Perceived Discrimination Is Associated with Reduced Breast and Cervical Cancer Screening: The Study of Women's Health Across the Nation (SWAN)

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Abstract

Background: Racial disparities in breast and cervical cancer screening have been documented in African American, Hispanic, and Asian populations. Perceived discrimination may contribute to this disparity. The aim of this study was to understand the relationship between perceived everyday racial/ethnic and other discrimination and receipt of breast and cervical cancer screening in a multiethnic population of women.

Methods: We analyzed data from 3,258 women participating in the Study of Women's Health Across the Nation (SWAN), a multiethnic/racial, longitudinal cohort study of the natural history of the menopausal transition conducted at seven U.S. sites. Participants completed a validated measure of perceived discrimination and reasons for believing that they were treated differently, along with Pap smears, clinical breast exams (CBE), and mammography at each follow-up period. We used multiple logistic regression for the binary outcomes of having a Pap smear, CBE, or mammogram in each of the two follow-up years, using self-reported "race discrimination" and "other discrimination" at baseline as the main predictors.

Results: African American women reported the highest percentage of racial discrimination (35%), followed by Chinese (20%), Hispanic (12%), Japanese (11%), and non-Hispanic white women (3%). Non-Hispanic white women reported the highest percentage of "other" discrimination (40%), followed by Chinese (33%), African American (24%), Japanese (23%), and Hispanic women (16%). Perceived racial discrimination was not associated with reduced receipt of preventive screening, except in one fully adjusted model. Reported discrimination owing to "other" reasons, such as age or gender, was associated with reduced receipt of Pap smear (odds ratio [OR] 0.85; 95% confidence interval [CI] 0.74–0.99), CBE (OR 0.78; 95% CI 0.67–0.91), and mammography (OR 0.80; 95% CI 0.69–0.92) regardless of patient race.

Conclusions: Perceived discrimination is an important issue across racial/ethnic groups and is negatively associated with receipt of breast and cervical cancer screening. This is an important issue that needs to be further explored and addressed in efforts to improve the delivery of healthcare to all groups.

Introduction

DISCRIMINATION, WHETHER PERCEIVED to be occurring specifically in the healthcare setting or in the world at large, has been associated with lower receipt of healthcare.[1–8] The majority of the research investigating the relationship between perceived discrimination and receipt of healthcare has focused on perceived racial/ethnic discrimination in the world at large rather than specifically in the healthcare setting and in receipt of preventive health services, including various types of cancer screening.

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This focus has likely been because racial disparities in breast and cervical cancer screening have been documented in African American, Hispanic, and Asian populations.[9–18] Although disparities for African American women have been greatly reduced and/or eliminated in some recent studies, they persist in many instances.[19] Research exploring the reasons for these disparities has found that socioeconomic status, access factors, health beliefs, and knowledge only partially explain these disparities.[11,12,16,18,20,21] The literature on the relationship between discrimination and use of preventive health services suggests that perceived discrimination may contribute to the remaining unexplained disparity. Although results vary across studies and between different screening types, many studies have found perceived racial/ethnic discrimination to be associated with decreased utilization of services, including screening for colorectal,[1,2,22,23] breast,[23] prostate,[24] and cervical cancer.[2,22,25] Others have found no association.[24–27] We found very few studies that investigated the relationship between types of discrimination other than racial/ethnic discrimination and receipt of cancer screening.[8,28]

The aim of this study was to understand the relationship between perceived everyday racial/ethnic and other discrimination and receipt of breast and cervical cancer screening in a multiethnic population of women. We chose to use a more general measure of discrimination rather than one specific to healthcare, because this type of "regular," everyday discrimination has been shown to negatively impact health in other ways.[29–35] Our hypotheses were that perceived discrimination for any reason would be higher among African American, Hispanic, and Asian women compared to Caucasian participants and that perceived discrimination would be associated with reduced breast and cervical cancer screening after accounting for other factors that are commonly recognized to influence receipt of preventive services.

