

8-2-2010

Socially-Perceived Race, Perceived Healthcare Discrimination and Preventive Health Service Utilization

Tracy Macintosh

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**Socially-Perceived Race, Perceived Healthcare Discrimination and Preventive
Health Service Utilization**

**A Thesis Submitted to the
Yale University School of Medicine
In Partial Fulfillment of the Requirements for the
Degree of Doctor of Medicine**

**By
Tracy St. Louis MacIntosh**

2010

**SOCIALLY-PERCEIVED RACE, PERCEIVED HEALTHCARE DISCRIMINATION AND
PREVENTIVE HEALTH SERVICE UTILIZATION**

Tracy St. Louis MacIntosh, Mayur M. Desai, and Marcella Nunez-Smith. Department of Internal Medicine, Yale University School of Medicine, New Haven, CT.

Self-identified racial/ethnic minorities are less likely to receive preventive care and more likely to report healthcare discrimination than whites. However, these outcomes may vary depending on whether racial/ethnic minorities are socially-perceived as minority versus white. We hypothesized that self-identified racial/ethnic minorities who believe they are socially-perceived as white have higher rates of preventive care and are less likely to report healthcare discrimination compared to minorities who believe they are socially-perceived as such. We conducted a cross-sectional analysis of the 2004 Behavioral Risk Factor Surveillance System. Respondents were categorized into 3 groups, defined by self-identified/socially-perceived race: Minority/Minority (n=6,837), Minority/White (n=929), and White/White (n=25,913).

The Minority/Minority and Minority/White groups were equally likely to report having a physician (80.4% vs. 79.9%), yet Minority/White respondents were less likely to report experiencing healthcare discrimination (5.0% vs. 9.4%, $p < 0.0001$). The Minority/White and White/White groups had similar rates for past-year influenza (69.7% vs. 72.5%) and pneumococcal (60.4% vs. 68.2%) vaccinations; corresponding rates were significantly lower among the Minority/Minority group (54.5% influenza and 48.2% pneumococcal, p -values < 0.05).

Minorities who are socially-perceived as minorities are equally likely to have a personal physician as those who are socially-perceived as white, but are less likely to receive preventive vaccinations and more likely to report healthcare discrimination.

Acknowledgments

Thank you to my husband, Baudelaire, and young son, Nathaniel, for your patience, support and encouragement throughout the development of this thesis. To my parents, Bridget and Peter, thank you for instilling in me the confidence to pursue my passions.

Thank you also to my Yale thesis advisors, Drs. Nunez-Smith and Desai for making this process both educational and enjoyable. Thank you also to Dr. Camara Jones for your insight in initiating this important work.

To the Office of Student Research, thank you for supporting students as we develop and pursue our intellectual curiosities.

Finally, I would like to extend my appreciation to the Racism and Health Working Group for developing and refining the Reactions to Race module, and to Dr. Rosana Gonzalez-Colaso and Ms. Natalie Spicyn for your input during the development of this research study.

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Introduction

In social and healthcare interactions, phenotypic race, or skin pigmentation, continues to dominate as the trait by which race/ethnicity and disease risk is presumed. This is despite lack of evidence to support that classifying based on this phenotype alone captures substantive underlying biological variation or large groupings of gene frequencies,^{1,2} particularly when assigned based on skin color or behavior, rather than ancestry.² Researchers also use race as a surrogate for socioeconomic status, and because this association began with, and is perpetuated by, institutionalized racism, it makes for a problematic relationship and assumption.³ There is substantial evidence to support that after controlling for other socioeconomic variables, race still contributes significantly to lower rates of service utilization and provision, and poorer overall health outcomes.⁴⁻⁹

Closing the utilization gap and eliminating any contribution of healthcare bias to observed racial/ethnic disparities are priorities identified by the Institute of Medicine (IOM).¹⁰ However, race/ethnicity is a complex phenomenon that has been difficult to capture. It has also been difficult to isolate the mechanism by which it impacts health and perpetuates health disparities. Current classification schemes of race/ethnicity may obscure differences among populations, and more discrete ethnic groups may represent one way to elucidate important disparities in health and healthcare.¹¹ An alternate, novel approach to race/ethnicity categorization examines socially-perceived race. Because much of the impact of race and racism is externally imposed, how individuals self-identify their race reveals only part of

one's potential experiences. New evidence suggests that when self-identified and self-reported socially-perceived race are discordant, socially-perceived race may provide even richer information about one's experiences with racism, and may ultimately lead to greater understanding of the relationship between race, racism and disease. Jones et al. found that for those who self-identified as Hispanic, American Indian and multiracial, reporting being perceived as white was associated with advantages in health status.¹² This intriguing new area of research suggests that for certain populations, socially-perceived race is different from self-identified race, and may be a superior predictor of health outcomes.

