	< .001	
Black Incarceration (Lagged)	0.01	0.10	.893	
Black Implicit Out-group Preference (Lagged)	-0.01	0.01	.402	
Time (Linear)	3.79	0.13	< .001	
Time (Quadratic)	-0.30	0.02	< .001	
Total Population	0.56	0.04	< .001	
Income Inequality	-3.24	2.14	.130	
Education	-4.30	0.87	< .001	
Median Income	3.57	0.39	< .001	
Unemployment	-64.17	3.58	< .001	

Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	2.02	0.13	15.17	< .001
τ_{10}	--	--	--	--
τ_{11}	--	--	--	--
Residual	15.20	0.19	79.27	< .001

Table 17

County-Level White Implicit In-group Preference and Traditional Measures of Structural Racism Predicting Black Implicit Out-group Preference

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	-8.91	0.15	< .001	
White Implicit In-group Preference (Lagged)	-0.80	0.02	< .001	
Black Unemployment (Lagged)	-0.63	0.30	.036	
Black Education (Lagged)	-0.62	0.45	.168	
Black Incarceration (Lagged)	-0.00	0.11	.989	
Black Implicit Out-group Preference (Lagged)	-0.01	0.01	.238	
Time (Linear)	3.70	0.12	< .001	
Time (Quadratic)	-0.39	0.02	< .001	
Total Population	0.25	0.04	< .001	
Income Inequality	-8.24	1.86	< .001	
Median Income	4.14	0.28	< .001	
Geographic Mobility	20.23	0.36	< .001	

Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	3.05	0.15	20.93	< .001
τ_{10}	0.06	0.04	1.51	.131
τ_{11}	0.13	0.02	6.30	< .001
Residual	12.74	0.18	70.54	< .001

Table 18

County-Level White Explicit In-group Preference and Traditional Measures of Structural Racism Predicting Black Implicit Out-group Preference

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	-9.94	0.16	< .001	
White Explicit In-group Preference (Lagged)	-0.02	0.00	< .001	
Black Unemployment (Lagged)	-0.55	0.31	.080	
Black Education (Lagged)	-0.44	0.48	.357	
Black Incarceration (Lagged)	-0.01	0.11	.908	
Black Implicit Out-group Preference (Lagged)	-0.01	0.01	.546	
Time (Linear)	3.91	0.14	< .001	
Time (Quadratic)	-0.36	0.03	< .001	
Total Population	0.22	0.05	< .001	
Income Inequality	-8.48	1.86	< .001	
Median Income	4.04	0.28	< .001	
Geographic Mobility	19.77	0.40	< .001	

Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	2.64	0.16	16.72	< .001
τ_{10}	--	--	--	--
τ_{11}	--	--	--	--
Residual	14.97	0.20	76.76	< .001

Table 19

County-Level White Implicit In-group Preference Predicting Black Implicit Out-group Preference in Counties Using At Least 1 Black Respondent

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	-6.83	0.17	< .001	
White Implicit In-group Preference (Lagged)	-0.66	0.03	< .001	
Black Implicit Out-group Preference (Lagged)	-0.13	0.02	< .001	
Time (Linear)	2.36	0.14	< .001	
Time (Quadratic)	-0.25	0.03	< .001	
Total Population	0.64	0.09	< .001	
Income Inequality	-7.64	4.18	.068	
Education	-5.02	1.80	.005	
Median Income	2.43	0.77	.002	
Unemployment	-65.44	8.26	< .001	
Black Geographic Mobility	12.99	1.30	< .001	

Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	4.58	0.27	16.93	< .001
τ_{10}	0.45	0.07	6.74	< .001
τ_{11}	0.22	0.02	10.08	< .001
Residual	4.49	0.12	-9.11	< .001

Table 20

County-Level White Implicit In-group Preference Predicting Black Implicit Out-group Preference in Counties Using At Least 25 Black Respondents

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	-4.41	0.31	< .001	
White Implicit In-group Preference (Lagged)	-0.34	0.04	< .001	
Black Implicit Out-group Preference (Lagged)	-0.31	0.04	< .001	
Time (Linear)	1.02	0.24	< .001	
Time (Quadratic)	-0.07	0.05	.115	
Total Population	0.11	0.15	.459	
Income Inequality	-0.33	6.29	.958	
Education	-7.53	2.70	.005	
Median Income	3.68	1.20	.002	
Unemployment	-105.20	15.61	< .001	
Black Geographic Mobility	-3.58	2.63	.174	

Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	2.28	0.27	8.30	< .001
τ_{10}	0.03	0.07	0.39	.694
τ_{11}	0.11	0.03	4.04	< .001
Residual	3.79	0.22	17.42	< .001

Table 21

County-Level White Implicit In-group Preference Predicting Black Implicit Out-group Preference in Counties Using At Least 50 Black Respondents

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	-4.77	0.39	< .001	
White Implicit In-group Preference (Lagged)	-0.27	0.06	< .001	
Black Implicit Out-group Preference (Lagged)	-0.38	0.06	< .001	
Time (Linear)	0.97	0.31	.002	
Time (Quadratic)	-0.06	0.06	.311	
Total Population	0.05	0.18	.764	
Income Inequality	0.11	6.83	.987	
Education	-8.28	3.28	.012	
Median Income	4.55	1.36	.001	
Unemployment	-102.15	20.36	< .001	
Black Geographic Mobility	-5.96	3.33	.074	
Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	1.81	0.33	5.56	< .001
τ_{10}	-0.10	0.08	-1.31	.189
τ_{11}	0.09	0.03	2.91	.004
Residual	3.71	0.28	13.09	< .001

Table 22

County-Level White Explicit In-group Preference Predicting Black Implicit Out-group Preference in Counties Using At Least 1 Black Respondent

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	-8.05	0.20	< .001	
White Explicit In-group Preference (Lagged)	-0.03	0.00	< .001	
Black Implicit Out-group Preference (Lagged)	-0.06	0.02	.003	
Time (Linear)	2.98	0.17	< .001	
Time (Quadratic)	-0.31	0.04	< .001	
Total Population	0.84	0.09	< .001	
Income Inequality	-11.60	4.24	.006	
Education	0.74	1.64	.654	
Median Income	0.94	0.76	.212	
Unemployment	-72.41	8.40	< .001	
Black Geographic Mobility	14.18	1.31	< .001	

Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	3.85	0.24	16.08	< .001
τ_{10}	--	--	--	--
τ_{11}	--	--	--	--
Residual	6.89	0.16	43.53	< .001

Table 23

County-Level White Explicit In-group Preference Predicting Black Implicit Out-group Preference in Counties Using At Least 25 Black Respondents

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	-4.67	0.35	< .001	
White Explicit In-group Preference (Lagged)	-0.03	0.01	< .001	
Black Implicit Out-group Preference (Lagged)	-0.27	0.04	< .001	
Time (Linear)	1.39	0.28	< .001	
Time (Quadratic)	-0.15	0.06	.012	
Total Population	0.11	0.15	.469	
Income Inequality	-0.69	6.23	.912	
Education	-7.03	2.38	.003	
Median Income	3.55	1.16	.002	
Unemployment	-105.31	15.54	< .001	
Black Geographic Mobility	-3.60	2.63	.171	

Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	2.07	0.27	7.67	< .001
τ_{10}	--	--	--	--
τ_{11}	--	--	--	--
Residual	4.79	0.23	20.83	< .001

Table 24

County-Level White Explicit In-group Preference Predicting Black Implicit Out-group Preference in Counties Using At Least 50 Black Respondents

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	-4.46	0.44	< .001	
White Explicit In-group Preference (Lagged)	-0.05	0.01	< .001	
Black Implicit Out-group Preference (Lagged)	-0.33	0.05	< .001	
Time (Linear)	1.53	0.36	< .001	
Time (Quadratic)	-0.24	0.08	.003	
Total Population	0.09	0.18	.623	
Income Inequality	1.81	6.75	.789	
Education	-10.46	2.85	< .001	
Median Income	5.02	1.32	< .001	
Unemployment	-104.17	20.45	< .001	
Black Geographic Mobility	-5.56	3.34	.096	

Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	1.65	0.32	5.15	< .001
τ_{10}	--	--	--	--
τ_{11}	--	--	--	--
Residual	4.43	0.28	15.71	< .001