Materials and Methods

Sample

The 3,258 women in this study are participants in the Study of Women's Health Across the Nation (SWAN). A detailed description of the SWAN methods and study design has been previously published.[36] Briefly, SWAN is organized as a prospective, multiethnic, multidisciplinary study of the natural history of the menopausal transition. The study is conducted at sites in Boston, Chicago, Oakland, Detroit, Los Angeles, Newark, and Pittsburgh. SWAN was designed to create a sample in which half the women were Caucasian and the other half were from one of four other racial/ethnic groups: African American, Chinese American, Japanese American, or Hispanic (Puerto Ricans, Mexicans, Dominicans, Central Americans, Cubans, and South Americans).[36] Each site recruited Caucasian women and women from one of these other racial/ethnic groups. Sampling strategies and frames varied from site to site and included random-digit dialing, voter registration lists, health maintenance organization subscription lists, census track/block enumeration, and "snowball" sampling techniques. At least 450 women were recruited at each site. Eligibility criteria required that participants be between 42 and 52 years old, not have taken hormone replacement therapy in the past 3 months, have an intact uterus and at least one ovary, have had a menstrual period in the 3 months prior to entry into the study, and not be pregnant or breastfeeding. In addition, we limited the present analyses to women who had not had breast, cervical, or uterine cancer. At study entry (1996–1997) and approximately annually thereafter, women at all sites completed a standard assessment that included interviewer-administered and self-administered questionnaires assessing various social, economic, behavioral, psychological, and lifestyle characteristics, along with collection of fasting blood and urine specimens. The SWAN research protocol was approved by the institutional review board at each site, and all women consented to participate in the study.

Study variables

Data for the present study were taken from the baseline, year 1, and year 2 follow-up questionnaires. Data on discrimination and all covariates were collected at baseline; breast and cervical cancer screening data were collected in all 3 years.

The 10-item Everyday Discrimination Scale used in SWAN was developed by David Williams *et al.* to measure relatively common experiences of discrimination, such as being treated with less courtesy or respect than others and receiving poorer service than others in such places as restaurants or stores.[37] The SWAN scale has been shown to be reliable and valid for use across racial/ethnic groups[38,39] and in the SWAN population[40] and has been associated with negative health outcomes in SWAN and other populations.[29–35] The stem question is "In your day-to-day life, how often do any of the following things happen to you?" A representative item is "You are treated with less courtesy than other people are." The frequency of each experience of discrimination is rated on a 4-point scale (1 = often, 2 = sometimes, 3 = rarely, 4 = never). If a respondent reports discrimination (e.g., answers 1 or 2 on one or more items), she is then asked what she thinks is "the main reason for these experiences" and to circle only one of nine possible reasons: race, ethnicity, gender, age, income level, language, physical appearance, sexual orientation, or other.[37] Women who answered "rarely" or "never" to all 10 discrimination items were assigned to the "no discrimination" category. Women who responded that they experienced 1 or more of the 10 items "often" or "sometimes" were classified as experiencing discrimination. Those who attributed their experiences to race or ethnicity were assigned to the "race discrimination" category. Those who attributed their experiences to one of the other seven possibilities were grouped into the "other discrimination" category.

Covariate data include sociodemographic variables and two measures of healthcare utilization (Table 1). Age is measured in years. Race reflects respondents' self-identification; women were asked to categorize themselves as belonging to one of five categories: African American, Chinese, Japanese, Hispanic, or non-Hispanic white. Insurance includes four categories: private insurance, federal insurance (Medicare or Medicaid), other insurance (including veterans' care), and no insurance. Respondents reported one of five educational levels from less than high school to postbaccalaureate schooling. Women reported their family's annual income within the range of less than $10,000 to more than $150,000. In addition to reporting their income, women were asked whether they had had money problems in the past year and if they

Table 1. Descriptive Statistics of SWAN Study
Sample at Baseline

		n (3,258)	%
Race	African American	918	28
	Chinese	240	7
	Japanese	271	8
	Hispanic	219	7
	Caucasian	1,610	50
Discrimination	Due to race/ethnicity	465	14
	Due to "other" reasons	1,040	32
	None	1,749	54
Education	Less than high school	187	6
	Completed high school	510	16
	Some college	1,018	33
	Complete college	661	21
	Postcollege	765	24
Income	Less than $10,000	171	5
	$10,000–$19,000	241	8
	$20,000–$34,999	472	15
	$35,000–$49,000	548	17
	$50,000–$74,999	773	24
	$75,000–$99,999	448	14
	$100,000–$149,999	366	12
	Greater $150,000	144	5
Insurance	Private insurance	2,706	83
	Medicare or Medicaid	130	4
	Other	196	6
	No insurance	211	7
Marital status	Married	2,135	68
	Divorced	408	13
	Separated	135	4
	Widowed	61	2
	Single	413	13
Money problems	No problems	2,176	67
	Problems, not upsetting	150	5
	Problems, somewhat upsetting	591	18
	Problems, very upsetting	323	10
		Mean (SD)	
Age	Years	45.8 (2.7)	
Hospitalizations	Number in past year	0.08 (0.4)	
Spoken to doctor	Number in past year	3.5 (4.5)	