Self-identified racial/ethnic minorities have lagged behind white counterparts on several measures of healthcare utilization, including influenza and pneumococcal vaccination,¹³⁻¹⁸ and in several areas of age-appropriate disease screening.¹⁹⁻²⁴ Influenza and pneumonia were the 8th leading cause of death in the United States in 2007,²⁵ and influenza vaccination has been demonstrated to reduce hospitalizations due to pneumonia, respiratory conditions and congestive heart failure among senior citizens.²⁶ As a result, one of the objectives for Healthy People 2010 is to increase the proportion of non-institutionalized adults who are vaccinated annually against influenza and have ever received the pneumococcal vaccine to 90%.²⁷

Prior analyses have found that, unfortunately, vaccination rates are not immune to health disparities. Instead, blacks and Hispanics have consistently had lower influenza and pneumococcal immunization rates compared to whites.¹³⁻¹⁷ In

2009, influenza immunization rates for both African Americans (51.7%) and Hispanic Americans (52.6%) lagged behind Whites (70.1%), with a similar trend for pneumococcal vaccination (38.5%, 46.7% and 65.0% respectively).¹⁴

Cancer represents the second leading cause of death in the United States, leading to over 560 000 deaths in 2007.^{25,28} Reducing the incidence of cancer is one of the Healthy People 2010 goals.²⁷ Cancer screening and early detection are essential for improving survival, and routine breast, cervical, and colorectal cancer screenings are important elements of primary care, with current recommendations on prostate cancer still being debated. Racial disparities in cancer incidences and mortality are profound, with African Americans having a higher incidence of cervical, prostate and colorectal cancer than European Americans, and a higher mortality from breast, cervical, prostate and colorectal cancer.²⁹ Previous studies have demonstrated that ethnic minorities are less likely to have a Pap test,^{19,30} mammogram,^{21,30} or screening for prostate^{22,23} and colorectal cancer.²⁴ The disparities in immunizations and cancer screening exist despite adjusting for insurance³¹ and socioeconomic status,^{19,20,23,24} suggesting perceived healthcare discrimination may contribute to these differences. The literature demonstrates that racial/ethnic minorities are more likely to report perceived healthcare discrimination,^{32,33} and it is associated with poorer healthcare utilization^{33,34} and outcomes.^{32,35,36}

The Behavioral Risk Factor Surveillance System (BRFSS) is a nationally-representative phone survey conducted by the Centers for Disease Control and

Prevention (CDC). It introduced the “Reactions to Race” module in 2004, which attempts to capture how racism may affect the patient-physician interaction.³⁷ To date, two studies have used this data to examine perceived racial/ethnic discrimination specifically in the healthcare setting.^{32,33,38} Hausman et al. found that 10.9% of African Americans perceived racism in the healthcare setting. In one study they found that perceived healthcare discrimination was associated with worse self-reported health status for the entire study sample and among Hispanics, but not for African Americans.³² In a second study, these authors failed to demonstrate an association with immunizations or cancer screening and perceived healthcare discrimination.³⁸ In contrast, another group examined perceived racial/ethnic healthcare discrimination and early cancer detection and found that women who perceived healthcare discrimination were less likely to be screened for colorectal and breast cancer screening, and men who perceived healthcare discrimination and had a usual source of care were less likely to be screened for colorectal cancer.³⁴ This limited and conflicting evidence therefore suggests that individuals who perceive race/ethnicity-based healthcare discrimination may delay or avoid screening, but that perceived healthcare discrimination is a complex phenomenon. Differences in measures between studies may contribute to the observed discrepancy.

A number of other studies have also demonstrated a relationship between perceived healthcare discrimination and preventive health service utilization, but have employed a much more general definition of discrimination. For example, Trivedi and Ayanian examined perceived discrimination in health care using a cross-

sectional study in California. The authors examined healthcare discrimination broadly, and included discrimination against “age, race, language, health or disability, weight, insurance, income, gender, medical beliefs and multiple reasons.” This study found that persons reporting any type of healthcare discrimination were less likely to receive diabetic foot exams, hemoglobin A1C and cholesterol testing, and influenza vaccination.³³ Another study examined perceived discrimination by a doctor or other medical personnel among a nationally representative Latino sample and found that 19% of respondents reported discrimination based on race/ethnicity, language, ability to pay or health insurance. This study found that individuals reporting poor health status were more likely to report perceived discrimination compared to those with better health status.³⁵ Similarly, perceived discrimination in seven areas including medical treatment, was associated with poorer self-reported general health and more chronic illnesses among blacks at a primary care clinic.³⁶ These studies demonstrate an association between perceived healthcare discrimination and poorer health care service utilization and health status. However, because all of these studies defined discrimination broadly, including health insurance and income discrimination, they are unable to tease apart the specific impact of racial discrimination after controlling for socio-economic variables.

In the Institute of Medicine’s (IOM) report on disparities, the committee suggests that healthcare providers may contribute to healthcare disparities by their own biases, beliefs and stereotypes against minority groups, and through clinical uncertainty when interacting with patients from minority communities. In turn,

biases, negative prior experiences, mistrust and perceived discrimination may lead to disparities in preventive health service utilization via minority patient refusal of treatment recommendations, poorer treatment adherence and delays in seeking care.¹⁰ Therefore, examining the role of perceived healthcare discrimination may help elucidate the mechanism by which racial and ethnic disparities in health occur, and disparities in preventive health service utilization may be one important manifestation.

The present study builds on the work by Jones et al. that being perceived as white has health status advantages for self-identified minorities. We examined the relationship between self-identified and socially-perceived race, perceived racial/ethnic healthcare discrimination and utilization of preventive health services. This study is unique as we sought to elucidate the potential mediating factors by which social perception of race manifests in poorer health status. Further, beyond self-reported race, we examined self-identified and socially-perceived race and perceived healthcare racism in the context of immunizations and cancer screening in light of the racial/ethnic disparities that persist. We hypothesized that self-identified racial/ethnic minority respondents who are socially-perceived as white have similar rates of preventive health service utilization as self-identified whites, and higher rates than those self-identified racial/ethnic minorities who are also socially-perceived minorities. We also hypothesized that self-identified racial/ethnic minority respondents who are socially-perceived minorities report higher rates of perceived healthcare discrimination compared to both racial/ethnic

minority respondents socially-perceived as white and self-identified white respondents.

