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Racism, Health Status, and Birth Outcomes: Results of a Participatory Community-Based Intervention and Health Survey

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ABSTRACT *Many community-based participatory research (CBPR) partnerships address social determinants of health as a central consideration. However, research studies that explicitly address racism are scarce in the CBPR literature, and there is a dearth of available community-generated data to empirically examine how racism influences health disparities at the local level. In this paper, we provide results of a cross-sectional, population-based health survey conducted in the urban areas of Genesee and Saginaw Counties in Michigan to assess how a sustained community intervention to reduce racism and infant mortality influenced knowledge, beliefs, and experiences of racism and to explore how perceived racism is associated with self-rated health and birth outcomes. We used ANOVA and regression models to compare the responses of intervention participants and non-participants as well as African Americans and European Americans (N=629). We found that intervention participants reported greater acknowledgment of the enduring and differential impact of racism in comparison to the non-intervention participants. Moreover, survey analyses revealed that racism was associated with health in the following ways: (1) experiences of racial discrimination predicted self-rated physical health, mental health, and smoking status; (2) perceived racism against one's racial group predicted lower self-rated physical health; and (3) emotional responses to racism-related experiences were marginally associated with lower birth-weight births in the study sample. Our study bolsters the published findings on perceived racism and health outcomes and highlights the usefulness of CBPR and community surveys to empirically investigate racism as a social determinant of health.*

KEYWORDS *Racism, Health status, Infant mortality, Community health survey, Community-based participatory research, REACH*

INTRODUCTION

Since 2000, the Genesee County Racial and Ethnic Approaches to Community Health coalition (REACH) has coordinated a multiprogram intervention to reduce the racial disparity in infant mortality in the county. The premise underlying REACH is that racism is a fundamental cause of racial health disparities through its

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influence on social-economic conditions,[1] societal and institutional structures,[2,3] racial prejudice and discrimination,[4,5] and stress,[6,7] which harm health. In accordance with a fundamental cause framework which attributes essential disease risks to social contexts,[8] the intervention seeks to redress infant mortality disparities by focusing directly on aspects of racism hypothesized to impact infant health. Accordingly, the intervention includes (a) community mobilization activities to improve awareness and understanding of racism and promote individual and community empowerment to "undo" racism; and (b) healthcare system activities to combat institutional racism and improve patient care for racially diverse populations. The REACH partnership is composed of community-based organizations, the county health department, local health and social service organizations, and an academic research center dedicated to community-based participatory research (CBPR). REACH embodies CBPR principles through its valuing of equitable research contributions and co-learning among all partners and its commitment to action-based research for the benefit of communities.[9]

Previous publications describe REACH programs in more detail.[10–12] The purpose of the present paper is to highlight results from the *Racism and Health Disparities Community Survey* developed as one component of an overall REACH program evaluation. The REACH participant and general population–based survey was designed to elicit data on racism-related knowledge, beliefs, and experiences of community residents, and explore the relationship of racism experiences to self-reported health and pregnancy-related health outcomes. The survey assessed racism knowledge and beliefs with the idea that racism education was a crucial step to developing critical race consciousness,[13] reducing prejudice,[4] and implementing social and community change[14] to reduce African-American health disparities. The assessment of health among survey participants provided an indirect measure of the potential impact of REACH programs that provided health education for high-risk mothers and families, enhanced psychosocial resources for individuals impacted by racism, and fostered improvements in perinatal healthcare.

Although REACH acknowledges the contributions of behavioral and biomedical factors to infant mortality, its main focus is addressing social determinants of African-American infant mortality, particularly racism. In addition to structural racism,[15,16] which is conceptualized by REACH as a primary social determinant of disparate health conditions and health outcomes in African-American communities, the intermediate pathways through which racism results in adverse fetal and infant health outcomes are understood within a socioecological framework that integrates racism-related stress[6,7] and stress-adaptation theories.[17] Racism may engender chronic, cumulative stress, which stimulates disruptive physiological processes that cause disease, including adverse maternal and infant health outcomes during pregnancy and over the life course.[18–20] Altogether, these theories provide a rational basis for REACH's focus on reducing racism as a viable public health strategy to ameliorate racial disparities in African-American health.

Previous studies have provided empirical evidence of the harmful influence of racial discrimination and other indicators of racism on African-American general and infant health.[21–23] Perceived discrimination has been associated with low self-rated mental and physical health,[24–26] low birth weight,[27–29] and preterm delivery[30,31] among African Americans. Perceived discrimination has also been associated with hypertension[32,33] and smoking,[34] which are risk factors during pregnancy. Structural manifestations of racism also threaten the health of African-American infants. For example, greater levels of racial residential segregation have independently predicted lower birth-weight births,[35] and black–white disparities in

infant mortality.[36] It is notable that several reviews have documented statistically insignificant associations between racism and health,[21–23] and there are limitations across studies related to inconsistent measures of racism and health as well as reliance on cross-sectional designs which restrict the ability to test explanatory or causal mechanisms. Nevertheless, the overall evidence suggests that racism, usually operationalized as perceived racial discrimination, is inversely related to health.