SD, standard deviation; SWAN, Study of Women's Health Across the Nation.

did, how stressful those problems were (not upsetting, somewhat upsetting, or very upsetting). Marital status had five categories for respondents to choose from (married/living as if married, divorced, separated, widowed, or single). Healthcare utilization was measured using women's self-report of the number of times they had been hospitalized and had talked to a doctor in the past year.

Information on utilization of breast and cervical cancer screening was collected via self-report. At each visit, women were asked whether they had had a Pap smear, clinical breast exam (CBE), and mammogram in the past year. Because the interviews did not necessarily coincide neatly with a woman's screening schedule, we chose a 2-year period for each of these screenings to be completed for a participant to be considered as "screened." For example, if a woman had a mammogram scheduled for 1 week after her interview in her first-year follow-up, she would appear "unscreened" when in fact she was up-to-date. She could have been screened in one or both

years to be considered "screened." Given that the data from this study are from 1996 to 2000, this is consistent with the guidelines at the time.

Analysis

The basic analytic framework for this study was logistic regression for the binary outcomes of having a Pap smear, CBE, or mammogram in each of the two follow-up years. The main predictors of interest were "race discrimination" and "other discrimination" at baseline. We then adjusted our analyses in a stepwise manner for potential confounders of the relationship between discrimination and cancer screening: baseline age (Model 1), socioeconomic factors (Model 2), and exposure to healthcare (Model 3). For each outcome, three models were fitted. In Model 1, we adjusted for baseline age. In Model 2, we further adjusted for age, race, education (coded 1–5), income (coded 1–8), insurance, marital status, and report of money problems (coded 1–4). In the last model (Model 3), we adjusted for annual exposure to healthcare in addition to all other covariates. Models 2 and 3 were fitted to the data to investigate the direct effect of the covariates on use of screening services and to examine whether adjustment for these variables changed the association between perceived discrimination and use of screening services. Separate sets of logistic models were conducted for each outcome and are reported later in this article. We also included an interaction term in a final model to test for effect modification of "discrimination" by racial/ethnic group.

Two features of the SWAN data required special statistical treatment. First, the data were collected longitudinally, yielding up to three measures per woman in the study. To account for correlation among the repeated measures, we fitted our logistic regression models, using generalized estimating equations with an exchangeable correlation structure and robust estimates of standard error.[41]

The second challenging feature is the considerable variability of the SWAN populations across sites. A first-line approach for multisite studies would be to develop a single model that includes both adjustors and a site-specific random or fixed effect. However, in SWAN, each site includes Caucasian women and women from one other race/ethnic group, with four sites including African American women and one site each including Hispanic, Japanese, or Chinese women. Samples also had different levels and types of insurance coverage. As a result, adjustment models with random site effects would have to be specified differentially from site to site to account for between-site differences, leading to awkward and difficult-to-reproduce adjustment models involving many interaction terms. Furthermore, owing to the cross-site heterogeneity, the levels and effects of perceived discrimination were also variable across sites.

To address these challenges, we took a meta-analytic approach to our data analyses.[42] Specifically, we fitted logistic models separately across the seven sites and then pooled the resulting regression coefficients, obtaining overall estimates of perceived discrimination and other predictors, with corresponding pooled standard errors for testing and constructing confidence intervals on this overall association. Working site by site allowed us to flexibly handle between-site differences in covariate structure, examine results site by site, and check for any model misspecifications at each site, before pooling

TABLE 2. REPORT OF DISCRIMINATION BY RACE AT BASELINE

Type of discrimination	African American		Chinese		Japanese		Hispanic		Caucasian		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Race	319	35	48	20	30	11	26	12	42	3	465	14
Other[a]	216	24	80	33	62	23	35	16	647	40	1040	32
None	381	42	112	47	179	66	158	72	919	57	1749	54

$p < 0.001$ for distribution of report of discrimination within each race category compared to Caucasians, adjusting for age, educational level, and income.