Hypotheses

- 1) Self-identified racial/ethnic minority respondents who report being socially-perceived as white have similar rates of preventive health service utilization as self-identified whites, and higher rates than those self-identified racial/ethnic minorities who also report being socially-perceived as minorities.
- 2) Self-identified racial/ethnic minority respondents who report being socially-perceived as minorities report higher rates of perceived healthcare discrimination compared to both racial/ethnic minority respondents who report being socially-perceived as white and self-identified white respondents.

Specific Aims

- 1) To characterize discordance between self-identified and socially-perceived race/ethnicity.
- 2) To identify the relationship between socially-perceived race/ethnicity and socio-economic variables.
- 3) To identify the relationship between socially-perceived race/ethnicity and immunizations.
- 4) To identify the relationship between socially-perceived race/ethnicity and age-appropriate early cancer screening.
- 5) To identify the relationship between socially-perceived race/ethnicity and perceived healthcare discrimination.

Methods

Sample

BRFSS is an annual, nationally-representative cross-sectional random-digit dialing telephone survey of adults 18 and over, conducted by states and coordinated by the CDC. The BRFSS was first introduced in 1984 which collects information on health-related behaviors from all 50 states on a monthly basis.³⁷ We used the 2004 BRFSS, including the “Reactions to Race” module and restricted our study to participants from Arkansas, Colorado, Delaware, Mississippi, Rhode Island, South Carolina, Wisconsin and the District of Columbia who participated in the optional “Reactions to Race” module. We further restricted our study to all subjects who reported both self-identified and socially-perceived race.

Data Collection

Participants 18 years and older were contacted using random-digit dialing. The survey consists of core questions and optional modules, including the “Reactions to Race” module,³⁷ and we used the 2004 survey because it is the survey year with the greatest number of states using this optional module. The response rates were 53.8% for Arkansas, 62.7% for Colorado, 46.6% for Delaware, 54.1% for Mississippi, 38.6% for Rhode Island, 43.4% for South Carolina, 59.1% for Wisconsin and 43.8% for the District of Columbia, consistent with typical BRFSS response rate ranges.³⁹ All data collected from the BRFSS are available to the public for analysis.

Study Variables

The primary independent variable was socially-perceived race, a composite of respondent self-identified race/ethnicity and self-reported socially-perceived race/ethnicity. Respondent self-identified race was dichotomized as either white or racial/ethnic minority which included black, Asian, Native Hawaiian/Pacific Islander, American Indian/Alaska Native, multiracial, Hispanic and “other.” To assess socially-perceived race/ethnicity, respondents were asked “How do other people classify you in this country?” and all responses other than white were re-categorized as socially-perceived minority. Our final analysis included respondents who were self-identified/socially-perceived as White/White, Minority/White and Minority/Minority.

We included the following additional independent variables in order to adjust for potential confounding in the multivariable analysis: (1) Sex (male or female), (2) Health Insurance (yes or no), (3) Married (yes or no), (4) Completed High School (yes or no), (5) Employed (yes or no), (6) Age (in years), and (7) Income (annual household income less than \$15000, \$15000-\$35000, greater than \$35000 or missing). Income was unknown for 13% of the sample and was therefore included as its own category.

The first dependent outcome was perceived racial/ethnic healthcare discrimination. Respondents were asked “Within the past 12 months when seeking health care, do you feel your experiences were worse than, the same as, or better

than for people of other races?" Respondents who felt their experiences were "worse than other races" or "worse than some, better than others" were classified as perceiving healthcare racism compared to those who reported their treatment as the same or better than other races. Respondents who did not know, or were unsure, were included in the analysis in a third, "uncertain," category.

We examined seven additional healthcare outcomes of interest: (1) having a personal physician, (2) receipt of annual influenza vaccination for those age 65 and over,⁴⁰ (3) pneumococcal vaccination among those age 65 and over,⁴¹ (4) annual breast cancer screening - an annual mammogram and clinical breast exam for women age 40 and older, (5) cervical cancer screening - Pap smear at least every 3 years among women age 21 and over, (6) prostate cancer screening - annual prostate-specific antigen (PSA) test and digital rectal exam (DRE) for men age 50 and older, and (7) colorectal cancer screening - annual fecal occult blood test (FOBT) or colonoscopy within the last 10 years for individuals age 50 and older.⁴²

Data Analysis

Data analysis included descriptive statistics using standard frequency analyses. Bivariate analyses using chi-squared statistics examined the association between socially-perceived race and demographic variables, perceived healthcare discrimination and health outcomes. For statistically significant relationships, additional two-by-two tables were created to identify which pairwise relationships

were significant. Finally, logistic regression was used to predict preventive healthcare service utilization and perceived healthcare discrimination from socially-perceived race, adjusting for other demographic variables at a significance level of $p \leq 0.05$. All data analysis was conducted with SAS v. 9.2.⁴³

