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Sexual Orientation and Testing for Prostate and Colorectal Cancers among Men in California

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Abstract

Background—Previous quantitative studies have not compared the use of prostate and colorectal cancer testing between gay/bisexual and heterosexual men.

Methods—We analyzed cross-sectional data on 19,410 men in the California Health Interview Survey. The percentage of respondents age 50 and over who received prostate and colorectal cancer tests was calculated across subgroups defined by self-reported sexual orientation, race/ethnicity, and a combined variable on sexual orientation and race/ethnicity. Multivariate regression analysis was used to identify variables on respondent characteristics that were independently associated with testing.

Results—In bivariate analyses, the percentage of gay/bisexual men receiving colorectal cancer tests was 6%–10% greater than that of heterosexuals. There were no overall differences in prostate-specific antigen test use between gay/bisexual and heterosexual men; however, use of these tests by gay/bisexual African Americans was 12%–14% lower than that of heterosexual African Americans and 15%–28% lower than that of gay/bisexual Whites. In multivariate analyses, gay/bisexual men had greater odds of ever receiving colorectal cancer tests (odds ratio [OR]=1.67; 95% confidence interval [CI]=1.06, 2.65), and lower odds of having an up-to-date prostate-specific antigen test than did heterosexuals (OR=0.61; CI=0.42, 0.89). However, interactions between sexual orientation and living situation showed that gay/bisexual men who lived alone had greater odds of receiving prostate-specific antigen tests than did other men (OR=1.93; CI=1.23, 3.03).

Conclusions—Sexual orientation is independently associated with cancer testing among men. Future work should investigate the differences in this association by race/ethnicity and living situation.

Keywords

Preventive services; prostate cancer; colorectal cancer; men; sexuality

Introduction

Prostate and colorectal cancers are the second and third most common causes of cancer deaths among men in the United States, exceeded only by lung cancer.¹ Colorectal cancer (CRC) screening is widely recommended for adults age 50 and over, based on evidence that early detection can decrease cancer incidence and mortality through the identification of preclinical lesions.^{2,3} By contrast, there is less support from randomized controlled trials for the use of prostate-specific antigen (PSA) testing, and a low level of agreement between different clinical preventive guidelines. For example, the American Cancer Society recommends annual PSA testing for men age 50 and over,⁴ whereas the U.S. Preventive Services Task Force has concluded that current evidence does not support PSA testing.⁵ Although stronger evidence exists for the efficacy of routine CRC testing, national data suggest that men in the general population are more likely to be tested for prostate cancer.⁶

Previous work has shown that the use of prostate and colorectal cancer testing differs by patient race/ethnicity, income, education, and other characteristics.^{7–12} Relatively little information, however, is available on the association of cancer testing with sexual orientation. Several studies suggest that lesbians are less likely than heterosexual women to receive cancer screening;¹³ however, no quantitative analyses have compared the use of cancer tests between gay/bisexual and heterosexual men. This gap in the literature is a concern from both public health and clinical perspectives, given the relatively high prevalence of HIV in the gay/bisexual male population.¹⁴ There is evidence that CRC is more common among HIV patients,¹⁵ and that it develops at an earlier age and is more aggressive than it is among persons without HIV.^{16–18} Despite the lack of a known association between HIV and prostate cancer, some clinicians working in the gay community maintain that HIV-positive men should receive PSA testing at ages younger than those recommended by clinical guidelines in order to avoid HIV-related complications of treatment for advanced cancers.¹⁹ However, these screening practices could lead to harmful therapies that impair patient functioning and well-being without improving outcomes. Estimates of the association of sexual orientation with CRC and PSA testing may provide useful information to planners and providers of prevention outreach and clinical services for gay/bisexual men.

Racial/ethnic differences in prostate and colorectal cancers and access to services have been documented extensively. A recurrent finding is the relatively low use of prostate cancer screening and treatment among African Americans, who are more likely to develop and die of prostate cancer than are other groups.^{20–23} Similarly, African Americans and Latinos are less likely to receive CRC screening than are Whites, despite marked differences in disease rates.^{10–12,24} In an analysis of national Surveillance, Epidemiology and End Results data from 1992 to 2001, CRC incidence among males declined by averages of 1.3% per year for Whites and 0.8% for Asians/Pacific Islanders, with no such improvement for African Americans or Latinos.²⁵ Although race-specific data on cancer incidence are not available for the gay/bisexual male population, the sharp increase in HIV among minority gay/bisexual men in the same decade suggests that subgroups of this population have limited access to important preventive services.²⁶

Concerns about stigmatization and the risks of disclosing personal health information may cause some gay/bisexual men to delay or completely forego the use of non-urgent, discretionary services such as cancer screening – particularly if they are still coming to terms with their sexual orientation.²⁷ For gay/bisexual men who are also racial/ethnic minorities, the combined effects of belonging to 2 socially marginalized groups are likely to be worse than those of belonging to either group alone, potentially leading to even greater disparities in recommended cancer testing. For these reasons, this study examines the association of sexual orientation and race/ethnicity with PSA and CRC testing, using data collected from men in a probability sample of California households.