[a]Due to gender, age, income level, physical appearance, language, sexual orientation, other.

results on discrimination effects. In pooling, we weighted the coefficients by the inverse of the site-specific estimate of variance (square of standard error). Note that with this method, a site that has, for example, no participants of Chinese origin will automatically not contribute to estimation of the association between Chinese ethnicity and screening behavior.

Results

Table 1 shows the racial and sociodemographic characteristics of the sample. Although the sample includes substantial numbers of participants identifying as African American, Chinese, Japanese, and Hispanic, participants identifying as Caucasian made up 50% of the study population. Most participants were highly educated, middle class, insured, and married. Most women had had exposure to healthcare in the prior year at baseline, and less than 30% had experienced stressful money problems. Overall, more than half the sample reported no discrimination, less than 15% reported racial discrimination, and 32% reported discrimination owing to other reasons. After race, which was the most frequently reported reason for discrimination (28%), the next most commonly reported reasons were gender (14%), physical appearance (12%), and "other" (27%; results not shown). Report of racial discrimination varied by ethnic group (see Table 2), with African Americans reporting the highest percentage of racial discrimination (35%), followed by Chinese (20%), Hispanic (12%), Japanese (11%), and non-Hispanic white women (3%; $p < 0.01$, chi-squared test of independence adjusting for age, income, and educational level). Non-Hispanic white women reported the highest percentage of "other" discrimination (40%), followed by Chinese (33%), African Americans (24%), Japanese (23%), and Hispanic women (16%). The majority of women did not have a Pap smear, CBE, or mammogram between the baseline visit and year 2 follow-up (Table 3).

TABLE 3. REPORT OF PAP SMEAR, CLINICAL BREAST EXAM, AND MAMMOGRAPHY IN YEARS 1 AND 2

	Year 1		Year 2	
	n	%	n	%
Pap smear	1,081	35	907	31
CBE	955	31	819	28
Mammogram	1,400	46	1,181	41

CBE, clinical breast exam.

The results of the three models exploring the relationship between discrimination and receipt of each of the three measures of breast and cervical cancer screening are shown in Table 4. Racial discrimination was not significantly related to receipt of Pap smears or mammography in any of the three models and was significantly related to receipt of CBE only in the fully adjusted Model 3. Women who reported experiencing discrimination attributed to nonracial factors were approximately 15%–22% less likely to receive Pap smears, CBE, and mammograms across all three models (each $p < 0.01$).

Table 4 also reports the odds ratios for receipt of each of the cancer screenings for each of the race categories included in Models 2 and 3. In Model 2, the odds of having had a Pap smear, CBE, or mammogram in the 2 years of the study were significantly greater for African American women and significantly less for Chinese women when compared with Caucasian women. The odds ratios for receipt of preventive services for Hispanic women were similar to those for Caucasian women. The odds of receipt of cancer screening compared to Caucasian women did not change significantly for these three racial ethnic groups in Model 3, except that the greater odds of receipt of mammography for African American women was no longer significant (1.29; CI, 0.91–1.58). Compared to Caucasian women. Japanese women had significantly reduced odds of receipt of Pap smears and CBE but not mammography in both Models 1 and 2.

Additional covariates significantly negatively associated with receipt of Pap smear, CBE, and mammography in Models 2 and 3 were younger age, lower income, lack of insurance, and fewer reported episodes of talking to a physician in the past year (results not shown). Having less education was associated with lower odds of receipt of Pap smear and CBE but not mammography, and being widowed was associated with lower Pap-smear odds in both models as well (results not shown). There were no significant relationships between report of stressful money problems (Models 2 and 3) and number of hospitalizations (Model 3) and breast and cervical cancer screening. There were no significant interactions between race/ethnicity and reporting discrimination (final model not shown).