Results

Sample Characteristics

The sample included 33679 respondents (Table 1). The majority of the sample self-identified as white (78.1); 15.5% of the sample self-identified as black; 4.4% of the sample self-identified as Hispanic; and 1.2% of individuals self-identified as multiracial. The proportion of white and black respondents were similar to national averages, but Hispanics were underrepresented in our sample relative to national rates (12.5%).⁴⁴ The other racial groups, Asian, Native Hawaiian/Pacific Islander and American Indian/Alaska Native, comprised less than 1% of the sample each. The majority of respondents were female (62.0%), and similar to national statistics, about one-half were married (52.6%), and the majority were employed (59.6%), had annual household incomes greater than \$35000 (49.4%), had completed at least high school (89.8%) and reported having health insurance (87.9%).⁴⁵

Socially-perceived race was significantly associated with each of the socio-economic variables in the bivariate analysis (Table 1). Compared with the Minority/Minority group, minorities socially-perceived as white tended to be older and were more likely to be married (52.4% vs. 34.7%, $p < 0.0001$). Although they were less likely to be employed (53.9% vs. 58.6%), they were more likely to have completed high school (84.4% vs. 80.6%) and tended to have higher annual household incomes (p -values < 0.05). Socially-perceived racial/ethnic minorities

were more likely to be female ($p < 0.0001$) compared to both other comparison groups.

Unadjusted Analysis of Healthcare Outcomes and Perceived Healthcare Discrimination

Socially-perceived race was associated with both preventive health service utilization and perceived healthcare discrimination. In the bivariate analysis (Table 2), a lower proportion of self-identified racial/ethnic minorities had their own personal physician compared to self-identified whites ($p < 0.0001$ pairwise relative to White/White). Although both self-identified racial/ethnic minorities were more likely to report perceived healthcare discrimination compared to whites, Minority/Minority respondents were almost twice as likely to report perceived healthcare discrimination compared to the Minority/White group (9.4% vs. 5.0%, $p < 0.0001$).

In contrast, immunization rates for self-identified racial/ethnic minorities varied considerably based on socially-perceived race/ethnicity. A significantly lower proportion of Minority/Minority respondents (54.5%) received influenza vaccination compared to both White/White and Minority/White respondents (72.5% and 69.7% respectively, pairwise $p < 0.001$). Similarly, a lower proportion of Minority/Minority respondents had ever received a pneumococcal vaccination compared to both Minority/White and White/White respondents (48.2% vs. 60.4% and 68.2%, p -values < 0.05).

Breast and prostate cancer early detection were also associated with socially-perceived race. A significantly lower proportion of Minority/Minority women received recommended breast cancer screening (50.4% vs. 53.0%, $p=0.0131$) compared to White/Whites, while Minority/White respondents had intermediate rates. Similarly, a significantly lower proportion of Minority/Minority men received the recommended prostate cancer screening (37.2% vs. 44.5% respectively, $p=0.0001$) compared to White/Whites. Minority/White men, again, had intermediate rates between White/White and Minority/Minority. There was an overall trend in the relationship between racial concordance and colorectal cancer ($p=0.0852$), and a significantly lower proportion of Minority/Minority respondents received appropriate screening compared to White/White respondents (11.3% vs. 12.9% respectively, pairwise comparison $p=0.0272$). There was no relationship between cervical cancer screening and socially-perceived race in the bivariate analysis.

Adjusted Analysis of Healthcare Outcomes and Perceived Healthcare Discrimination

The multivariate logistic regression analysis of the relationships between socially-perceived race and preventive health service utilization and perceived healthcare discrimination are presented in Tables 3 and 4. Self-identified minorities were more likely to perceive healthcare discrimination compared to whites after adjustment for potential confounders, and Minority/Minorities (OR=3.88, 95% CI

3.40, 4.43) had almost twice the odds compared to Minority/Whites (OR=2.08, 95% CI 1.50, 2.88). Although both groups of self-identified minorities had a lower odds of having a personal physician compared to self-identified whites, this relationship only persisted for socially-perceived minorities after adjustment (OR=0.91, 95% CI 0.84, 0.99).

In contrast, self-identified racial/ethnic minorities who were socially-perceived as white had immunization rates similar to self-identified whites and were more likely to receive both influenza (OR=1.74, 95%CI 1.23, 2.47) and pneumococcal vaccination (OR=1.55, 95%CI 1.10, 2.19) relative to socially-perceived minorities. Minority/Minority women were more likely to have had appropriate breast cancer (OR=1.20, 95% CI=1.09, 1.32) and cervical cancer screening (OR=1.54, 95% CI=1.32, 1.80) compared to White/White women, but there was no statistically significant difference between Minority/White and Minority/Minority women for cancer screening. Finally, unadjusted prostate and colorectal cancer screening rates were higher among White/White compared to Minority/Minority respondents; however, this relationship was attenuated in the adjusted analysis.

Discussion

Our study suggests that in order to fully understand how race and racism may be mediating health disparities in the United States, it is important to assess not only how patients self-identify their race, but also how they report their race is perceived by society. Our results demonstrated significant disparities between Minority/White and Minority/Minority groups among both socio-economic and health outcomes variables, suggesting that self-identified race alone may be an inadequate measure of one's experience with race and racism. Although Minority/White respondents were less likely to be employed or have completed high school, and were more likely to report lower incomes than White/White respondents, Minority/Minority respondents fared even worse than those minorities perceived as white on these socio-economic indicators.

