RACIAL DIFFERENCES IN THE USE OF ASPIRIN: AN IMPORTANT TOOL FOR PREVENTING HEART DISEASE AND STROKE

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Background: Regular aspirin use, particularly as secondary prevention, reduces morbidity from heart disease and stroke. Few studies have examined racial/ethnic differences in aspirin use for the prevention of cardiovascular disease (CVD).

Methods: Data from the 2001 Behavioral Risk Factor Surveillance System (n=2,514 African Americans; n=865 Hispanics; n=28,038 Whites) were used to assess racial/ethnic differences in aspirin use. Multivariable logistic regression was used to examine whether the likelihood of aspirin use differs by race/ethnicity after accounting for sociodemographic and CVD risk factors.

Results: Regular aspirin use was associated with increasing age, male gender, lower educational attainment, hypertension, diabetes, overweight, and histories of myocardial infarction, coronary heart disease, and stroke. Aspirin use was lower among African Americans and Hispanics than Whites (28.6% and 28.7% vs 37.1%, respectively). After adjustment for sociodemographic and CVD risk factors, African Americans and Hispanics were 30%–40% less likely than Whites (OR=0.6, 95% CI=0.5, 0.7, African Americans; OR=0.7, 95% CI=0.5, 1.0, Hispanics) to take aspirin. Although aspirin use was higher among those with CVD (73.6% African Americans, 73.6% Hispanics, and 82.7% Whites), after multivariable adjustment, African Americans and Hispanics with CVD remained 30% to 50% less likely to use aspirin than Whites (OR=0.7, 95% CI=0.4, 1.2, African Americans; OR=0.5, 95% CI=0.2, 1.1, Hispanics).

Conclusions: African Americans and Hispanics are less likely to take aspirin than their White counterparts. Differences in sociodemographic characteristics and CVD risk factors do not account for lower aspirin use among racial/ethnic minorities. Additional studies should examine methods to increase aspirin use in these populations. (*Ethn Dis*. 2005;15:620–626)

Key Words: African Americans, Aspirin, Cardiovascular Disease, Cross Sectional, Hispanic

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INTRODUCTION

Heart disease and stroke are the first- and third-leading causes of death in the United States, and death rates are substantially higher among African Americans than Whites or Hispanics.[1] An important cause of these disparities is differential delivery of preventive counseling. For example the Centers for Medicare and Medicaid Services' Cooperative Cardiovascular Project[2] reported that African Americans who suffered a myocardial infarction were significantly less likely than their White counterparts to be prescribed aspirin at discharge from the hospital. More recently the Atherosclerosis Risk in Communities Study (ARIC)[3] reported that African-American outpatients were less likely than Whites to take aspirin. Randomized clinical trials have shown that regular aspirin use can greatly reduce morbidity and mortality from heart disease and stroke,[4–7] and the American Heart Association recommends the regular use of aspirin to prevent both conditions.[8]

Neither the Cooperative Cardiovascular Project nor ARIC examined aspirin use among Hispanics, the fastest-growing ethnic group in the United States; the ARIC study represents only four communities. The objective of the present study was to use data from the Behavioral Risk Factor Surveillance System (BRFSS) to determine whether the proportion of US adults who report taking aspirin every day or every other day to prevent heart disease and stroke differs by race or ethnicity. We also determined whether these differences persist after accounting for selected sociodemographic characteristics and risk factors for heart disease and stroke.

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METHODS

The BRFSS is a random-digit-dialed telephone survey conducted by state health departments in conjunction with the Centers for Disease Control and Prevention (CDC). A detailed description of the survey design and random sampling procedures is available elsewhere.[9] The BRFSS contains a core survey that includes questions asked by all 50 states and territories as well as optional modules asked in some of the states. One of the optional modules in 2001 concerned cardiovascular disease (CVD) prevention and was used by 19 states (Alabama, Arkansas, Colorado, District of Columbia, Iowa, Minnesota,