A search of articles indexed in PubMed yielded only two CBPR studies that significantly addressed racism and health status. We did not consider articles that focused on conceptualization or measurement of racism or discussed racism as a challenge within CBPR partnerships. The first selected study described the CBPR process used by a North Carolina-based collaborative to develop a proposal to investigate institutional racism and disparities in breast cancer care.[37] Similar to Genesee County REACH, the collaborative included Undoing Racism[38] as part of its research planning and intervention activities. The second study presented results of a population-based health survey developed as part of a CBPR project to examine social stressors and health among African-American women in Detroit.[39] A longitudinal analysis of two waves of the survey revealed that an increase in discrimination over time was associated with increased depressive symptoms and decreased self-rated general health, adjusting for baseline and sociodemographic measures.

Building on these studies, our project augments the racism and health research literature by expanding the representation of findings from population-based surveys developed by deliberate CBPR partnership approaches. Moreover, our study incorporates a large probability sample of local community residents; examines several measures of racism and health, including pregnancy-associated outcomes; and offers an evaluation of the potential impact of anti-racism education.

METHODS

Study Design

The *Racism and Health Disparities Community Survey* is a cross-sectional, population-based survey developed by REACH in accordance with CBPR principles.[9] Partners participated in all phases of research, including deciding the focus of the survey, developing and refining questions, pilot testing the survey, and approving the final questionnaire. Partnership members also participated in the analysis, translation, and dissemination of survey results. The Institutional Review Board for Health Sciences at the University of Michigan approved the survey instrument and study design.

Sampling and Recruitment

Random telephone listings were obtained for all four intervention ZIP codes in Genesee County and three demographically similar comparison ZIP codes in neighboring Saginaw County where the majority of African Americans resided. Computer-assisted telephone interviews (CATI) were conducted on consenting participants aged 18–45 ($n=663$) who were contacted at random until the quota of participants was met for each county. Only 105 REACH program participants were surveyed via the CATI method. Therefore, partnership members conducted additional convenience sample recruitment of REACH program participants ($n=82$) who self-administered a written version of the survey.

Of the 170 REACH respondents who identified as either African American or European American, 55.3% (n=94) were in the CATI group and 44.7% (n=76) were in the written survey group. The groups differed by race, education, and age. However, in fully adjusted models the mode of survey administration generally did not influence the outcomes described in this paper.

Participants

The analyses in this paper are restricted to 629 survey respondents who reported their race as African American/black only or European American/white only. Twenty-seven percent (n=170) were REACH participants and 73% (n=459) were non-REACH participants.

Measures

The 128-item survey assessed sociodemographic characteristics (age, highest education completed, and self-identified race); beliefs and experiences of racism; self-reported health; and pregnancy and birth experiences.

Twenty-four racism questions were included in the survey. On the total survey sample we conducted Principal Axis Factoring that elicited five dimensions of racism (with noted Chronbach's alphas) from which scale mean average measurements were computed. The *racism knowledge and beliefs* scale (α=0.78) included seven questions developed by REACH that asked about racism in the USA and its enduring effect on African Americans. Sample items included: "I believe that racism exists in our society today"; "Racism is a combination of racial prejudice and power"; and "Even today, blacks feel the effects of slavery and segregation." Response options ranged from 1=Strongly disagree to 4=Strongly agree. The *racial discrimination* scale (α=0.84) included five items adapted from the Everyday Discrimination Scale.[26] Respondents were asked if in the past 12 months they had experienced any of the following situations due to their race: being ignored, overlooked, not given service; treated rudely or disrespectfully; observed or followed while in public places; treated as if they were not intelligent; and threatened, harassed, or called names. Response options ranged from 1=Never to 4=Often. *Perceived group-impact racism* (α=0.60) is a three-item measure to assess the perceived impact of racism on one's racial group. Respondents were asked how much they thought their racial group were regarded in the USA (1=Very positively to 5=Very negatively); how much they thought racism affected the lives of people in their racial/ethnic group (1=Not at all to 5=Extremely); and how frequently they heard about incidents of racial prejudice, discrimination, or racism from family, friends, co-workers, etc. (1=Once a year or less to 5=Every day) adapted from the Racism and Life Experiences Scale.[40] *Racism-related stress* (α=0.70) is a four-item measure to gauge the degree to which racism was perceived as stressful, adapted from Racism and Life Experiences Scale[40] and the Reactions to Race Module of the Behavioral Risk Factor Surveillance System.[41] Respondents were asked how often they thought about their race (1=Never/Once a year to 5=Once an hour/constantly); how much they thought about racism (1=Never to 4=Often); how much they personally experienced racial prejudice, discrimination, or racism during the past 12 months (1=Not at all to 5=Extremely); and how much stress racism has caused them during their lifetime (1=None to 5=Extreme). *Emotional reactions to racism* (α=0.84) is a five-item measure to gauge the intensity of possible emotional responses to racism-related experiences. Items were adapted from the Racism-related Experiences Scale.[42] Respondents were asked separately how angry, nervous or tense,

depressed, bothered, and powerless they felt when something happened to them because of their race. Response options ranged from 1=Not at all to 5=Extremely.