Methods

Data

Data were obtained from the 2001, 2003, and 2005 California Health Interview Survey (CHIS), a biennial cross-sectional telephone survey of a representative sample of households randomly drawn from stratified areas in California. One adult in each eligible household was randomly selected for interview. Adult response rates were 37.7% for 2001, 33.5% for 2003, and 26.9% for 2005. Weights were constructed to adjust for non-response and for differences across households in the probability of sampling adults. Full details of CHIS methods are available elsewhere.²⁸ These analyses were exempted from review by the Institutional Review Board at the Charles Drew University.

Analytic Sample

Colorectal and prostate cancer screening is generally recommended for individuals age 50 and over.^{2–4} Because of the disproportionate burden of prostate cancer among African-American men, American Cancer Society guidelines recommend that this population begin routine screening at age 45.⁴ Thus, the PSA analyses included African-American men age 45 and over (n=1,103), and men of other racial/ethnic backgrounds age 50 and over (n=18,487), for a sample size of 19,590. The CRC analyses included 19,410 men who were age 50 and over, with no race/ethnicity-specific inclusion criteria.

Dependent Variables

The PSA and CRC tests are used for screening, diagnosis, or surveillance. This study examines testing in general rather than screening *per se*, because the CHIS did not determine whether respondents received tests for screening or for the diagnosis of benign prostatic hyperplasia, irritable bowel-type symptoms, or other conditions.

Prostate-Specific Antigen Testing

Interviewers first defined the PSA test as “a blood test to detect prostate cancer” and then asked, “Have you ever had a PSA test?” Men responding “yes” were asked, “When did you have your most recent PSA test?” A test within the past year was considered “up-to-date.”⁴ We created 2 binary variables: 1 measure of ever receiving a PSA test (vs. never), and another measure of having an up-to-date test (vs. not having an up-to-date test).

Colorectal Cancer Testing

The original 3-category CHIS variables on CRC testing were derived from a set of questions on whether respondents received 1) sigmoidoscopy, colonoscopy, or proctoscopy within the past 5 years, or fecal occult blood testing (FOBT) within the past year; 2) sigmoidoscopy, colonoscopy, or proctoscopy more than 5 years ago, or FOBT more than a year ago; or 3) none of these tests. We used these variables to create 2 binary variables: 1 measure of ever receiving any of these tests (vs. never), and another measure of having an up-to-date test (vs. not having an up-to-date test).

Independent Variables

Sexual Orientation

Measures of sexual orientation in survey research usually refer to identity, behavior, or attraction.²⁹ Respondents in all three years of the CHIS were asked to choose an identity category such as gay, bisexual, homosexual, heterosexual, or straight. When asking about sexual orientation, interviewers reminded respondents that all survey information was confidential. Men who responded “yes” to the question, “Are you gay or bisexual?” in the 2001 CHIS, or who identified their sexual orientation as “gay or homosexual” or “bisexual” in the 2003 or 2005 CHIS, were coded in this analysis as “gay/bisexual.” Men who responded “no” to the 2001 question or “heterosexual” to the 2003 or 2005 questions were coded as “heterosexual.”

Race/ethnicity

Data on ethnicity and race were collected in several steps. Respondents were first asked whether they were of a Latino ethnic background. All respondents – including the self-identified Latinos – were then asked whether they belonged to 1 or more of the following races: Alaska Native/American Indian, Asian, Black/African American, Native Hawaiian/other Pacific Islander, or White; they could also report *verbatim* another race. Respondents who chose 2 or more races, or who chose Latino and 1 or more races, were then asked: “Of these, which do you most

identify with?" If no primary group identification was selected, the respondent was coded as "multiracial." The option to select a single racial/ethnic category with which they "most identify" may allow Latino and multiracial respondents to be classified in a way that more meaningfully characterizes their social experiences as minority group members in the U.S., as well as their cultural and political perspectives on race/ethnicity.³⁰ Because of low numbers, men in the Alaska Native/American Indian and multiracial categories were included in an "other" category. Thus, we had 4 indicator variables for men who were African American, Asian/Pacific Islander (API), Latino, and "other," compared with Whites.