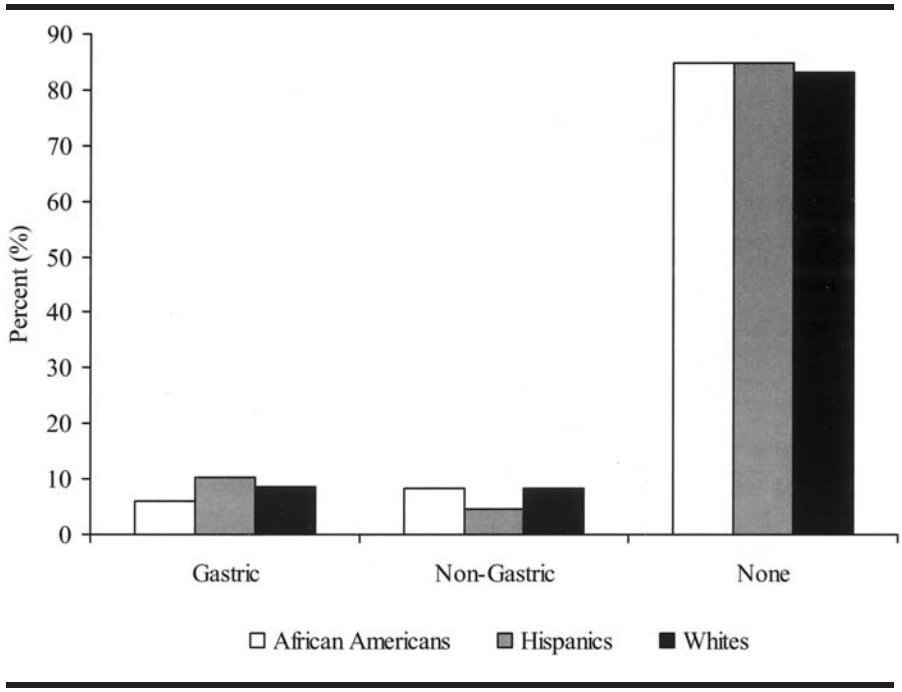

Fig 1. Contraindications to regular aspirin use, Behavioral Risk Factor Surveillance System, 2001

Mississippi, Missouri, Montana, New York, North Dakota, Ohio, Oklahoma, South Carolina, Tennessee, Utah, Virginia, Washington, West Virginia, and Wyoming) and the District of Columbia. Respondents, aged 35 years, were asked whether they took aspirin every day or every other day. Those who said they did not were subsequently asked whether they had a health problem or condition that made taking aspirin unsafe and if so, whether that problem was stomach related or not. The proportion of persons who had a medical contraindication did not differ by race/ethnicity (16.9% of Whites, 15.1% of African Americans, and 15.1% of Hispanics; Figure 1). These 4,193 persons were excluded from the analysis. Persons who reported taking aspirin regularly (ie, every day or every other day) were asked why they took it: to relieve pain (yes, no), to reduce the chance of a heart attack (yes, no), to reduce the chance of a stroke (yes, no).

The survey also asked respondents whether they had ever been told by a healthcare provider that they had hypertension, high blood cholesterol, diabetes, coronary heart disease, myocardial infarction, or stroke. Persons reporting a history of myocardial infarction, coronary heart disease, or stroke were considered to have CVD and were included in the analyses examining racial differences in the use of aspirin for the secondary prevention of CVD. Participants' body mass index (BMI: weight in kg/height in m^2) was calculated by using self-reported height and weight information. Respondents with a BMI $\geq$25 kg/m^2 were defined as overweight. Finally, respondents were asked whether they had smoked 100 cigarettes in their lifetime and if so, whether they smoked currently; those who answered both questions affirmatively were considered current smokers. To determine whether aspirin use was related to cardiovascular disease risk, a six-level risk score (0–5) was constructed from the self-reported history of heart disease, stroke, and diabetes and four self-reported CVD risk factors: high blood cholesterol, hypertension, overweight, and cigarette smoking. The highest score (5) was assigned to persons with a history of myocardial infarction, coronary heart disease, stroke, or diabetes and the lowest (0) to those free of cardiovascular disease or diabetes and the four risk factors. The remaining respondents were assigned a score equaling the number of risk factors present. Because few persons had three or four risk factors, these two groups were combined.

For this analysis, data were analyzed for 31,417 persons aged $\geq$35 years with complete information on aspirin use, sociodemographic characteristics, and CVD risk factors. The data were weighted to account for the age, race, and sex distribution in each state. Chi-square tests were used to compare differences in categorical variables across racial/ethnic groups and aspirin use. To determine whether the likelihood of aspirin use differed by race/ethnicity, logistic regression was used. The logistic regression model adjusted for age, sex, education, high blood cholesterol, hypertension, diabetes, overweight, cigarette smoking, and a history of heart attack, stroke, or coronary heart disease. The model examining the likelihood of aspirin use among those with heart disease or stroke adjusted for these factors except the histories of heart attack, stroke, and coronary heart disease. SUDAAN 8.0 (Research Triangle Institute, Research Triangle Park, NC, USA) was used to account for the complex sampling design and to obtain accurate variance estimates. All statistical tests were based on a significance level of P (2-sided) $\leq$.05.