In the healthcare environment, we found that all minorities had an increased odds of perceiving healthcare discrimination compared to whites; however, the odds ratio for socially-perceived minorities was almost twice that of socially-perceived whites. In the adjusted analysis, we observed that minority respondents who were socially-perceived as white had similar odds of obtaining recommended immunization and cancer screening as self-identified white respondents, while Minority/Minority respondents were less likely to receive either the influenza or pneumococcal vaccination, and were more likely to obtain breast cancer and cervical cancer screening compared to White/White individuals.

These results suggest that Americans who self-identify as racial/ethnic minorities, but report being socially-perceived as white, face socio-economic disadvantages compared to those who self-identify as white, but also enjoy certain health outcomes advantages compared to racial/ethnic minorities who are socially-perceived as such. We found that after adjusting for socio-economic variables, Minority/Minority respondents were less likely to obtain recommended vaccinations compared to White/White respondents, while Minority/White respondents had similar odds ratios as White/White. However, overall rates of immunization were far below the Healthy People 2010 goals for all racial groups. These findings add support to the research by Jones et al. who found that being classified by others as white was associated with better self-reported overall health status, or “White advantage in health status.”¹² Our research adds to the literature as it points to perceived healthcare discrimination and differences in rates of preventive healthcare utilization as possible mechanisms by which race and racism manifest in adverse health outcomes.

The Institute of Medicine (IOM) defined healthcare disparities as “racial/ethnic differences in the quality of healthcare that are not due to access-related or clinical needs, preferences, and appropriateness of intervention.”¹⁰ Disparities in immunization rates have been well-documented, with African Americans¹⁷ and Hispanic Americans less likely to receive both the influenza and pneumococcal vaccines.^{13-17,46} Numerous studies have attempted to identify the determinants of these disparities. In her review, Logan suggests that disparities in influenza vaccination may be due unequal access to services, a lack of health care

literacy and understanding of the risks of disease and mistrust in the medical system.⁴⁷ Others have found that higher levels of resistant attitudes and beliefs, differences in patient initiation and lower awareness are patient characteristics associated with some of the disparities in immunization rates.^{16,17}

Investigations of the physician-level determinants of immunization disparities have found that having a usual physician reported to have “good information-giving skills” and having a generalist provider was associated with higher immunization rates.¹⁵ Other physician-level characteristics have also been demonstrated to affect immunization rates: immunization rates are positively associated with provider recommendation,¹⁷ and patients of physicians who operate in a group practice, receive a lower percentage of revenue from Medicaid, have access to information technology to generate reminders, are board certified in their primary specialty and are graduates of an American or Canadian medical program were all more likely to receive preventive services.⁴⁸ While not examined in the context of preventive care services, a study by Sabin et al. demonstrated that the majority of physicians hold racist preferences of Whites over Blacks,⁴⁹ and suggest that these provider biases may also ultimately manifest in unequal treatment.

Perceived discrimination both socially and in the healthcare setting has been associated with poorer healthcare utilization^{33,50} and health outcomes;^{35,51-53} however, fewer studies have examined the mechanism by which this phenomenon manifests. One proposed mechanism is that perceived racial discrimination leads to delays in seeking medical care. Casagrande et al. found that lifetime perceived racial

discrimination was associated with delays in seeking, and adherence to, medical care for both African and European Americans. This study, however, failed to demonstrate an association with perceived healthcare racism, but may have been underpowered given that the sample only had 70 respondents (5%) reporting discrimination while getting medical care in the last 12 months.⁵⁴ In other studies, perceived discrimination was associated with delays in obtaining ordered tests and treatment, or not filling prescriptions for both African and European Americans,⁵⁵ and with less patient satisfaction and adherence.³⁶

Our results demonstrated that Minority/Minority women were more likely to be screened for breast cancer compared to White/White women, but there was no difference between Minority/White and White/White women. Although the literature generally demonstrates that ethnic minority populations have lower rates of breast cancer screening,^{19,21} further socio-demographic stratification reveals unique sub-populations. For example, using data from the 2000 National Health Interview Survey Swan et al. found that the greatest disparities in mammography were among recent immigrant women,⁵⁶ while Wilson et al. demonstrated that less-educated African American women had a higher odds of mammography compared to their European American counterparts.⁵⁷ The findings presented here and those by Swan et al. both support that self-reported race may be an inadequate predictor of health disparities, and that, as proposed by the IOM, a new race/ethnicity classification scheme may be necessary.¹¹

There is significant interest in identifying the reasons for racial disparities in breast cancer mortality, and whether differences in screening rates are a factor. There is some evidence that self-reported mammography rates may be overestimated among low-income minority populations.⁵⁸⁻⁶⁰ For example, using self-reported mammography data, Swan et al. found that mammography rates did not differ by race,⁵⁶ while Wilson et al. demonstrated that less-educated African American women had a higher odds of mammography compared to their European American counterparts.⁵⁷ In contrast, studies collecting medical records data have found that African American women had lower rates of screening.^{19,21} We found that Minority/Minority respondents had lower rates of high school completion and lower incomes compared to the other racial concordance groups, two factors known to be associated with overestimated mammography rates. Therefore, in light of the possibility for overestimation among certain minority populations and given that the odds of breast cancer screening for Minority/Minorities is only marginally increased, and rates remain well below targets, these data should be interpreted with caution.