The variables on sexual orientation and race/ethnicity were combined to create a 10-category measure that identified men by both sexual orientation and race/ethnicity. Although counts within the gay/bisexual minority categories were sufficiently large for bivariate analyses, these groups were too small to represent separately with interaction terms in multivariate models.

The analysis included age as a continuous variable. Because a 1-year increase in age may not be associated with an interpretable increase in the odds of testing, we divided age by 5 for the multivariate models.³¹ We tested for non-linearity by including a squared term for age/5. Education is associated with CRC testing;³² thus, 2 indicator variables were included for "high school or less" and "associate's degree or some college," compared with the excluded reference group "bachelor's degree or more."

Increased income and insurance coverage are likely to affect use of testing, because they better enable patients to cover the associated costs.³³ Monthly household income was included as a 6-category variable increasing in \$20,000 increments from <\$20,000 to ≥\$100,000, with the latter category as the comparison group. Two indicator variables were included for men with no insurance and public-sector coverage (e.g., Medicare, Medicaid), compared with private coverage (e.g., employment-based). Because lost wages and other opportunity costs of taking off work may deter some men from obtaining cancer testing, we included a variable indicating whether respondents were unemployed but looking for work, compared with working respondents. Another indicator was created for men not in the workforce (e.g., retired, disabled), again compared with working men.

People who smoke cigarettes or misuse alcohol may be less likely to use cancer tests, reflecting a preference for present consumption over the potential future benefits of screening and other preventive health behaviors.³⁴ As proxy measures of these time preferences, the analysis included smoking (current and former, compared with never) and alcohol consumption in the previous month (binge and non-binge, compared with none). Although obesity is a CRC risk factor, evidence suggests that obese adults are less likely to undergo testing.³⁵ Obesity may also be a prostate cancer risk factor.³⁶ For these reasons, 2 variables were included for whether respondents were overweight or obese (vs. normal weight).

Having a regular source of care (RSC) may be important for obtaining cancer tests,³⁷ as individuals are generally not compelled by pain or other symptoms to seek preventive services. We included 2 variables indicating whether respondents had no RSC or a public-sector RSC such as a community clinic or hospital (vs. a private-sector RSC). Because rural residents are less likely than those in urban areas to receive cancer screening,³⁸ a rural (vs. urban) variable was included in the analysis. We created an interaction term by multiplying the rural residence and sexual orientation variables, because the concentration of gay communities in large cities³⁹ suggests that rural gay/bisexual men may be particularly isolated, with fewer resources for testing.

A recent study found that unmarried men were less likely than married men to receive PSA testing,⁴⁰ perhaps because single men often lack primary relationships that reinforce positive health behaviors.⁴¹ For this reason, the analysis included a living situation variable to indicate

whether respondents lived alone (vs. with others). Because the impact of living alone on test use may differ for gay/bisexual and heterosexual men,⁴² we created an interaction term by multiplying the sexual orientation and living situation variables.

Previous work has shown that people with limited English language skills use fewer health services.⁴³ Respondents who spoke 1 or more non-English language at home were asked for their opinion of “how well” they spoke English. This analysis includes 1 variable for those who believed they spoke English “well” and another that combined those who believed they spoke “poorly” and those who did not speak any English (compared with monolingual English speakers).

Data Analysis

Analyses were conducted with the Stata 9.0 program to weight prevalence estimates and to adjust standard errors for the sampling design.⁴⁴ Within the 2 sexual orientation groups, we calculated frequencies and means of the independent variables. We also calculated the percentage of men who used tests within each category of sexual orientation, race/ethnicity, and the combined variable on sexual orientation and race/ethnicity. Four multivariate logistic regression models were fitted to identify independent correlates of CRC and PSA testing (“ever” and “up-to-date”). Odds ratios and 95% confidence intervals were calculated. Two variables indicating whether the data were collected in 2003 or 2005 (vs. 2001) were included in the models to adjust for residual differences between samples from these years. The up-to-date analyses excluded 701 men with a prostate cancer history and 192 men with CRC history, because they were likely tested for follow-up monitoring rather than early detection. Because sexual orientation variables were not included in the CHIS public use files, analyses were conducted at the UCLA Center for Health Policy Research.