RESULTS

The study sample included 2,514 African Americans, 865 Hispanics, and 28,038 Whites. The three race/ethnic groups differed significantly in age distribution, proportion of male respondents, educational attainment, and the prevalence of hypertension, diabetes, and overweight (Table 1).

Table 1. Respondent characteristics by race/ethnicity, Behavioral Risk Factor Surveillance System, 2001

Characteristic	African Americans (*n*=2514)	Hispanics (*n*=865)	Whites (*n*=28,038)	*P* value
Age, years (%)				<.001
35–49	50.0	51.0	40.5	
50–64	30.0	32.0	32.6	
≥65	20.1	17.0	26.8	<.001
Men (%)	43.6	47.1	49.8	<.001
Education, years (%)				<.001
<12	18.1	33.8	8.7	
12	32.2	27.4	31.1	<.001
>12	49.7	38.7	60.2	
High blood cholesterol (%)	32.8	37.9	35.9	.093
Hypertension (%)	48.3	33.9	33.8	<.001
Diabetes (%)	15.5	15.9	8.4	<.001
Smoking (%)	22.0	20.5	19.6	.177
Overweight (%)	74.1	68.6	63.1	<.001
Myocardial infarction (%)	6.2	5.7	6.7	.683
Coronary heart disease (%)	5.2	5.7	7.5	.083
Stroke (%)	4.8	2.7	3.1	.074

Across all race/ethnic groups >60% of respondents were overweight and approximately 20% were current cigarette smokers.

Regular aspirin use was reported by 35.9% of respondents. The proportion of persons who reported taking aspirin regularly increased among successive age groups ($P<.001$) and declined with educational attainment ($P<.001$) (Table 2). Men were more likely to take aspirin than women ($P<.001$). All CVD risk factors except cigarette smoking were associated with regular aspirin use ($P<.001$). Persons with a history of myocardial infarction, coronary heart disease, or stroke were more than twice as likely to report taking aspirin as persons without these conditions ($P<.001$).

Overall, 37.1% of Whites, 28.6% of African Americans, and 28.7% of Hispanics reported taking aspirin either every day or every other day. When asked why they took aspirin, Hispanics were substantially more likely than African Americans or Whites to report taking aspirin for pain relief (36.8% vs 28.2% and 20.9%, respectively; $P<.001$; Figure 2). In contrast, Whites were more likely than Hispanics and African Americans to report taking aspirin to prevent a heart attack (84.0% vs 77.3% and 78.6%, respectively; $P=.022$).

Across all three race/ethnic groups was a graded, positive relationship between the CVD risk factor score and the prevalence of aspirin use (Figure 3). For example, 27.9% of African Americans with two risk factors took aspirin compared with 11.0% of African Americans with zero risk factors and no history of heart disease, stroke, or diabetes. In addition, at each level of CVD risk, Hispanics and African Americans were less likely to take aspirin than their White counterparts. For example, among those with three or four risk factors, the prevalence of aspirin use was 30.9% among African Americans, 37.0% among Hispanics, and 45.6% among Whites.

In the crude analysis, African Americans and Hispanics were significantly less likely than their White counterparts to report taking aspirin regularly (Table 3). Adjustment for age, sex, education, high blood cholesterol, hypertension, diabetes, cigarette smoking, overweight, myocardial infarction, coronary heart disease, and stroke did not substantially change the likelihood of aspirin use for either African Americans or for Hispanics. Limiting the analysis to persons with heart disease or stroke, a group where the benefits of aspirin have been well described, also did not alter the results for African Americans or Hispanics, although the results were no longer statistically significant, most likely because of the small number of African Americans and Hispanics with heart disease or stroke.

When the analysis was limited to persons with heart disease or stroke, African Americans and Hispanics were 30%–50% less likely than their White counterparts to take aspirin.

DISCUSSION

The results of this analysis from the 2001 BRFSS indicate that African Americans and Hispanics are significantly less likely than their White counterparts to take aspirin regularly. These differences did not change with adjustment for sociodemographic and CVD risk factors, which suggests the lower prevalence of aspirin use among African Americans and Hispanics could not be explained by these factors. When the analysis was limited to persons with heart disease or stroke, African Americans and Hispanics were 30%–50% less likely than their White counterparts to take aspirin.