Discussion

We found that that perceived racial discrimination was higher among African American, Hispanic, and Asian women compared to Caucasian participants in our study, but reports of racial discrimination were generally not associated with reduced breast and cervical cancer screening. We also found that reports of discrimination owing to other factors was high

TABLE 4. ODDS RATIOS FOR RECEIVING BREAST AND CERVICAL CANCER SCREENING BY REPORT OF DISCRIMINATION AND RACE

	Pap smears OR (95% CI)		
	Model 1[a]	Model 2[b]	Model 3[c]
Race discrimination	1.00 (0.31–2.45)	0.96 (0.77–1.19)	0.88 (0.79–1.10)
Other discrimination	0.84 (0.73–0.96)	0.88 (0.76–1.02)	0.85 (0.74–0.99)
No discrimination	1.00	1.00	1.00
African American		1.28 (1.04–1.58)	1.28 (1.04–1.59)
Chinese		0.61 (0.44–0.86)	0.61 (0.43–0.86)
Japanese		0.60 (0.42–0.86)	0.65 (0.45–0.94)
Hispanic		0.96 (0.54–1.71)	0.95 (0.53–1.72)
Caucasian		1.00	1.00

	Clinical breast exam OR (95% CI)		
	Model 1[a]	Model 2[b]	Model 3[c]
Race discrimination	0.88 (0.72–1.06)	0.82 (0.66–1.03)	0.77 (0.61–0.97)
Other discrimination	0.78 (0.68–0.90)	0.81 (0.69–0.94)	0.78 (0.67–0.91)
No discrimination	1.00	1.00	1.00
African American		1.50 (1.21–1.87)	1.50 (1.20–1.88)
Chinese		0.64 (0.44–0.92)	0.63 (0.44–0.91)
Japanese		0.58 (0.40–0.83)	0.64 (0.45–0.92)
Hispanic		1.13 (0.63–2.04)	1.12 (0.62–2.02)
Caucasian		1.00	1.00

	Mammography OR (95% CI)		
	Model 1[a]	Model 2[b]	Model 3[c]
Race discrimination	0.92 (0.77–1.10)	0.89 (0.73–1.08)	0.82 (0.67–1.01)
Other discrimination	0.80 (0.70–0.91)	0.83 (0.72–0.94)	0.80 (0.69–0.92)
No discrimination		1.00	1.00
African American		1.28 (1.06–1.55)	1.29 (0.95–1.58)
Chinese		0.62 (0.44–0.87)	0.61 (0.43–0.86)
Japanese		0.73 (0.52–1.01)	0.79 (0.57–1.09)
Hispanic		1.21 (0.70–2.09)	1.20 (0.69–2.09)
Caucasian		1.00	1.00

[a]Adjusted for age.
[b]Adjusted for age, race, education, income, insurance status, marital status, and report of stressful money problems.
[c]Adjusted for variables in Model 2 plus number of hospitalizations and times spoken to a physician in the past year.
CI, confidence interval; OR, odds ratio.

across all the groups in our study—highest, in fact, among the Caucasians in our study—and that reports of discrimination owing to reasons other than race were strongly related to reduced self-reported receipt of CBE, Pap smears, and mammography.

Our findings are consistent with other studies that have shown higher rates of perceived racial discrimination among non-Caucasian racial/ethnic groups and mixed results regarding the relationship between this type of discrimination and receipt of preventive cancer screening, including breast and cervical cancer screening.[23–26,43,44] This is surprising given that the negative association between reports of racial/ethnic discrimination and other health outcomes is usually clear and consistent.[5,44] This inconsistency may be due to several factors. First, there are documented psychometric differences between the measures of perceived racial discrimination used across these studies[45] and the types of dis-

crimination measured—both in the healthcare setting and the experience of discrimination more broadly. In a brief review of the studies we cite in this article, we noted that those that found an association between discrimination and health outcomes were more likely to use measures of perceived discrimination specific to healthcare.[7,23,26,46–49] Second, it may be that other determinants of receipt of preventive cancer screening are more salient than perceived racial/ethnic discrimination. For example, in our study, we were unable to measure and control for additional factors that are known to influence cancer screening, such as differences across racial/ethnic groups in beliefs about susceptibility to cancer, fatalism, whether a doctor recommended screening, previous screening behavior and so on.[50–52]