Health issues explored were self-rated health, smoking, and birth outcomes. *Self-reported physical* and *mental health* were separately evaluated with the question, "In general, would you say your (physical health/mental health) is excellent, very good, good, fair, or poor?"[43] Response options ranged from 1=Poor to 5=Excellent. We also evaluated data on *smoking* (i.e., current smoker and smoked at least 100 cigarettes in a lifetime, coded as 0=non-smoker and 1=smoker). Questions on *pregnancy and birth* were asked of respondents with children aged 10 or less at the time of the survey. We documented parent-reported birth weight (coded 0=Greater than or equal to 2,500 g (normal weight) and 1=Less than 2,500 g (low birth weight)).

Data Analysis

We used analysis of variance (ANOVA) models to analyze group differences in racism knowledge, attitudes, experiences, and self-reported health between REACH participants and non-REACH participants, adjusting for highest educational level and race. We also compared European Americans and African Americans, adjusting for REACH participation and highest education level. Multivariable linear and logistic regression models were used to predict relationships between racism-related measures and general and reproductive health status, adjusting for race and education. All models were tested with a group x race interaction to evaluate response differences by race based on participation in the intervention or non-intervention groups. Pregnancy and infant outcomes were disaggregated by birth cohort periods prior to (1997–2001) and during (2002–2007) the REACH intervention. Generalized linear estimation with repeated measures was used to evaluate birth cohort differences, adjusting for parents' race as well as the number of children born to each parent within each birth cohort period. Analyses were conducted with PASW Version 17.0 (SPSS Inc., Chicago, IL).

RESULTS

Participant Characteristics

Of the 629 selected respondents, 27% (n=170) had participated in at least one REACH program (hereafter, "REACH participants") and 73% (n=459) had no direct experience with the REACH intervention (hereafter, "non-REACH participants"). The REACH group had the highest proportions of African Americans, college graduates, and persons 45 years and older. Age was not a significant predictor in preliminary regression analyses, and it was excluded from the final models. Table 1 provides information on respondent characteristics.

Knowledge, Beliefs, and Experiences of Racism

REACH participants had higher levels of agreement than non-REACH participants regarding the continuing impact of racism, slavery, segregation, and prejudice in the United States (Table 2). The mean difference in racism-related knowledge and beliefs between the participants who took part in REACH programs and the non-REACH participants was 1.6 times larger than the mean difference between African Americans and European Americans in the general population (Table 3). Participants in REACH programs were also more likely than non-participants to report

TABLE 1 Characteristics of survey respondents

	REACH participants ($n=170$)	Non-REACH participants ($n=459$)	Total ($N=629$)
	n (%)	*n* (%)	*N* (%)
Race*			
African American	131 (77.1)	276 (60.1)	407 (64.7)
European American	39 (22.9)	183 (39.9)	222 (35.3)
Sex*			
Female	103 (60.6)	350 (76.3)	453 (72.0)
Male	67 (39.4)	109 (23.7)	206 (28.0)
Age*			
18–24	18 (15.7)	51 (11.6)	69 (12.4)
25–44	72 (62.6)	382 (86.8)	454 (81.8)
45+	25 (21.7)	7 (1.6)	32 (5.8)
Highest education*			
Less than high school	19 (11.3)	48 (10.5)	67 (10.7)
High school graduate	14 (8.3)	153 (33.3)	167 (26.6)
Technical school or some college	46 (27.4)	150 (32.7)	196 (31.3)
College graduate	89 (53.0)	108 (23.5)	197 (31.4)

*$p<.001$ based on Chi-square tests of percentage differences

having experienced racial discrimination, controlling for educational attainment and race. Overall, African Americans experienced day-to-day types of discrimination "sometimes" or "often" in comparison to European Americans who "never" or "rarely" experienced racial discrimination as they went about their daily lives (Table 2).

Group-impact racism measures the perceived impact of racism on one's racial group as a whole, including perceptions about how members of one's group are regarded in society. Group-impact racism was the only racism-related response measure with a significant group x race interaction. Controlling for educational level, European Americans who participated in REACH programs were 1.8 times less likely than African Americans to view their racial group as being regarded negatively (Table 2). This difference was significantly larger than the racial gap observed among non-REACH participants (1.3 times difference), as noted by an interactive effect ($F(1, 609)=32.47$, $p=0.000$) of race and intervention group participation. Tables 2 and 3 provide the adjusted main effect values for group and race differences in perceived group-impact racism, inclusive of the interaction effect.

Racism-related stress is an indicator of the degree to which racism manifests as a chronic stressor in a person's life. REACH participants were more likely than non-REACH respondents to report low to moderate levels of racism-related stress when group race and education levels were held constant (Tables 2 and 3). African Americans reported the highest overall levels of low to moderate stress due to racism, including direct reports of racism-related stress as well as presumed stress indicated by the frequency with which an individual thought about their race. In addition, REACH participants and African Americans reported more extreme emotional reactions to race-related experiences than their respective non-REACH and European American counterparts (Tables 2 and 3).