We observed that persons with heart disease or stroke were almost twice as likely to take aspirin regularly as those without heart disease or stroke. While the benefits of regular aspirin use are clear for secondary prevention, the role of aspirin in primary prevention is less clear. Data from the Physicians Health Study,[4] which included 22,000 male

Table 2. Prevalence of aspirin use by respondent characteristics, Behavioral Risk Factor Surveillance System, 2001

Characteristic	*N*	Taking Aspirin (%)	*P* value
Age (years)			<.001
35–49	12,934	18.5	
50–64	10,217	40.8	
≥65	8,266	57.9	<.001
Sex			<.001
Men	13,361	39.3	
Women	18,056	32.6	<.001
Education (years)			<.001
<12	3,268	48.0	
12	9,767	38.0	
>12	18,382	32.5	
High blood cholesterol			<.001
Yes	11,060	48.4	
No	20,357	28.9	
Hypertension			<.001
Yes	11,023	52.3	
No	20,394	27.0	
Diabetes			<.001
Yes	2,801	61.0	
No	28,616	33.3	
Smoking			.133
Yes	6,216	34.6	
No	25,201	36.2	
Overweight			<.001
Yes	19,618	38.1	
No	11,799	31.9	
Myocardial infarction			<.001
Yes	1,948	85.7	
No	29,469	32.3	
Coronary heart disease			<.001
Yes	2,087	85.7	
No	29,330	32.0	
Stroke			<.001
Yes	1,044	78.7	
No	30,373	34.4	

physicians aged 40–84 years who took 325 mg of aspirin every other day, reported a 44% reduction in the incidence of fatal and nonfatal myocardial infarction. In contrast, the British Physicians' Trial,[5] which included 5,139 male physicians all under the age of 80 who took 500 mg of aspirin daily, was unable to find a significant difference in risk of CVD events between those who took aspirin versus placebo. When the two trials were combined, however, regular use of aspirin was associated with a 32% reduction in CVD endpoints.[10] Both trials reported that those taking aspirin were at greater risk for hemorrhagic stroke and gastrointestinal bleeding.

Because of the conflicting results from the two primary prevention trials and the side effect profile associated with regular aspirin use, national organizations and physician groups have had difficulty coming to consensus regarding the role of aspirin in the primary prevention of CVD. The US Preventive Services Task Force concluded that insufficient evidence existed to recommend for or against regular aspirin use in the primary prevention of CVD.[11] In addition, the American Heart Association (AHA) recommends aspirin for men middle-aged and older whose risk for myocardial infarction was sufficiently high to warrant the possible adverse effects of long-term use of the drug.[8] The AHA emphasizes that the decision to use aspirin should be an individual one and that aspirin prophylaxis is only an adjunct to coronary heart disease risk factor management. The results from this analysis suggest that in many areas physicians are following these recommendations. Across all three race/ethnic groups, as the risk for CVD increased so did the likelihood of aspirin use. However at each risk level, African Americans and Hispanics were less likely to take aspirin than their White counterparts.

These results are similar to those from the ARIC study which analyzed data from three risk factors.[3] We were somewhat surprised to find that among those with no CVD risk factors, 20% of Whites, 11% of African Americans, and 9% of Hispanics reported taking aspirin regularly. These individuals may have other indications for regular aspirin use, such as arthritis. However, when we examined the reasons why these individuals took aspirin, 78% stated to reduce their risk for heart disease, 61% to reduce their risk for stroke, and only 28% to relieve pain. These results suggest that a group of individuals at relatively low risk for developing CVD may take aspirin regularly to prevent CVD. Among these individuals, the risks associated with regular aspirin use may actually outweigh the benefits. This problem may be a particular risk for White adults, in the low-risk group, one in five of whom was taking aspirin regularly.

The results from the BRFSS analysis also indicate that women were less likely to report taking aspirin than their male counterparts; this finding was noted overall and among persons with or without heart disease or stroke (data not shown). This finding is consistent with those from a number of other studies which have noted lower rates of aspirin use among women.[12–14] Using data from the National Ambulatory Medical Care Survey, Stafford and colleagues reported that women with