Results

Descriptive Results

Table 1 compares gay/bisexual and heterosexual men age 50 and over in California. The gay/bisexual men had a higher percentage of Whites and fewer APIs and Latinos than did heterosexual men. Heterosexuals were more often overweight or obese than were gay/bisexual men, but there were no differences in smoking or alcohol consumption. The percentage of gay/bisexual men living alone was approximately 3 times greater than that of heterosexuals. Heterosexuals had 6 times the percentage of men with poor English proficiency than did gay/bisexual men. Although a higher percentage of gay/bisexual men had bachelor’s degrees, the groups were comparable in income, insurance, and employment.

Bivariate Results

Gay/bisexual men’s use of CRC tests was 10% (ever) and 6% (up-to-date) greater than that of heterosexuals (Table 2). Within some racial/ethnic groups, however, differences between gay/bisexual and heterosexual men were appreciably greater. Compared with heterosexual Latinos, 25% more gay/bisexual Latinos had an up-to-date CRC test, exceeding the percentage difference between all Latinos and Whites.

The bivariate analysis showed no differences in PSA testing between all gay/bisexual and heterosexual men. However, use of PSA tests by gay/bisexual African Americans was 12%–14% lower than that of heterosexual African Americans and 15%–28% lower than that of gay/bisexual Whites. In contrast, up-to-date use of PSA testing by gay/bisexual Latinos was approximately 11% greater than that of heterosexual Latinos and equal to that of gay/bisexual Whites. The use of PSA testing by gay/bisexual APIs was 10%–15% greater than that of heterosexual APIs.

Because the 2003 and 2005 data for gay men and bisexual men can be disaggregated, we compared testing percentages for these two groups of respondents. Results showed that testing did not differ significantly ($p < 0.05$) between gay men and bisexual men in those years (results not shown).

Multivariate Results

Table 3 shows that gay/bisexual men living alone had approximately 93% greater odds of ever receiving a PSA test and 67% greater odds of having an up-to-date PSA test, than did other men. However, the main effect for sexual orientation suggests that gay/bisexual men (regardless of living situation) had approximately 40% lower odds of having an up-to-date test than did heterosexuals. The ever-tested and up-to-date models showed higher odds of PSA testing for men who were older, no longer in the workforce (vs. working), and non-binge drinkers (vs. non-drinkers). Decreased odds of testing in both PSA models were estimated for men who were API (vs. White), with incomes below \$80,000 (vs. $\geq \$100,000$), lacking a RSC (vs. a private-sector RSC), uninsured (vs. privately insured), multilingual (vs. monolingual English), current smokers (vs. never), and whose highest education was associate's degree/some college or high school diploma or less (vs. college). The ever-tested model also showed decreased odds of PSA testing for men who were obese (vs. normal weight).

Multivariate results for CRC testing are shown in Table 4. Gay/bisexual men had approximately 67% greater odds of ever receiving CRC tests than did heterosexuals. The ever-tested and up-to-date models showed higher odds of CRC testing for men who were older, no longer in the workforce (vs. working), non-binge drinkers (vs. non-drinkers), and former smokers (vs. never). Obese men had greater odds of ever receiving a test than did those of normal weight. Decreased odds of both CRC test outcomes were estimated for men who were API or Latino (vs. White), in income categories below \$100,000 (vs. $\geq \$100,000$), lacking a RSC (vs. private-sector RSC), uninsured (vs. privately insured), current smokers (vs. never), and whose highest education was associate's degree/some college or high school diploma or less (vs. college). Men of "other" race/ethnicity (vs. White) and those with poor English proficiency (vs. monolingual English) had lower odds of ever receiving tests. In addition, the up-to-date model showed lower odds of testing for men living alone (vs. with others) and higher odds for the publicly (vs. privately) insured. The interaction of sexual orientation and living situation was not significant.

Discussion

Previous research suggests that men in the general population are more likely to receive tests for prostate cancer than for CRC.⁵ In contrast, this analysis found that more men received CRC than PSA tests; among gay/bisexual men, the percentage ever receiving CRC tests approached 80%. Although this finding suggests that gay/bisexual men have better access to CRC testing than do heterosexuals, the difference between these groups may partly be due to the fact that colonoscopy, sigmoidoscopy, and proctoscopy can be used to diagnose problems associated with receptive anal sex.⁴⁵ However, using these procedures to evaluate sexually related symptoms would likely lead to the "serendipitous detection" of any cancerous lesions that may be present.⁴⁶ Because colonoscopy is used to diagnose HIV-related malignancies such as lymphoma, the higher prevalence of HIV among gay/bisexual men may partially account for their difference from heterosexuals in the use of this procedure.