In contrast, report of perceived discrimination owing to other factors, such as physical appearance or gender, was clearly negatively associated with receipt of all three screening

measures, indicating that discrimination has an impact on receipt of healthcare services across all groups. This finding is consistent with a few previous studies reporting an association between perceived discrimination related to gender, obesity, and sexual orientation and nonadherence to breast and cervical cancer screening guidelines.[3,8,23] We were unable to disentangle how each of the other categories of discrimination contributed to this relationship, owing to the small number of women attributing their experiences of discrimination to each "other" category. This finding suggests that something about perceived discrimination, no matter what factor it is attributed to, interferes with a woman's ability to get breast and cervical cancer screening. It may be that women experience this same discrimination in the healthcare setting and therefore do not get the services they should or that women reporting discrimination are likely to expect discrimination in the healthcare setting and therefore avoid getting healthcare. More research is needed to elucidate how perceived discrimination is related to reduced utilization of healthcare and whether the reason attributed for the mistreatment changes this relationship.

This study was not without limitations. The fact that the sampling strategies and racial groups differed by site may have limited our ability to understand the relationship between racial discrimination and receipt of breast and cervical cancer screening. In addition, unlike most comparative studies, the African American women in this study were significantly more likely than Caucasian women to have had Pap smears, CBEs, and mammograms. Given that African American women reported the most perceived racial discrimination of any group in this study, it is likely that in a different population, the relationship between racial discrimination and breast and cervical cancer screening would have been stronger than that found in our study. In addition, perceived discrimination could potentially vary across regions of the country, and our results might have been different if we had included additional regions of the United States. The women in our sample, with frequent exposure to healthcare, may be different in respect to the relationship between perceived discrimination and preventive screening than women without less frequent exposure to healthcare. That said, we still found a significant relationship between screening and perceived discrimination, and this relationship was consistent across the models, whether or not we controlled for exposure to healthcare. Our measure of perceived discrimination did not provide us with information about how discrimination, for whatever reason, reduces breast and cervical cancer screening. This underscores the points made in recent reviews that the relationship between discrimination and receipt of healthcare needs to be explored in further depth.[5,44]

Despite these limitations, this study adds to the growing body of literature documenting the relationship between discrimination and health and healthcare. This study indicates that perceived discrimination due to "other" factors, regardless of race, also likely plays an important role in whether people get the healthcare they need. Clearly, delivering healthcare involves more than providing insurance, access, and the services that patients need. The racial and social contexts in which patients and providers operate also influence their receipt of healthcare. If we are serious about

providing optimal care to all the women we serve, we must begin to address these issues as well.

Author Disclosure Statement

No competing financial interests exist for any of the authors.

References

1. Benjamins MR. Race/ethnic discrimination and preventive service utilization in a sample of whites, blacks, Mexicans, and Puerto Ricans. Med Care 2012;50:870–876.
2. Gonzales KL, Harding AK, Lambert WE, Fu R, Henderson WG. Perceived experiences of discrimination in health care: A barrier for cancer screening among American Indian women with type 2 diabetes. Womens Health Issues 2013;23:e61–67. PMCID: 3640290.
3. Hansson LM, Naslund E, Rasmussen F. Perceived discrimination among men and women with normal weight and

obesity. A population-based study from Sweden. Scand J Public Health 2010;38:587–596.

4. Kressin NR, Raymond KL, Manze M. Perceptions of race/ethnicity-based discrimination: A review of measures and evaluation of their usefulness for the health care setting. J Health Care Poor Underserved 2008;19:697–730. PMCID: 2914305.

5. Pascoe EA, Smart Richman L. Perceived discrimination and health: A meta-analytic review. Psychol Bul. 2009;135:531–554. PMCID: 2747726.

6. Perez-Stable EJ, Afable-Munsuz A, Kaplan CP, et al. Factors influencing time to diagnosis after abnormal mammography in diverse women. J Womens Health (Larchmt) 2013;22:159–166. PMCID: 3573728.

7. Shelton RC, Winkel G, Davis SN, et al. Validation of the group-based medical mistrust scale among urban black men. J Gen Intern Med 2010;25:549–555. PMCID: 2869405.

8. Tracy JK, Lydecker AD, Ireland L. Barriers to cervical cancer screening among lesbians. J Womens Health (Larchmt) 2010;19:229–237. PMCID: 2834453.

9. Centers for Disease Control and Prevention. Study finds racial and ethnic disparities in US cancer screening rates. Available at: http://www.cdc.gov/media/releases/2012/p0126_cancer_screening.html (accessed August 13, 2013).