TABLE 2 Adjusted means in racism and health measures by REACH program participation, and by race, Genesee County REACH Racism and Health Disparities Community Survey, 2007

Racism and health measures	REACH participants	Non-REACH Participants	African Americans	European Americans
	Marginal mean[a] (SE)	Marginal mean[a] (SE)	Marginal mean[b] (SE)	Marginal mean[b] (SE)
Racism knowledge and beliefs,[c] 1 (low) to 4 (high)	3.26 (0.04)	3.02 (0.04)	3.22 (0.03)	3.06 (0.04)
Experiences of discrimination, 1 (never) to 4 (often)	2.24 (0.06)	2.01 (0.04)	2.47 (0.04)	1.77 (0.06)
Perceived group-impact racism, 1 (low impact) to 5 (high impact)	2.88 (0.07)	2.89 (0.04)	3.49 (0.04)	2.28 (0.07)
Interactive effect, by race				
African American	3.70 (0.07)	3.28 (0.05)		
European American	2.06 (0.12)	2.50 (0.06)		
Racism-related stress, 1 (none) to 5 (extreme)	2.69 (0.08)	2.20 (0.05)	2.73 (0.05)	2.15 (0.07)
Emotional reactions to racism, 1 (low emotions) to 5 (extreme emotions)	2.92 (0.10)	2.71 (0.06)	3.06 (0.06)	2.58 (0.09)
Self-reported physical health, 1 (poor) to 5 (excellent)	3.54 (0.09)	3.32 (0.05)	3.31 (0.06)	3.55 (0.08)
Self-reported mental health, 1 (poor) to 5 (excellent)	3.74 (0.10)	3.43 (0.06)	3.51 (0.06)	3.66 (0.09)

SE standard error

[a]Estimate of the participant group mean adjusted for race and education

[b]Estimate of the racial group mean adjusted for education and participation in a REACH program.

[c]Marginal mean for racism knowledge-beliefs reflects a significant adjusted difference between telephone-interviewed (CATI) survey participants and those who self-administered a written survey

Racism, Health, and Birth Outcomes

Survey respondents rated their health as "good" to "very good" on average (Table 2). However, participants in the REACH intervention reported better self-rated physical health and mental health than non-REACH participants (Table 3). The more favorable general health assessments were maintained when adjusting for education and race composition differences among the groups. Moreover, an average scale increase in reported experiences of discrimination in the past year was associated with a decline in self-rated physical health and mental health among all survey participants combined, adjusting for race, education, and REACH program participation (Table 4). A similar association held for racism-related stress, perceived group-impact racism, and emotional reactions to racism such that average scale increases in these measures were associated with lower self-reported levels of physical and mental health. In contrast to the inverse racism and health pattern observed in the aggregate sample, REACH participants reported *better* overall physical and mental health in relation to *increased* discrimination, racism-related stress, emotional reactions to racism, and perceived group-impact racism (Table 4).

Both discrimination and racism-related stress predicted smoking. Overall, respondents were 42% and 31% more likely to smoke for each average level increase in reported discrimination or stress, respectively, controlled for race and

TABLE 3 Group and race differences in racism-related knowledge, racism-related experiences, and self-reported health, Genesee County REACH Racism and Health Disparities Community Survey, 2007

	Intervention group differences: REACH and non-REACH participants[a]		Racial group differences: African Americans and European Americans[b]	
Racism and health measures[c]	*b* (SE)	*t*	*b* (SE)	*t*
Racism knowledge and beliefs,[d] 1 (low) to 4 (high)	0.25 (0.05)	5.10***	0.16 (0.04)	4.52***
Experiences of discrimination, 1 (never) to 4 (often)	0.24 (0.07)	3.48**	0.70 (0.06)	11.69***
Perceived group-impact racism,[e] 1 (low impact) to 5 (high impact)	−0.45 (0.13)	−3.33**	0.78 (0.07)	10.97***
Racism-related stress, 1 (none) to 5 (extreme)	0.49 (0.09)	5.60***	0.58 (0.08)	7.45***
Emotional reactions to racism, 1 (low emotions) to 5 (extreme emotions)	0.21 (0.11)	2.03*	0.47 (0.09)	5.13***
Self-reported physical health, 1 (poor) to 5 (excellent)	0.22 (0.10)	2.18*	−0.24 (0.09)	−2.65**
Self-reported mental health, 1 (poor) to 5 (excellent)	0.32 (0.11)	3.03**	−0.15(0.09)	−1.56****

b unstandardized beta, *SE* standard error

*$p<0.05$; **$p<0.01$; ***$p<0.001$; ****$=p>0.05$

[a]REACH participants are compared to non-REACH participants as the reference group

[b]African Americans are compared with European Americans as the reference group

[c]Each racism and health measure was analyzed in a separate univariate ANOVA model. Models for intervention group differences include controls for race and education. Models for racial group differences include controls for education and intervention group participation

[d]Racism knowledge-beliefs was adjusted for mode of survey administration (i.e., telephone- vs. self-administered) which was a significant predictor in this model.