Compared with heterosexuals, gay/bisexual men had lower adjusted odds of having up-to-date PSA testing (Table 3). The bivariate analysis, however, showed no difference in this outcome by sexual orientation (Table 2). To explain this inconsistency, we performed a sensitivity analysis to examine how the sexual orientation finding was affected after adjusting for other variables (Table 1). Sexual orientation became significantly ($p < 0.05$) associated with up-to-

date PSA testing when adjusted for race/ethnicity, education, or language proficiency (results not shown). It appears that the negative association of sexual orientation with up-to-date PSA testing was masked in the unadjusted analysis because gay/bisexual men were more likely than heterosexuals to be White, college educated, and monolingual English speakers – each of which had positive associations with having an up-to-date test. It is possible that gay/bisexual men had lower odds of up-to-date PSA testing than did heterosexuals because of a greater knowledge of the controversy surrounding the PSA test. The ambiguities in both the PSA and CRC test findings suggest that future research should elicit more specific information about the circumstances surrounding the use of these procedures by gay/bisexual men.

A consistent finding across models was the decreased odds of testing for APIs compared with Whites. There is evidence that APIs have lower risk of CRC, which may be related to racial/ethnic differences in dietary fat intake; soy proteins that are common in some Asian diets have also been shown to inhibit the growth of prostate cancer cells.⁴⁷ Given such data, APIs may be less likely to perceive a need for CRC and PSA testing than do other groups. Previous work has shown that Latinos who are less acculturated to the U.S. are less likely to receive CRC screening than are others;⁴⁸ this study found decreased odds of CRC testing among Latinos even after accounting for acculturation with English language proficiency. Although African Americans did not differ from Whites in the multivariate models, the low percentage of PSA testing among gay/bisexual African Americans in the bivariate analysis suggests that defining prostate cancer disparities in terms of race/ethnicity alone may neglect subgroups of high-risk minority men.

Even without detailed information on interpersonal relationships, the interaction of sexual orientation and living alone shows that basic facts about home life can reveal important differences in service use. In the health outcomes literature, living alone has been associated with adverse events such as myocardial infarction and subsequent cardiac death.^{49,50} Although the main effect for this variable was decreased odds of cancer testing, it appears that living alone represents an advantage for gay/bisexual men in obtaining PSA tests. Gay/bisexual men who live alone may have a greater number of friends and acquaintances than do other men, and these relationships may facilitate cancer testing specifically through referrals to providers and more generally through the modeling of positive health behaviors. To test this hypothesis in future work, surveys measuring sexual orientation should include variables that more fully characterize the social networks of gay/bisexual men.

Because cancer risk increases with age, the higher odds of testing with every 5-year increase in age suggests that the provision of these services is driven to some degree by clinical preventive guidelines. Early detection is most likely to benefit individuals with both an increased risk of cancer and a reasonable expectation of being alive in the next decade.⁴⁶ Thus, the negative association between testing and the relatively larger values of the squared age term may reflect providers' knowledge of the decreasing mortality benefit of asymptomatic cancer detection in late life.

Having less than a college education was associated with lower odds of PSA testing, perhaps due to limited access to information resources that support healthcare decision-making.³² Men no longer in the workforce may generally use more health services, including PSA and CRC tests, because of chronic conditions that need ongoing care. Compared with private insurance coverage, public-sector coverage may have been associated with up-to-date CRC testing because of the relatively generous benefits of Medicaid and Medicare. The lower odds of PSA testing for men with no regular source of care underscore the importance of continuity of care.

Current smokers' lower odds of ever receiving PSA and CRC tests is cause for some concern, because smoking is associated with both CRC and prostate cancer. Former smokers may have

had higher odds CRC testing than did men who never smoked because of a stronger sense of health-related self-efficacy, which can help sustain a difficult behavioral change such as smoking cessation. Higher odds of testing among non-binge drinkers suggest that moderate alcohol consumption is a better indicator of healthy behavior than is abstinence. The finding that obesity was associated with greater odds of ever receiving a CRC test is promising, as it suggests that providers are attending to this cancer risk factor.

These analyses were restricted largely to men age 50 and over, when screening is recommended regardless of family history. Still, the lack of data on men with a family history is a study limitation, because some guidelines recommend that this group begin screening at age 45.²⁸ The small number of gay/bisexual minority men in this sample prevented us from representing these groups separately with interaction terms in the multivariate models. A related limitation is the difficulty of interpreting the “other” race/ethnicity findings, which represent an aggregation of small but culturally diverse groups such as Alaska Natives and American Indians. The survey questions on CRC testing were limited by the inclusion of proctoscopy (which is not recommended for screening) and the exclusion of barium enema. Further, colonoscopy may be considered up-to-date for as long as 10 years after a normal test. Although consistent with previous research,⁶ our use of a 5-year cut-off for defining an “up-to-date” CRC test may have misclassified some respondents who had a normal colonoscopy 6–10 years earlier.