10. Coughlin SS, Uhler RJ, Richards T, Wilson KM. Breast and cervical cancer screening practices among Hispanic and non-Hispanic women residing near the United States–Mexico border, 1999–2000. Fam Community Health 2003;26:130–139.

11. Haas JS, Phillips KA, Sonneborn D, McCulloch CE, Liang SY. Effect of managed care insurance on the use of preventive care for specific ethnic groups in the United States. Med Care 2002;40:743–751.

12. Harlan LC, Bernstein AB, Kessler LG. Cervical cancer screening: Who is not screened and why? Am J Public Health 1991;81:885–890. PMCID: 1405182.

13. Hislop TG, Deschamps M, Teh C, et al. Facilitators and barriers to cervical cancer screening among Chinese Canadian women. Can J Public Health 2003;94:68–73.

14. Jazieh AR, Buncher CR. Racial and age-related disparities in obtaining screening mammography: Results of a statewide database. South Med J 2002;95:1145–1148.

15. Jones BA, Patterson EA, Calvocoressi L. Mammography screening in African American women: Evaluating the research. Cancer 2003;97(1 Suppl):258–272.

16. Royak-Schaler R, Chen S, Zang E, Vivacqua RJ, Bynoe M. Does access to screening through health maintenance organization membership translate into improved breast cancer outcomes for African American patients? J Am Med Womens Assoc 2003;58:154–156.

17. Taylor VM, Jackson JC, Tu SP, et al. Cervical cancer screening among Chinese Americans. Cancer Detect Prev 2002;26:139–145. PMCID: 1592328.

18. Thompson VL. Racism: Perceptions of distress among African Americans. Community Ment Health J 2002;38:111–118.

19. Shi L, Lebrun LA, Zhu J, Tsai J. Cancer screening among racial/ethnic and insurance groups in the United States: A comparison of disparities in 2000 and 2008. J Health Care Poor Underserved 2011;22:945–961.

20. Harris DM, Miller JE, Davis DM. Racial differences in breast cancer screening, knowledge and compliance. J Natl Med Assoc 2003;95:693–701. PMCID: 2594576.

21. Yu MY, Hong OS, Seetoo AD. Uncovering factors contributing to under-utilization of breast cancer screening by

Chinese and Korean women living in the United States. Ethn Dis 2003;13:213–219.

22. Born W, Engelman K, Greiner KA, et al. Colorectal cancer screening, perceived discrimination, and low-income and trust in doctors: A survey of minority patients. BMC Public Health 2009;9:363. PMCID: 2761405.

23. Crawley LM, Ahn DK, Winkleby MA. Perceived medical discrimination and cancer screening behaviors of racial and ethnic minority adults. Cancer Epidemiol Biomarkers Prev 2008;17:1937–1944. PMCID: 2526181.

24. Hausmann LR, Jeong K, Bost JE, Ibrahim SA. Perceived discrimination in health care and use of preventive health services. J Gen Intern Med 2008;23:1679–1684. PMCID: 2533365.

25. Mouton CP, Carter-Nolan PL, Makambi KH, et al. Impact of perceived racial discrimination on health screening in black women. J Health Care Poor Underserved 2010;21:287–300.

26. Dailey AB, Kasl SV, Holford TR, Jones BA. Perceived racial discrimination and nonadherence to screening mammography guidelines: Results from the race differences in the screening mammography process study. Am J Epidemiol 2007;165:1287–1295.

27. Sheppard VB, Wang J, Yi B. Are health-care relationships important for mammography adherence in Latinas? J Gen Intern Me. 2008;23:2024–2030. PMCID: 2596511.

28. Dailey AB, Kasl SV, Jones BA. Does gender discrimination impact regular mammography screening? Findings from the race differences in screening mammography study. J Womens Health (Larchmt) 2008;17:195–206. PMCID: 3086046.

29. Barnes LL, de Leon CF, Lewis TT, Bienias JL, Wilson RS, Evans DA. Perceived discrimination and mortality in a population-based study of older adults. Am J Public Health 2008;98:1241–1247. PMCID: 2424090.

30. Barnes LL, Mendes De Leon CF, Wilson RS, Bienias JL, Bennett DA, Evans DA. Racial differences in perceived discrimination in a community population of older blacks and whites. J Aging Health 2004;16:315–337.