[e]The model for group-impact racism includes a significant group × race interaction term (*b* (SE) = 0.87 (0.15), *t* (1) = 5.7; $p = 0.000$)

participation in REACH intervention programs (Table 4). REACH participants were only 0.36 times and 0.35 times as likely to smoke than non-REACH participants in association with discrimination and racism-related stress, respectively, adjusting for educational level and race. The odds of smoking in relation to discrimination were 41% lower for African Americans compared with European Americans, and the odds of smoking in relation to racism-related stress were 36% lower for African Americans than European Americans (Table 4).

Emotional responses to racism was the only racism measure found to be somewhat related to a pregnancy or birth outcome. Adjusting for repeated births within families, more extreme average emotional reactions to racism increased the odds of low birth weight by 24% (odds ratio [OR] = 1.24; 95% confidence interval [CI] [0.99, 1.55]). However, when race and highest education level were added as co-predictors, the significance of emotional reactions was lost (OR = 1.17; 95% CI, [0.93, 1.48]) and race was the primary predictor, producing an attenuating effect on the odds of LBW when considered together with education and emotional reactions to racism.

TABLE 4 Measures of racism as predictors of self-rated physical health, self-rated mental health smoking, and low birth weight

	Self-rated physical health[a]		Self-rated mental health[a]		Smoking[a]	Low birth weight[a]
	b (SE)	*β*	*b* (SE)	*β*	OR (CI)	OR (CI)
Experiences of discrimination	−0.20 (0.06)**	−0.15	−0.26 (0.06)***	−0.18	1.42 (1.08, 1.86)*	1.07 (0.76, 1.50)
REACH participants[b]	0.26 (0.10)**	0.11	0.38 (0.11)***	0.15	0.36 (0.21, 0.61)***	
African Americans[c]	−0.08 (0.10)****	−0.04	0.03 (0.10)****	0.01	0.59 (0.38, 0.90)*	
Racism-related stress	−0.17 (0.05)***	−0.16	−0.24 (0.05)***	−0.22	1.31 (1.06, 1.62)*	0.92 (0.71, 1.19)
REACH participants[b]	0.30 (0.10)**	0.12	0.43 (0.11)***	0.17	0.35 (0.21, 0.60)***	
African Americans[c]	−0.13 (0.09)****	−0.06	−0.08 (0.10)****	−0.00	0.64 (0.43, 0.96)*	
Emotional reactions to racism	−0.04 (0.04)****	−0.04	−0.12 (0.04)**	−0.12	1.12 (0.95, 1.33)	1.17 (0.93, 1.48)[d]
REACH participants[b]	0.23 (0.10)*	0.10	0.35 (0.11)**	0.14	0.37 (0.22, 0.63)***	
African Americans[c]	−0.23 (0.09)*	−0.11	−0.09 (0.09)****	−0.04	0.68 (0.45, 1.01)	
Perceived group-impact racism	−0.20 (0.06)***	−0.17	−0.15 (0.06)*	−0.12	1.30 (1.02, 1.67)*	1.19 (0.87, 1.64)
REACH participants[b]	0.27 (0.10)**	0.11	0.36 (0.11)**	0.14	0.38 (0.22, 0.63)***	
African Americans[c]	−0.04 (0.10)****	−0.02	−0.01 (0.11)****	−0.01	0.59 (0.38, 0.91)*	

b unstandardized beta, *SE* standard error, *β* standardized beta, *OR* odd ratio, *CI* confidence interval, *LBW* low birth weight

*$p<0.05$; **$p<0.01$; ***$p<0.001$; ****$=p>0.05$

[a]Health outcomes were analyzed in separate models for each racism measure with controls for race and education. The models for physical health, mental health, and smoking include all survey participants. The models for LBW are restricted to 75 self-reported LBW births to survey participants. There was inadequate power for subgroup analyses for LBW.

[b]Reference, non-REACH participants

[c]Reference, European Americans

[d]The unadjusted LBW result for emotional reactions to racism is OR=1.24 (0.99, 1.55); $p=0.06$

DISCUSSION

The results show support for our predictions regarding the impact of REACH programs and the association of racism with individual health. First, REACH participants demonstrated greater knowledge than non-REACH participants about the continuing impact of racism in the USA. The corroboration of anti-racism education by REACH program participants is encouraging. However, because individuals were not surveyed prior to the initiation of the REACH intervention, the current survey cannot evaluate a temporal effect of REACH training on racism knowledge and attitudes. Also, although targeted outreach attracted REACH program participants to take the survey, a self-selection bias may have been introduced which could have magnified the differences between REACH participants and the general community residents surveyed. Notwithstanding, with the exception of assessed knowledge and beliefs about racism, there were no significant response differences by mode of survey administration. A noteworthy finding relates to the exaggerated perceptions of group-targeted racism for African Americans and European Americans in REACH compared to their counterparts in the general community. A reason for the widely divergent views by race among REACH participants could be that participation in activities such as Undoing Racism[38] and African historical and cultural education trainings magnified one's subjective evaluation of how racism perpetuates negative attitudes toward African Americans, in contrast to more positive group regard conferred to European Americans. Longer-term studies of Undoing Racism participants are needed to evaluate how attitudinal changes about racism translate into behavioral or system changes in institutional and community settings.