In contrast to the literature,^{19,20} we found relatively high rates of cervical cancer screening across all racial concordance groups, and our study demonstrated that Minority/Minority women had a higher odds of having appropriate cervical cancer screening compared to White/White women. Compared to breast cancer screening, there is conflicting evidence on whether socio-demographic factors are associated with overestimations of Pap smear self-report,^{60,61} and therefore the caveat applied to interpreting our breast cancer results may not apply to cervical

cancer screening. In their study of mammography, Wilson et al. suggested that the higher rates among less educated African American women compared to European American women may be due to tertiary care utilization and the focus on providing screening to underserved minority women.⁵⁷ Although we found higher rates of both breast and cervical cancer screening among Minority/Minority women, our study is unable to assess the avenues of care and therefore cannot support or refute this hypothesis. To our knowledge, ours is the first study to demonstrate that although rates of breast and cervical cancer screening are low across all populations, stratification by socially-perceived race reveals differences between minorities who are socially-perceived white compared to those who are socially-perceived minorities.

One of the major challenges in assessing racism and discrimination, exemplified by the present study, is identifying a suitable and externally valid scale, or measure, of racism. As we demonstrated, self-identified race alone may overestimate the presumed effect of racism on Minority/White respondents. With respect to characterizing perceived discrimination in the literature, Kressin et al. identified 34 different measures: 16 in the healthcare setting, most with little theoretical basis, one-half based on a single question and the remainder focused only on the African American population.⁶² Their review highlights the continued need to develop appropriate tools to assess perceived racism in order to determine its impact on healthcare utilization. Additionally, perceived discrimination is but one manifestation of racism, and it is unlikely to comprehensively capture the entire range of experiences of racial/ethnic discrimination or mistrust of the healthcare

system. Racism leads to perceptions of racial hierarchy and differential treatment at both the individual and community levels. For example, more deeply rooted institutional discrimination and residential segregation can affect access to care and the quality of services provided.⁶³ Furthermore, because race and ethnicity are acquired at birth, they represent a lifetime of lived experiences with discrimination. Therefore, a cross-sectional assessment of perceived discrimination in the healthcare setting within the past twelve months may not reflect this longitudinal force which often transcends multiple environments.⁶⁴ Another limitation of our measure of perceived healthcare discrimination is that it is a three-level, single-question survey item on perceived healthcare discrimination which does not assess frequency or duration of discrimination. As a result, we are unable to capture the nature of discrimination faced by respondents and whether its effect varies by time and intensity. Further, the use of a categorical variable for ascertaining discrimination reduces the variance of the exposure and thereby attenuates the effect of the relationship.⁶⁵

The BRFSS offers a rich data set of many predictors of health and disease in a nationally representative sample. There are a number of limitations inherent to the cross-sectional and sampling design of the study. First, because this study is cross-sectional, it precludes any further elucidation of whether the proposed relationship between socially-perceived race, healthcare discrimination and immunizations and cancer screening is causal, and if so, by which mechanism it manifests. Second, we selected the 2004 survey because it is the survey year with the greatest number of states using the optional “Reactions to Race” module, but the results may only be

applicable to the seven states and District of Columbia who self-selected to obtain this information from their residents. Third, there is evidence that psychosocial factors such as self-esteem, stressful events, a strong sense of racial/ethnic identity or engaging in traditional activities may all modify the effect of self-reported racism and health.⁶⁶ Unfortunately, the “Reactions to Race” module does not capture these potential effect modifiers, and our data analysis only adjusts for the potential effect modification of socio-demographic variables. Fourth, socially-perceived race was self-reported and not verified by an outside observer; therefore, reported socially-perceived race may not truly reflect society’s perception of the respondents’ race but may instead be an internalized notion. Future studies are therefore needed to examine the reliability of self-reported socially-perceived race. Finally, the 2004 questionnaire was conducted using random-digit dialing on landlines only. This method undersamples individuals from lower socio-economic strata, particularly the homeless and poor, which may lead to underrepresentation among those populations with poorer access to healthcare services and introduces sampling bias. Additionally, because of the increasing trend of US households having only cellular phones (17%), the 2009 BRFSS introduced “dual-frame landline and cell phone” sampling in all states to address the potential sampling bias.⁶⁷ Therefore, using the 2004 data means that individuals without landlines were omitted from the survey, introducing another potential sampling bias. A third potential source of sampling bias results from the relatively low response rates for Rhode Island (38.6%), Delaware (46.6%), the District of Columbia (43.8%) and South Carolina (43.4%).

However, given that non-responders were demographically similar to responders,³⁹ the effect of the bias is likely to be non-specific.

Despite these limitations, this study contributes to the literature on the association between perceived healthcare discrimination and health outcomes by distinguishing the effect of self-identified versus socially-perceived race. Among the strengths of this study are that it draws from a large multi-state survey and provided a sample size large enough to detect statistically significant differences between minorities who are socially-perceived as white compared to those perceived as minorities. The database also contains rich information on many socio-economic variables, allowing us to effectively control for confounders. Our results demonstrate that socially-perceived minority status is associated with lower odds of immunization compared to whites and those minorities perceived as white, and higher odds of cervical and breast cancer screening. This suggests that it may be prudent to use both self-identified and socially-perceived race in research settings and when designing and implementing programs to eliminate immunization disparities.