These population-based estimates of the association of sexual orientation with cancer testing have several implications for program planning and research. Planners seeking to reduce racial/ethnic disparities in prostate cancer may need to consider sexual orientation when developing culturally specific screening programs for high-risk subgroups of men, such as African Americans. Because living alone may not represent a lack of social support among gay/bisexual men, more detailed information on social networks is needed to assess the potential impact of support on cancer testing in this population. Finally, future research in this area should collect data that can help explain why being gay or bisexual is positively associated with the use of such widely recommended procedures as colonoscopy or sigmoidoscopy, but negatively associated with a procedure as controversial as the PSA test.

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Table 1

Demographic, social, and economic characteristics of gay/bisexual and heterosexual men age 50 and over (n=19,410).

Characteristics (n)	Gay/Bisexual	Heterosexual	p value
	(n = 694)	(n = 18,716)	
<i>Race/ethnicity</i>	%	%	
African American (923)	6.4	6.1	
Asian/Pacific Islander (1,605)	5.5	11.2	
Latino (1,739)	5.6	14.8	
White (14,423)	79.2	64.5	
Other (720)	3.2	3.4	< 0.0001
<i>Age (mean)</i>	58.4	59.7	0.0002
<i>Education</i>			
High school diploma or less (5,258)	17.0	32.9	
Associate's degree/some college (5,186)	23.7	24.8	
Bachelor's degree or more (8,863)	59.3	42.3	0.0001
<i>Annual household income</i>			
≤\$20,000 (3,246)	19.3	17.4	
\$20,001–39,999 (3,847)	19.3	19.9	
\$40,000–59,999 (3,162)	17.4	15.4	
\$60,000–79,999 (2,575)	11.6	12.8	
\$80,000–99,999 (2,050)	8.3	10.7	
≥\$100,000 (4,530)	24.1	23.8	0.50
<i>Employment status</i>			
Employed (12,138)	60.1	63.7	
Unemployed, looking for work (246)	1.5	1.3	
Not in workforce (6,967)	37.8	35.0	0.47
<i>Type of health insurance</i>			
Privately purchased/job-based (11,281)	60.6	58.0	
Medicaid/Medicare/other public (6,430)	28.5	32.6	
None (1,679)	11.0	9.4	0.16
<i>Type of regular source of care</i>			
Private (15,005)	76.7	74.8	
Community clinic or hospital (2,852)	14.9	16.4	
None (1,541)	8.5	8.8	0.68
<i>English language proficiency</i>			
Monolingual, speaks only English (14,650)	82.4	67.2	
Bilingual, speaks English well (3,338)	15.8	20.4	
Non-English-speaking/Speaks English poorly (1,422)	1.8	12.5	0.0001
<i>Lives alone</i> (4,980)	45.8	14.3	0.0001
<i>Rural area of residence</i> (4,303)	12.1	14.4	0.15
<i>Body weight</i>			

Characteristics (n)	Gay/Bisexual	Heterosexual	p value
	(n = 694)	(n = 18,716)	
<i>Race/ethnicity</i>	%	%	
Normal weight (5,988)	42.0	29.5	0.0001
Overweight (8,891)	39.5	46.8	
Obese (4,495)	18.5	23.6	
<i>Smoking status</i>			
Current (3,209)	17.5	16.6	0.85
Former (8,832)	44.3	45.6	
Never (7,361)	38.3	37.8	
<i>Alcohol consumption, past month</i>			
None (6,392)	33.8	35.4	0.21
Alcohol use, without binge (10,082)	54.3	50.3	
Binge drinking, ≥ 1 episode (2,902)	11.9	14.4	

P values are from design-adjusted F tests.

Table 2

Prostate and colorectal cancer testing among men age 50 and over, by race/ethnicity and sexual orientation (n=19,410).