31. Hunte HE, Williams DR. The association between perceived discrimination and obesity in a population-based multiracial and multiethnic adult sample. Am J Public Health 2009;99:1285–1292. PMCID: 2696650.

32. Lewis TT, Everson-Rose SA, Powell LH. Chronic exposure to everyday discrimination and coronary artery calcification in African-American women: The SWAN Heart Study. Psychosom Med 2006;68:362–368.

33. Lewis TT, Kravitz HM, Janssen I, Powell LH. Self-reported experiences of discrimination and visceral fat in middle-aged African-American and Caucasian women. Am J Epidemiol 2011;173:1223–1231. PMCID: 3101065.

34. Lewis TT, Troxel WM, Kravitz HM, Bromberger JT, Matthews KA, Hall MH. Chronic exposure to everyday discrimination and sleep in a multiethnic sample of middle-aged women. Health Psychol 2013;32:810–819. PMCID: 3654016.

35. Troxel WM, Matthews KA, Bromberger JT, Sutton-Tyrrell K. Chronic stress burden, discrimination, and subclinical carotid artery disease in African Americans and Caucasian women. Health Psychol 2003;22:300–309.

36. Sowers M, Crawford SL, Sternfeld B. SWAN: A multicenter, multiethnic, community-based cohort study of women and the menopausal transition. Menopause: Biology and pathobiology. San Diego, CA: Academic Press, 2000:175–188.

37. 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: 335–351.

38. Krieger N, Smith K, Naishadham D, Hartman C, Barbeau EM. Experiences of discrimination: Validity and reliability of a self-report measure for population health research on racism and health. Soc Sci Med 2005;61:1576–1596.

39. Taylor TR, Williams CD, Makambi KH. Racial discrimination and breast cancer incidence in US Black women: The Black Women's Health Study. Am J Epidemiol 2007;166:46–54.

40. Lewis TT, Yang FM, Jacobs EA, Fitchett G. Racial/ethnic differences in responses to the everyday discrimination scale: A differential item functioning analysis. Am J Epidemiol 2012;175:391–401. PMCID: 3282874.

41. Zeger SL, Liang KY. Longitudinal data analysis for discrete and continuous outcomes. Biometrics 1986;42:121–130.

42. Fisher L, van Belle G. Biostatistics: A methodology for the health sciences. New York: Wiley & Sons,1993.

43. Hoyo C, Yarnall KS, Skinner CS, Moorman PG, Sellers D, Reid L. Pain predicts non-adherence to pap smear screening among middle-aged African American women. Prev Med 2005;41:439–445.

44. Williams DR, Mohammed SA. Discrimination and racial disparities in health: Evidence and needed research. J Behav Med 2009;32:20–47. PMCID: 2821669.

45. Shariff-Marco S, Breen N, Landrine H. Measuring everyday racial/ethnic discrimination in health surveys. Du Bois Review: Social Science Research on Race 2011;8:159–177.

46. Blanchard J, Lurie N. R-E-S-P-E-C-T: Patient reports of disrespect in the health care setting and its impact on care. J Fam Pract 2004;53:721–730.

47. Lee C, Ayers SL, Kronenfeld JJ. The association between perceived provider discrimination, healthcare utilization and health status in racial and ethnic minorities. Ethn Dis 2009;19:330–337. PMCID: 2750098.

48. Thorburn S, Bogart LM. African American women and family planning services: Perceptions of discrimination. Women Health 2005;42:23–39.

49. Trivedi AN, Ayanian JZ. Perceived discrimination and use of preventive health services. J Gen Intern Med 2006;21:553–558. PMCID: 1924636.

50. Hall AG, Khoury AJ, Lopez ED, Lisovicz N, Avis-Williams A, Mitra A. Breast cancer fatalism: The role of women's perceptions of the health care system. J Health Care Poor Underserved 2008;19:1321–1335.

51. Remennick L. The challenge of early breast cancer detection among immigrant and minority women in multicultural societies. Breast J 2006;12 Suppl 1:S103–110.

52. Zhu K, Hunter S, Bernard LJ, Payne-Wilks K, Roland CL, Levine RS. Mammography screening in single older African-American women: A study of related factors. Ethn Dis 2000;10:395–405.

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