Second, REACH participants had better self-rated physical and mental health status than non-participants, adjusting for race and highest education completed. We speculated that the REACH intervention could impact individual health through its health promotion, psychosocial empowerment, and healthcare improvement strategies, and we anticipated that African American participants in particular would demonstrate more favorable health assessments than their counterparts in the general community in response to REACH programs that facilitated access to healthcare services and promoted health education in various African American community venues, undergirded by awareness of the effects of negative race-based ideologies and other barriers to health. However, the exposure to REACH programs was inconsistent across participants, our self-report survey measures did not permit validation of health status, and many of the health education activities were intended to influence intermediate measures of behavioral intention that are better assessed at the individual and program-specific levels.

Third, racial discrimination was associated with lower self-reported physical health, mental health, and a higher likelihood of smoking. Moreover, perceived group-impact racism was associated with lower self-rated physical health and intensity of emotional responses (e.g., anger, sadness, anxiety) to experiences of racial discrimination was marginally associated with lower birth-weight births. One strength of our study is that we simultaneously measured racism-related stress, vicarious or group experiences of racism, and emotional responses to racism in lieu of restricting our analyses to interpersonal discrimination only. We align with researchers who call for increased study of multidimensional measures of racism in relation to health, including internalized, interpersonal, collective, institutional, and sociopolitical manifestations of racism.[2,6,22,44–47] Future studies will be enhanced by

simultaneously measuring racism- and non-racism-related stressors along with coping responses that could lend insight into varying pathways between perceived racism and health.

Our study complements the few existing empirical studies of racism and infant health outcomes. However, not unlike other studies that have investigated racism and birth outcomes,[28–30,48] our observed association between racism and low birth weight did not attain statistical significance in adjusted analyses, and therefore our empirical findings are only mildly suggestive of a relationship. We relied on retrospective self-reports of birth outcomes from a sample birth cohort that cannot be generalized to the counties, and our sample may have been inadequately powered for the measured associations. Although potential recall bias is minimized in light of research that suggests that maternal recall of pregnancy-related events is excellent decades after a birth[49] and highly reliable for exposures that are fairly constant during pregnancy,[50] maternal-child health disparities research stands to benefit from larger population-based studies that measure pregnancy and birth outcomes in relation to systematically measured psychosocial stressors, including racism. Future studies are encouraged to explore an expanded range of racism-related exposures affecting mothers and infants, including neighborhood factors, access to social resources, and unequal healthcare.

In our survey, racism was associated with overall health, but it did not predict disparities in health status between African Americans and European Americans or between REACH and non-REACH program participants. It is notable that REACH participants in our sample reported *better* self-rated health in association with *higher* levels of racism experiences compared to the general community sample. While this observation appears paradoxical, it also suggests the potential for effective coping in the face of racial adversity. Studies confirm that active coping strategies in response to racism are associated with better physical and mental health outcomes.[51] Our finding may signify a beneficial effect of REACH cultural education and anti-racism programs that reinforced cultural strengths and positive affirmation to counteract racist ideologies. We acknowledge that population surveys are not an optimal method to examine the complexities of racism experiences across diverse individuals, and mixed methods have been utilized to yield more nuanced understandings of racism measures and racism-related responses across different gendered and cultural contexts.[46,52,53]

Our study validates the benefits of CBPR with its emphasis on science and action to examine community concerns. We accomplished complementary CBPR aims by addressing health disparities (i.e., African-American general and infant health) while simultaneously acting toward social change with sustained anti-racism education, community engagement, and community mobilization. The focus and content of our survey fulfilled the dictates of our community partners, and this consideration enhanced the relevance and utility of the data collection and study results.[54,55] We also demonstrated the benefits of CBPR to stimulate health-related policy change.[56] Our research and community change process prompted the development of a medical residency training component that incorporates racism education, and we justified the need for more systematic assessment of social resources and stress for pregnant and postpartum clients in clinical settings. Racism is just one of many social determinants of health (e.g., employment, education, and housing) that command the interests of urban residents. Our CBPR project serves as a model for systematically addressing critical social health issues utilizing intervention and survey research methods together with sustained social action.

Overall, our community-generated survey allowed for examination of racism and health disparities on a community-wide scale, it complemented vital statistics

data by providing a more comprehensive assessment of social determinants that may contribute to localized disparities in infant and overall health, and it enhanced the capacity of community members to engage in and utilize original research on a salient community concern.