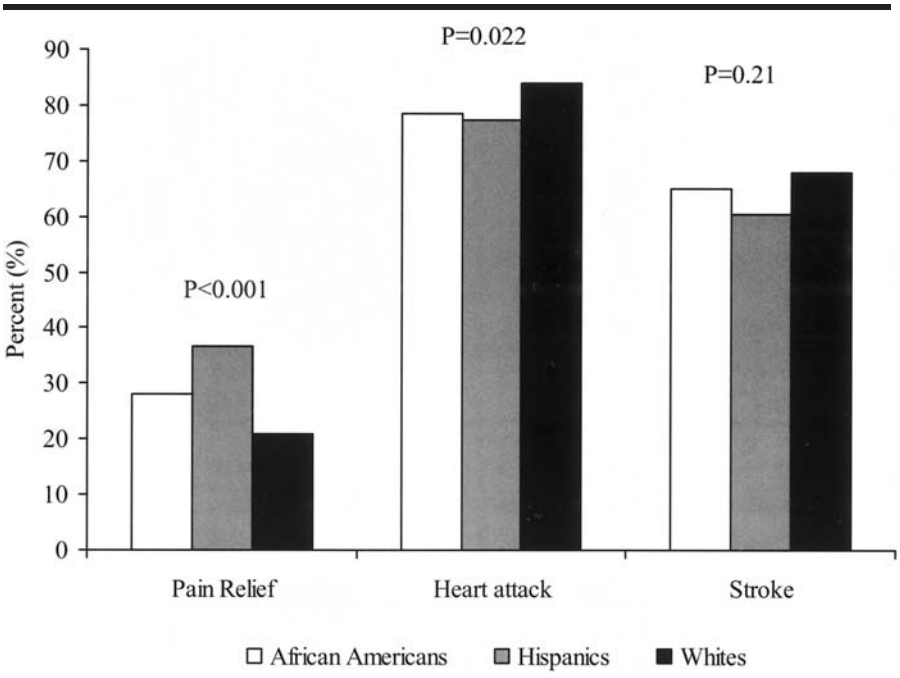

Fig 2. Reasons for taking aspirin, Behavioral Risk Factor Surveillance System, 2001

CVD were 25% less likely than men to be prescribed aspirin by their physicians.[13] In addition, the Corpus Christi Project has reported that men were 61% more likely than women to take aspirin regularly; these findings are strikingly similar to those in the present report.[14] The lower use of aspirin among women may reflect the fact that none of the national organizations have addressed this issue because clinical trial data on the topic are lacking. The Women's Health Initiative will hopefully provide some much needed information on this issue within the next few years. However, one finding from our analysis that was particularly concerning is that men with CVD were 60% more likely to report taking aspirin than their female counterparts after multivariable adjustment. Secondary prevention is one area where the benefits of aspirin use among women has been well documented.

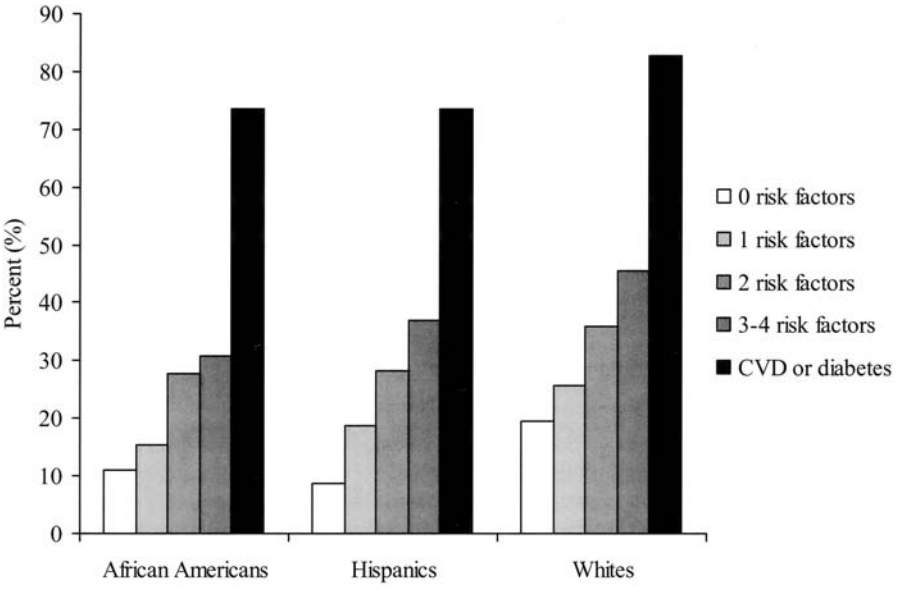

Fig 3. Relation of aspirin use to cardiovascular disease risk, Behavioral Risk Factor Surveillance System

Our analysis also indicated that Hispanics, particularly those with CVD, were among the least likely to report taking aspirin regularly after adjustment for sociodemographic and CVD risk factors. These findings are consistent with those from Herholz and colleagues[14] from the Corpus Christi Project who reported that Mexicans with CVD were 13% less likely than Whites to take aspirin regularly. In addition, we found that among those who took aspirin regularly, Hispanics were significantly more likely to report taking aspirin for pain relief and significantly less likely to report taking aspirin to prevent stroke than their African-American and White counterparts. Given the deleterious effects of CVD among the Hispanic population,[1] healthcare providers and voluntary organizations serving the Hispanic population need to refocus their efforts to ensure that the health benefits associated with aspirin are disseminated to this population.