Table 25

Raw County-Level White Implicit In-group Preference Predicting Black Implicit Out-group Preference

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	-5.81	1.34	< .001	
White Implicit In-group Preference (Lagged)	-0.07	0.03	.017	
Black Implicit Out-group Preference (Lagged)	-0.26	0.01	< .001	
Time (Linear)	2.68	1.04	.010	
Time (Quadratic)	-0.27	0.17	.120	
Total Population	1.49	0.37	< .001	
Income Inequality	-31.47	18.79	.094	
Education	-2.46	7.14	.731	
Median Income	-1.47	3.31	.657	
Unemployment	-136.55	36.03	< .001	
Black Geographic Mobility	7.85	4.84	.105	

Random Effects				
Variiances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	36.12	7.97	4.53	< .001
τ_{10}	--	--	--	--
τ_{11}	--	--	--	--
Residual	527.64	11.23	46.99	< .001

Table 26

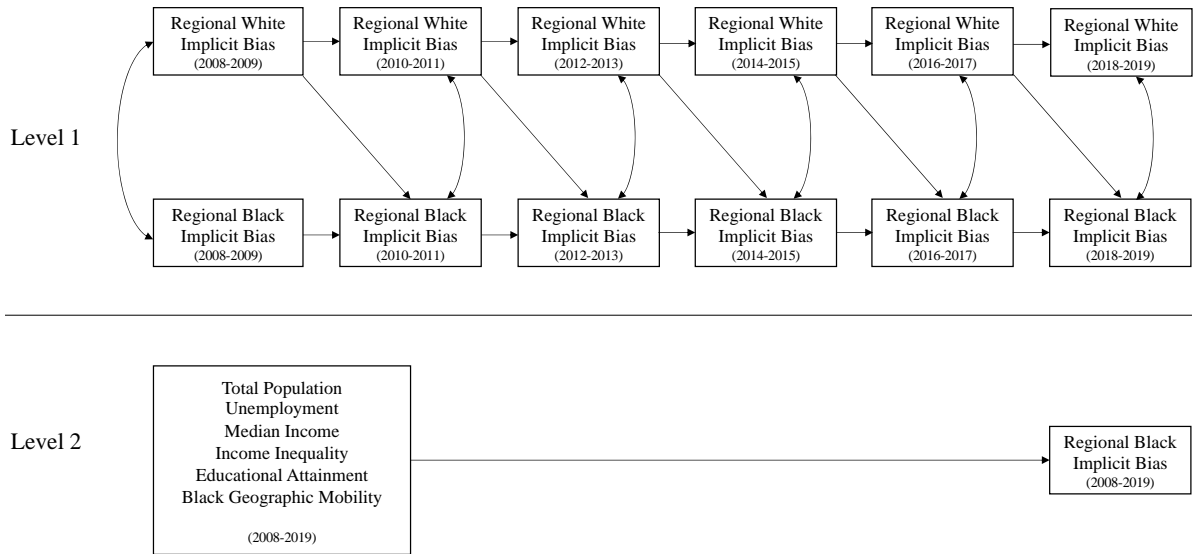
Raw County-Level White Explicit In-group Preference Predicting Black Implicit Out-group Preference

Fixed Effects				
Variable	<i>b</i>	<i>SE</i>	<i>p</i>	
Intercept	-5.76	1.34	< .001	
White Explicit In-group Preference (Lagged)	0.01	0.01	.077	
Black Implicit Out-group Preference (Lagged)	-0.27	0.01	< .001	
Time (Linear)	2.32	1.05	.027	
Time (Quadratic)	-0.17	0.17	.318	
Total Population	1.48	0.37	< .001	
Income Inequality	-32.10	18.78	.087	
Education	-2.30	7.14	.747	
Median Income	-1.53	3.31	.645	
Unemployment	-135.57	36.01	< .001	
Black Geographic Mobility	7.73	4.84	.110	

Random Effects				
Variances	Estimate	<i>SE</i>	<i>z</i>	<i>p</i>
τ_{00}	35.94	7.97	4.51	< .001
τ_{10}	--	--	--	--
τ_{11}	--	--	--	--
Residual	527.78	11.23	47.00	< .001

Figure 1

Autoregressive Model (County-Level White Implicit In-group Preference)



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