Characteristics (n)	Colorectal Cancer Tests		Prostate-Specific Antigen Tests	
	% Ever	% Up-to-Date	% Ever	% Up-to-Date
<i>Race/ethnicity</i>				
African American (923)	68.3	55.6	46.1	33.6
API (1,605)	55.4	43.7	34.9	25.3
Latino (1,739)	48.2	38.6	37.2	27.5
White (14,423)	75.4	58.3	62.7	45.5
Other (720)	63.6	50.3	49.1	37.8
p value:	<0.0001	<0.0001	<0.0001	<0.0001
<i>Sexual Orientation</i>				
Gay or bisexual (694)	78.6	59.4	55.8	35.8
Heterosexual (18,716)	68.1	53.5	54.2	39.5
p value:	<0.0001	0.0214	0.5242	0.1523
<i>Race/Ethnicity and Sexual Orientation Combined</i>				
African American				
Gay or bisexual (35)	83.0	68.2	33.1	22.1
Heterosexual (888)	67.9	55.2	46.6	34.0
<i>Asian/Pacific Islander</i>				
Gay or bisexual (25)	62.7	41.0	44.2	40.4
Heterosexual (1,580)	55.3	43.8	34.7	25.1
<i>Latino</i>				
Gay or bisexual (33)	67.7	63.7	42.0	38.4
Heterosexual (1,706)	48.0	38.4	37.2	27.4
<i>White</i>				
Gay or bisexual (575)	80.6	59.8	61.1	37.2
Heterosexual (13,848)	75.3	58.2	62.8	45.8
<i>“Other” race/ethnicity</i>				
Gay or bisexual (26)	66.6	48.8	47.0	34.9
Heterosexual (694)	63.5	50.3	49.1	37.8
p value:	<0.0001	<0.0001	<0.0001	<0.0001

API, Asian/Pacific Islander. P values are from design-adjusted F tests. Prostate-specific antigen testing analyses included an additional 180 African-American men aged 45 to 49.

Table 3Multivariate Logistic Regression of Prostate-Specific Antigen Testing Among Men in California.^a

Characteristics (reference group)	Ever Tested	Up-to-Date Test
	OR (95% CI)	OR (95% CI)
Gay or Bisexual (heterosexual)	0.71 (0.49, 1.02)	0.61 (0.42, 0.89)*
Lives alone (lives with others)	0.96 (0.87, 1.06)	0.94 (0.85, 1.05)
<i>Interaction: Gay/bisexual × lives alone</i>	1.93 (1.23, 3.03)**	1.67 (1.05, 2.63)*
Rural residence (urban)	1.08 (0.96, 1.20)	1.08 (0.96, 1.21)
<i>Interaction: Gay/bisexual × rural</i>	1.44 (0.74, 2.80)	1.40 (0.73, 2.70)
Age, 5-year increments	7.92 (5.95, 10.55)***	7.65 (5.61, 10.44)***
<i>Squared age, 5-year increments</i>	0.93 (0.92, 0.94)***	0.93 (0.92, 0.94)***
Race/ethnicity (White)		
African American	1.00 (0.84, 1.19)	1.10 (0.91, 1.32)
Asian/Pacific Islander	0.41 (0.34, 0.50)***	0.51 (0.42, 0.63)***
Latino	1.02 (0.84, 1.23)	1.14 (0.93, 1.38)
Other	0.81 (0.64, 1.03)	0.97 (0.76, 1.23)
Highest education (≥bachelor degree)		
Associate's degree/some college	0.73 (0.65, 0.81)***	0.75 (0.67, 0.84)***
High school or less	0.49 (0.44, 0.56)***	0.57 (0.51, 0.65)***
Annual household income (≥\$100,000)		
<\$20,000	0.40 (0.33, 0.48)***	0.42 (0.35, 0.51)***
\$20,000 – 39,999	0.51 (0.44, 0.60)***	0.56 (0.48, 0.66)***
\$40,000 – 59,999	0.68 (0.58, 0.79)***	0.75 (0.65, 0.87)***
\$60,000 – 79,999	0.69 (0.60, 0.80)***	0.74 (0.64, 0.85)***
\$80,000 – 99,999	0.90 (0.77, 1.06)	1.02 (0.88, 1.19)
Employment Status (working)		
Unemployed, looking for work	1.19 (0.79, 1.80)	1.43 (0.93, 2.22)
Not in workforce	1.31 (1.16, 1.47)***	1.36 (1.21, 1.54)***
Type of health insurance (private)		
Medicaid/Medicare/other public	1.02 (0.88, 1.18)	1.15 (0.99, 1.34)
None	0.72 (0.60, 0.87)***	0.61 (0.49, 0.76)***
Type of regular source of care (private)		
Community clinic/hospital	0.88 (0.77, 1.01)	0.91 (0.79, 1.04)
No regular source of care	0.34 (0.28, 0.42)***	0.27 (0.21, 0.35)***
Alcohol use, past month (none)		
Alcohol use, without binge	1.24 (1.12, 1.37)***	1.19 (1.07, 1.31)***
Binge drinking, ≥ 1 episode	1.10 (0.95, 1.27)	1.07 (0.92, 1.24)
Smoking status (never)		
Former	0.98 (0.89, 1.08)	0.99 (0.89, 1.09)
Current	0.59 (0.52, 0.67)***	0.67 (0.59, 0.78)***