The CDC developed the Racial and Ethnic Adult Disparities in Immunization Initiative in 2000 to address disparities in immunization rates and to provide evidence-based models for communities to implement to increase immunization rates. Lessons learned from this initiative include engaging pharmacists and community-based organizations in immunization activities to target more individuals, the need for media messages to address misconceptions and emphasize

the gravity of infection, and that physicians need to be encouraged to actively recommend vaccination.⁶⁸ Similarly, in their profile of three different primary care centers, authors found that disparities in immunization services could be eliminated, and attributed this to practice-related conditions including having a designated immunization leader to guide and educate staff and patients, having effective communication and designated roles and having an organized system to track and offer immunizations.⁴⁶ Future intervention studies should examine socially-perceived race as well as self-identified race in order to identify the sub-population of Minority/Whites and target limited resources in the most effective way possible. Additionally, future research studies are needed to identify the association between self-reported socially-perceived race, perceived healthcare discrimination and biases in provider care.

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Tables

Table 1 – Sample Characteristics

Characteristic	Total (n=33679) ^A n(%)	Racial assignment groups (self-identified/socially-perceived)			P-values for Pairwise Comparisons			
		White/ White (1) (n=25913) n (%)	Minority/ White (2) (n=929) n (%)	Minority/ Minority (3) (n=6837) n (%)	Overall P-value	1 & 2	1 & 3	2 & 3
Age (years)					<0.0001	<0.0001	<0.0001	0.0002
Mean \pm SD = 49.8 \pm 17.0								
<35	7305 (21.8)	4957 (19.2)	268 (29.0)	2080 (30.7)				
35-49	9838 (29.4)	7420 (28.8)	261 (28.3)	2157 (31.8)				
50-64	9200 (27.5)	7397 (28.7)	216 (23.4)	1587 (23.4)				
65+	7154 (21.4)	6018 (23.3)	179 (19.4)	957 (14.1)				
Sex					<0.0001	0.0121	<0.0001	<0.0001

Female	20877 (62.0)	15760 (60.8)	527 (56.7)	4590 (67.1)				
Male	12802 (38.0)	10153 (39.2)	402 (43.3)	2247 (32.9)				
Married	17684 (52.6)	14835 (57.4)	487 (52.4)	2362 (34.7)	<0.0001	0.0027	<0.0001	<0.0001
Employed	20015 (59.6)	15521 (60.0)	500 (53.9)	3994 (58.6)	0.0002	0.0002	0.0367	0.0068
Completed High School	30216 (89.8)	23928 (92.4)	784 (84.4)	5504 (80.6)	<0.0001	<0.0001	<0.0001	0.0061
Annual Household Income (\$)					<0.0001	<0.0001	<0.0001	<0.0001
<15000	3667 (10.9)	2191 (8.5)	144 (15.5)	1332 (19.5)				
15000-35000	9099 (27.0)	6272 (24.2)	281 (30.3)	2546 (37.2)				
>35000	16647 (49.4)	14122 (54.5)	385 (41.4)	2140 (31.3)				
Missing	4266 (12.7)	3328 (12.8)	119 (12.8)	819 (12.0)				
Health Insurance	29526 (87.9)	23318 (90.2)	763 (82.5)	5445 (79.9)	<0.0001	<0.0001	<0.0001	NS

^A Numbers may not sum to total n due to missing data.

Table 2 – Racial Assignment Group and Healthcare Outcomes

Healthcare Outcomes	Racial assignment groups (self-identified/socially- perceived)				Overall P-value	P-values for Pairwise Comparisons		
	Total ^A n (%)	White/ White (1) n (%)	Minority/ White (2) n (%)	Minority/ Minority (3) n (%)		1 & 2	1 & 3	2 & 3
Have Personal Physician (n=33624)	28667 (85.2)	22474 (86.9)	745 (80.4)	5448 (79.9)	<0.0001	<0.0001	<0.0001	NS
Received Influenza vaccine within last 12 months (n=7136)	4999 (70.1)	4355 (72.5)	124 (69.7)	520 (54.5)	<0.0001	NS	<0.0001	0.0002
Ever received pneumococcal vaccine (n=6970)	4554 (65.3)	4008 (68.2)	102 (60.4)	444 (48.2)	<0.0001	0.032	<0.0001	0.0037

Breast CA Screening (n=14109)	7399 (52.4)	5934 (53.0)	157 (48.5)	1308 (50.4)	0.0161	NS	0.0131	NS
Cervical CA Screening (n=11901)	10692 (89.8)	7873 (89.8)	276 (89.3)	2543 (90.1)	NS	NS	NS	NS
Prostate CA Screening (n=5801)	2516 (43.4)	2162 (44.5)	60 (40.5)	294 (37.2)	0.0005	NS	0.0001	NS
Colorectal CA Screening (n=15906)	2010 (12.6)	1687 (12.9)	47 (12.3)	276 (11.3)	P=0.0852	NS	0.0272	NS
Perceived Healthcare Discrimination (n=32742)					<0.0001	<0.0001	<0.0001	<0.0001
No	27850 (85.0)	21634 (85.9)	757 (84.7)	5459 (82.1)				
Yes	1140 (3.5)	470 (1.9)	45 (5.0)	625 (9.4)				

Uncertain	3752 (11.5)	3096 (12.3)	92 (10.3)	564 (8.5)				
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CA = Cancer

^A Numbers may not sum to total n due to missing data.