This study is subject to several potential limitations. First, the data on CVD and its associated risk factors were based on self-report. However, the BRFSS questions have been shown to have good-to-excellent validity in a number of studies.[15,16] In addition, the prevalence estimates and associations from the current analysis are similar to those from other studies where the risk factors were directly measured.[13,14,17–19] Second, the BRFSS is a telephone survey, and therefore persons without telephones are not surveyed. While telephone coverage

Table 3. Likelihood of regular aspirin use by race/ethnicity, Behavioral Risk Factor Surveillance System, 2001

Characteristic	*N*	Taking Aspirin (%)	Crude OR (95% CI)	Multivariable Adjusted OR (95% CI)*
Overall				
Whites	28,038	37.1	1.0 (referent)	1.0 (referent)
African Americans	2,514	28.6	0.7 (0.6–0.8)	0.6 (0.5–0.7)
Hispanics	865	28.7	0.7 (0.5–0.9)	0.7 (0.5–1.0)
Persons with CVD†				
Whites	3,323	82.7	1.0 (referent)	1.0 (referent)
African Americans	283	73.6	0.6 (0.4–1.0)	0.7 (0.4–1.2)
Hispanics	76	73.6	0.6 (0.2–1.5)	0.5 (0.2–1.1)
Persons without CVD†				
Whites	24,715	30.6	1.0 (referent)	1.0 (referent)
African Americans	2,231	22.3	0.7 (0.6–0.8)	0.6 (0.5–0.7)
Hispanics	789	23.8	0.7 (0.5–0.9)	0.7 (0.5–1.0)

OR=odds ratio; CI=confidence interval; CVD=cardiovascular disease.

* Model is adjusted for age, sex, education, high blood cholesterol, hypertension, diabetes, cigarette smoking, overweight, myocardial infarction, stroke, and coronary heart disease.

† CVD is defined as a history of myocardial infarction, coronary heart disease, or stroke.

in the United States is high,[20–22] segments of the population without telephone coverage, primarily groups of lower socioeconomic status, are less likely to take aspirin. Therefore, this analysis may overestimate the prevalence of aspirin use among the US population. In addition, we excluded persons who had a medical contraindication to aspirin use, further raising the prevalence of aspirin use. However, when we included persons with medical contraindications to aspirin use in the analysis, the magnitude of the associations did not appreciably change. Furthermore, the prevalence estimates that we present are similar to those in the Cooperative Cardiovascular Project[2] and the ARIC study.[3] Finally, while the overall magnitude of the association between race/ethnicity and aspirin use was similar for Hispanics and African Americans, the findings for Hispanics were not statistically significant after multivariable adjustment. The lack of statistical significance is likely due to the limited number of Hispanic participants in the analysis (n=865). Statistical power was a particular issue among Hispanics with CVD (n=76).

Despite these limitations, the results from this analysis indicate that African Americans and Hispanics are less likely to take aspirin than their White counterparts. Among those with CVD, a group where the benefits of aspirin use have been widely documented, the disparities for African Americans and Hispanics were even greater; a finding that is particularly troublesome. Previous studies have shown that standing orders, healthcare provider detailing and feedback, and physician reminders can greatly increase the delivery of preventive services, including aspirin use by healthcare providers.[23,24] In addition, educational efforts regarding CVD prevention targeting both the Hispanic and African-American populations should include information pertaining to the health benefits associated with aspirin. If these efforts are implemented, the prevalence of aspirin use among the African-American and Hispanic populations would likely increase, thereby reducing the effect of CVD within the population.

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AUTHOR CONTRIBUTIONS

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Data analysis and interpretation: Brown, Shepard, Greenlund, Croft
Manuscript draft: Brown, Shepard, Greenlund, Croft
Statistical expertise: Brown, Shepard, Giles, Greenlund, Croft
Administrative, technical, or material assistance: Brown