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REFERENCES

1. Williams DR, Mohammed SA, Leavell J, Collins C. Race, socioeconomic status, and health: complexities, ongoing challenges, and research opportunities. *Ann NY Acad Sci*. 2010;1186:69–101.
2. Jones CP. Levels of racism: a theoretic framework and a gardener's tale. *Am J Public Health*. 2000;90(8):1212–1215.
3. Griffith DM, Mason M, Yonas M, et al. Dismantling institutional racism: theory and action. *Am J Community Psychol*. 2007;39(3–4):381–392.
4. Jones JM. *Prejudice and Racism*. 2nd ed. New York: McGraw-Hill; 1997.
5. Mays VM, Cochran SD, Barnes NW. Race, race-based discrimination, and health outcomes among African Americans. *Annu Rev Psychol*. 2007;58:201–225.
6. Harrell SP. A multidimensional conceptualization of racism-related stress: implications for the well-being of people of color. *Am J Orthopsychiatry*. 2000;70(1):42–57.
7. Clark R, Anderson NB, Clark VR, Williams DR. Racism as a stressor for African Americans: a biopsychosocial model. *Am Psychol*. 1999;54(10):805–816.
8. Link BG, Phelan J. Social conditions as fundamental causes of disease. *J Health Soc Behav*. 1995;35:80–94. Extra.
9. Israel BA, Schulz AJ, Parker EA, Becker AB, Allen AJ, Guzman JR. Critical issues in developing and following community-based participatory research principles. In: Minkler M, Wallerstein N, eds. *Community-based Participatory Research for Health*. San Francisco: Jossey-Bass; 2003:56–73.
10. Pestronk RM, Franks ML. A partnership to reduce African American infant mortality in Genesee County, Michigan. *Public Health Rep*. 2003;118(4):324–335.
11. Hunte HE, Turner TM, Pollack HA, Lewis EY. A birth records analysis of the Maternal Infant Health Advocate Service program: a paraprofessional intervention aimed at addressing infant mortality in African Americans. *Ethn Dis*. 2004;14(3 suppl 1):S102–S107.
12. Selig S, Tropiano E, Greene-Moton E. Teaching cultural competence to reduce health disparities. *Health Promot Pract*. 2006;7(3 suppl):247S–255S.
13. Ford C, Airhihenbuwa CO. Critical race theory, race equity, and public health: toward antiracism praxis. *Am J Public Health*. 2010;100(suppl 1):S30–S35.
14. Applebaum B. Good liberal intentions are not enough! Racism, intentions, and moral responsibility. *J Moral Educ*. 1997;26(4):409–421.
15. Geronimus AT. To mitigate, resist, or undo: addressing structural influences on the health of urban populations. *Am J Public Health*. 2000;90(6):867–872.
16. Willams DR. Race and health: basic questions, emerging directions. *Ann Epidemiol*. 1997;7(5):322–333.
17. Lazarus RS, Folkman S. *Stress, Appraisal, and Coping*. New York: Springer; 1984.

18. Rich-Edwards JW, Grizzard TA. Psychosocial stress and neuroendocrine mechanisms in preterm delivery. *Am J Obstet Gynecol*. 2005;192(5 Suppl):S30–S35.
19. Giscombe CL, Lobel M. Explaining disproportionately high rates of adverse birth outcomes among African Americans: the impact of stress, racism, and related factors in pregnancy. *Psychol Bull*. 2005;131(5):662–683.
20. Lu M, Halfon N. Racial and ethnic disparities in birth outcomes: a life course perspective. *Matern Child Health J*. 2003;7(1):13–30.
21. Paradies Y. A systematic review of empirical research on self-reported racism and health. *Int J Epidemiol*. 2006;35(4):888–901.
22. Williams DR, Mohammed SA. Discrimination and racial disparities in health: evidence and needed research. *J Behav Med*. 2009;32(1):20–47.
23. Pascoe EA, Smart Richman L. Perceived discrimination and health: a meta-analytic review. *Psychol Bull*. 2009;135(4):531–554.
24. Stuber J, Galea S, Ahern J, Blaney S, Fuller C. The association between multiple domains of discrimination and self-assessed health: a multilevel analysis of Latinos and blacks in four low-income New York City neighborhoods. *Health Serv Res*. 2003;38(6 Pt 2):1735–1759.
25. Jackson JS, Brown TN, Williams DR, Torres M, Sellers S, Brown K. Racism and the physical and mental health status of African Americans: a thirteen-year national panel study. *Ethn Dis*. 1996;1–2:132–147.
26. Williams DR, Yu Y, Jackson JS, Anderson NB. Racial differences in physical and mental health: socio-economic status, stress, and discrimination. *J Health Psychol*. 1997;2 (3):335–351.
27. Collins JW, David RJ, Handler A, Wall S, Andes S. Very low birthweight in African American infants: the role of exposure to interpersonal racial discrimination. *Am J Public Health*. 2004;94(12):2132–2138.
28. Collins JW, David RJ, Symons R, Handler A, Wall SN, Dwyer L. Low-income African-American mothers' perception of exposure to racial discrimination and infant birth weight. *Epidemiology*. 2000;11(3):337–339.
29. Mustillo S, Krieger N, Gunderson EP, Sidney S, McCreath H, Kiefe CI. Self-reported experiences of racial discrimination and Black-White differences in preterm and low-birthweight deliveries: the CARDIA study. *Am J Public Health*. 2004;94(12):2125–2131.
30. Rosenberg L, Palmer JR, Wise LA, Horton NJ, Corwin MJ. Perceptions of racial discrimination and the risk of preterm birth. *Epidemiology*. 2002;13(6):646–652.
31. Dole N, Savitz DA, Siega-Riz AM, Hertz-Picciotto I, McMahon MJ, Buekens P. Psychosocial factors and preterm birth among African American and White women in central North Carolina. *Am J Public Health*. 2004;94(8):1358–1365.
32. Brondolo E, Rieppi R, Kelly KP, Gerin W. Perceived racism and blood pressure: a review of the literature and conceptual and methodological critique. *Ann Behav Med*. 2003;25 (1):55–65.
33. Din-Dzietham R, Nembhard WN, Collins R, Davis SK. Perceived stress following race-based discrimination at work is associated with hypertension in African Americans: the metro Atlanta heart disease study, 1999–2001. *Soc Sci Med*. 2004;58:449–461.
34. Landrine H, Klonoff EA. Racial discrimination and cigarette smoking among blacks: findings from two studies. *Ethn Dis*. 2000;10(2):195–202.
35. Grady SC. Racial disparities in low birthweight and the contribution of residential segregation: a multilevel analysis. *Soc Sci Med*. 2006;63(12):3013–3029.
36. Polednak AP. Trends in US urban Black infant mortality, by degree of residential segregation. *Am J Public Health*. 1996;86(5):723–726.
37. Yonas MA, Jones N, Eng E, et al. The art and science of integrating Undoing Racism with CBPR: challenges of pursuing NIH funding to investigate cancer care and racial equity. *J Urban Health*. 2006;83(6):1004–1012.
38. People's Institute for Survival and Beyond. Undoing Racism™ and Community Organizing Workshop (2009). Accessed on: September 17, 2010. Available at: http://www.pisab.org.