Table 3 – Logistic Regression Analysis of the Association between Racial Assignment Group and Health-related Outcomes (White/White as Reference Group)

	Racial assignment groups (self-identified/socially- perceived)		
Health Outcomes OR (CI)	White/White OR (CI)	Minority/White OR (CI)	Minority/Minority OR (CI)
Have Personal Physician			
Unadjusted OR	1.00	0.62 (0.53, 0.73)	0.601 (0.56, 0.64)
Adjusted OR ^A	1.00	0.84 (0.70, 1.01)	0.910 (0.84, 0.99)
Received Influenza vaccine within last 12 months			
Unadjusted OR	1.00	0.87 (0.63, 1.20)	0.45 (0.40, 0.52)
Adjusted OR ^A	1.00	0.935 (0.67, 1.30)	0.54 (0.46, 0.62)

Ever received pneumococcal vaccine			
Unadjusted OR	1.00	0.71 (0.52, 0.97)	0.44 (0.38, 0.50)
Adjusted OR ^A	1.00	0.75 (0.55, 1.04)	0.45 (0.42, 0.56)
Breast CA Screening			
Unadjusted OR	1.00	0.83 (0.67, 1.04)	0.90 (0.82, 0.98)
Adjusted OR ^B	1.00	0.96 (0.77, 1.20)	1.20 (1.09, 1.32)
Cervical CA Screening			
Unadjusted OR	1.00	0.95 (0.66, 1.38)	1.04 (0.90, 1.20)
Adjusted OR ^B	1.00	1.16 (0.79, 1.71)	1.54 (1.32, 1.80)
Prostate CA Screening			
Unadjusted OR	1.00	0.85 (0.61, 1.19)	0.74 (0.63, 0.86)
Adjusted OR ^B	1.00	1.01 (0.72, 1.43)	1.07 (0.90, 1.26)
Colorectal CA Screening			

Unadjusted OR	1.00	0.94 (0.69, 1.29)	0.86 (0.75, 0.98)
Adjusted OR ^A	1.00	1.04 (0.76, 1.42)	1.12 (0.97, 1.30)
Perceived Healthcare Discrimination			
<i>Yes</i>			
Unadjusted OR	1.00	2.74 (1.20, 3.75)	5.270 (4.66, 5.96)
Adjusted OR ^A	1.00	2.08 (1.50, 2.88)	3.880 (3.40, 4.43)
<i>Uncertain</i>			
Unadjusted OR	1.00	0.85 (0.68, 10.58)	0.72 (0.66, 0.79)
Adjusted OR ^A	1.00	0.88 (0.70, 1.10)	0.79 (0.71, 0.88)

OR = Odds Ratio; CI = Confidence Interval; CA = Cancer

^A Regression Model adjusted for Sex, Health Insurance, Married, Completed High School, Employed, Income and Age.

^B Regression Model adjusted for Health Insurance, Married, Completed High School, Employed, Income and Age.

Table 4 – Logistic Regression Analysis of the Association between Racial Assignment Group and Health-related Outcomes (Minority/Minority as Reference Group)

	Racial assignment groups (self-identified/socially- perceived)		
Health Outcomes OR (CI)	Minority/Minority OR (CI)	White/White OR (CI)	Minority/White OR (CI)
Have Personal Physician			
Unadjusted OR	1.00	1.67 (1.55, 1.78)	1.03 (0.87, 1.23)
Adjusted OR ^A	1.00	1.10 (1.02, 1.19)	0.92 (0.76, 1.11)
Received Influenza vaccine within last 12 months			
Unadjusted OR	1.00	2.21 (1.92, 2.54)	1.92 (1.36, 2.70)
Adjusted OR ^A	1.00	1.86 (1.61, 2.16)	1.74 (1.23, 2.47)

Ever received pneumococcal vaccine			
Unadjusted OR	1.00	2.30 (2.00, 2.65)	1.64 (1.17, 2.28)
Adjusted OR ^A	1.00	2.07 (1.78, 2.40)	1.55 (1.10, 2.19)
Breast CA Screening			
Unadjusted OR	1.00	1.11 (1.02, 1.21)	0.93 (0.74, 1.17)
Adjusted OR ^B	1.00	0.83 (0.76, 0.92)	0.80 (0.63, 1.02)
Cervical CA Screening			
Unadjusted OR	1.00	0.96 (0.84, 1.11)	0.92 (0.63, 1.34)
Adjusted OR ^B	1.00	0.65 (0.56, 0.76)	0.76 (0.51, 1.13)
Prostate CA Screening			
Unadjusted OR	1.00	1.35 (1.16, 1.58)	1.15 (0.81, 1.65)
Adjusted OR ^B	1.00	0.94 (0.79, 1.11)	0.95 (0.66, 1.38)
Colorectal CA Screening			

Unadjusted OR	1.00	1.16 (1.02, 1.33)	1.10 (0.79, 1.33)
Adjusted OR ^A	1.00	0.89 (0.77, 1.03)	0.92 (0.66, 1.29)
Perceived Healthcare Discrimination			
<i>Yes</i>			
Unadjusted OR	1.00	0.19 (0.17, 0.22)	0.52 (0.38, 0.71)
Adjusted OR ^A	1.00	0.26 (0.23, 0.30)	0.54 (0.39, 0.74)
<i>Uncertain</i>			
Unadjusted OR	1.00	1.385 (1.26, 1.52)	1.18 (0.93, 1.49)
Adjusted OR ^A	1.00	1.27 (1.14, 1.41)	1.11 (0.87, 1.41)

OR = Odds Ratio; CI = Confidence Interval; CA = Cancer

^A Regression Model adjusted for Sex, Health Insurance, Married, Completed High School, Employed, Income and Age.

^B Regression Model adjusted for Health Insurance, Married, Completed High School, Employed, Income and Age.