39. Schulz AJ, Gravlee CC, Williams DR, Israel BA, Mentz G, Rowe Z. Discrimination, symptoms of depression, and self-rated health among African American women in Detroit: results from a longitudinal analysis. *Am J Public Health*. 2006;96(7):1265–1270.
40. Harrell SP. *The Racism and Life Experiences Scales (RaLES)*. Los Angeles: California School of Professional Psychology; 1997.
41. Centers for Disease Control and Prevention (CDC). *Behavioral risk factor surveillance system survey questionnaire*. Atlanta: Centers for Disease Control and Prevention, US Dept of Health and Human Services; 2006.
42. Harrel SP. *Development and initial validation of scales to measure racism-related stress*. Columbia, South Carolina: 6th Biennial Conference on Community Research and Action, Society for Community Research and Action; 1997.
43. Idler EL, Benyamini Y. Self-rated health and mortality: a review of twenty-seven community studies. *J Health Soc Behav*. 1997;38(1):21–37.
44. Krieger N. Embodying inequality: a review of concepts, measures, and methods for studying the health consequences of discrimination. *Int J Health Serv*. 1999;29(2):295–352.
45. Meyer IH. Prejudice as stress: conceptual and measurement problems. *Am J Public Health*. 2003;93(2):262–265.
46. Nuru-Jeter A, Dominguez TP, Hammond WP, et al. "It's the skin you're in": African-American women talk about their experiences of racism. an exploratory study to develop measures of racism for birth outcome studies. *Matern Child Health J*. 2009;13(1):29–39.
47. Sims M, Wyatt SB, Gutierrez ML, Taylor HA, Williams DA. Development and psychometric testing of a multidimensional instrument of perceived discrimination among African Americans in the Jackson Heart Study. *Ethn Dis*. 2009;19(1):56–64.
48. Misra D, Strobino D, Trabert B. Effects of social and phsycosocial factors on risk of preterm birth in black women. *Paediatr Perinat Epidemiol*. 2010;24(6):546–554.
49. Tomeo CA, Rich-Edwards JW, Michels KB, et al. Reproducibility and validity of maternal recall of pregnancy-related events. *Epidemiology*. 1999;10(6):774–777.
50. Hertz-Picciotto I, Pastore LM, Beaumont JJ. Timing and patterns of exposures during pregnancy and their implications for study methods. *Am J Epidemiol*. 1996;143(6):597–607.
51. Brondolo E, Brady ver Halen N, Pencille M, Beatty D, Contrada RJ. Coping with racism: a selective review of the literature and a theoretical and methodological critique. *J Behav Med*. 2009;32(1):64–88.
52. Jackson FM, Hogue CR, Phillips MT. The development of a race and gender-specific stress measure for African American women: Jackson, Hogue, Phillips contextualized stress measure. *Ethn Dis*. 2005;15(4):594–600.
53. Shariff-Marco S, Gee GC, Breen N, et al. A mixed methods approach to developing a self-reported racial/ethnic discrimination measure for use in multi-ethnic health surveys. *Ethn Dis*. 2009;19(4):447–453.
54. Brown ER, Holtby S, Zahnd E, Abbot GB. Community-based participatory research in the California Health Interview Survey. *Prev Chronic Dis*. 2005;2(4):1–8. Available at: http://www.cdc.gov/pcd/issues/2005/oct/05_0046.htm. Accessed on: September 17, 2010.
55. Shirey LA, Griffith DM, Brady J, Kruger DJ, Morrel-Samuels S, Greene-Moton E. Challenges and lessons learned in developing a community-based survey. *Prog Community Health Partnersh*. 2008;2(2):99–104.
56. Minkler M. Linking science and policy through community-based participatory research to study and address health disparities. *Am J Public Health*. 2010;100(suppl 1):S81–S87.