	Ever Tested	Up-to-Date Test
Characteristics (reference group)	OR (95% CI)	OR (95% CI)
Body weight (normal)		
Overweight	0.97 (0.88, 1.08)	1.02 (0.91, 1.13)
Obese	0.87 (0.77, 0.98) [*]	0.99 (0.87, 1.12)
English proficiency (only English)		
Speaks English <i>well</i>	0.76 (0.67, 0.86) ^{***}	0.87 (0.76, 0.99) [*]
Speaks English <i>poorly</i> or not at all	0.71 (0.56, 0.90) ^{**}	0.78 (0.61, 1.01)
Year of Survey (2001)		
2003	1.17 (1.04, 1.31) ^{**}	0.93 (0.82, 1.04)
2005	1.15 (1.03, 1.29) [*]	1.03 (0.92, 1.16)

^a Analytic sample size of 19,033 is 97.2% of original sample of 19,590. Up-to-date analysis excluded 701 men with histories of prostate cancer.

*
p<0.05

**
p<0.01

p<0.001 from design-adjusted t tests.

Table 4Multivariate Logistic Regression of Colorectal Cancer Testing Among Men in California.^a

Characteristics (reference group)	Ever Tested	Up-to-Date Test
	OR (95% CI)	OR (95% CI)
Gay or Bisexual (heterosexual)	1.67 (1.06, 2.65) [*]	1.34 (0.92, 1.95)
Lives alone (lives with others)	0.91 (0.81, 1.01)	0.90 (0.81, 0.99) [*]
<i>Interaction: Gay/bisexual × lives alone</i>	0.99 (0.58, 1.69)	0.96 (0.61, 1.51)
Rural residence (urban)	0.88 (0.78, 1.00)	0.95 (0.85, 1.06)
<i>Interaction: Gay/bisexual × rural</i>	1.27 (0.64, 2.54)	0.99 (0.52, 1.91)
Age, 5-year increments	9.99 (7.21, 13.84) ^{***}	8.31 (6.15, 11.22) ^{***}
<i>Squared age, 5-year increments</i>	0.92 (0.91, 0.94) ^{***}	0.93 (0.92, 0.94) ^{***}
Race/ethnicity (White)		
African American	0.89 (0.72, 1.10)	1.13 (0.93, 1.37)
Asian/Pacific Islander	0.53 (0.44, 0.64) ^{***}	0.64 (0.53, 0.77) ^{***}
Latino	0.68 (0.56, 0.83) ^{***}	0.80 (0.66, 0.96) [*]
Other	0.72 (0.57, 0.90) ^{**}	0.85 (0.68, 1.06)
Highest education (≥bachelor degree)		
Associate's degree/some college	0.78 (0.69, 0.89) ^{***}	0.84 (0.76, 0.94) ^{**}
High school or less	0.64 (0.56, 0.73) ^{***}	0.75 (0.67, 0.85) ^{***}
Annual household income (≥\$100,000)		
<\$20,000	0.51 (0.42, 0.63) ^{***}	0.53 (0.44, 0.63) ^{***}
\$20,000 – 39,999	0.59 (0.50, 0.70) ^{***}	0.63 (0.54, 0.73) ^{***}
\$40,000 – 59,999	0.75 (0.64, 0.89) ^{***}	0.75 (0.65, 0.87) ^{***}
\$60,000 – 79,999	0.83 (0.70, 0.98) [*]	0.79 (0.68, 0.91) ^{**}
\$80,000 – 99,999	0.84 (0.70, 1.00) [*]	0.82 (0.71, 0.95) ^{**}
Employment Status (working)		
Unemployed, looking for work	1.09 (0.72, 1.66)	1.21 (0.82, 1.78)
Not in workforce	1.19 (1.05, 1.36) ^{**}	1.15 (1.03, 1.29) [*]
Type of health insurance (private)		
Medicaid/Medicare/other public	1.17 (1.00, 1.38)	1.21 (1.04, 1.39) [*]
None	0.60 (0.49, 0.72) ^{***}	0.49 (0.40, 0.60) ^{***}
Type of regular source of care (private)		
Community clinic/hospital	0.96 (0.83, 1.11)	1.01 (0.89, 1.15)
No regular source of care	0.31 (0.26, 0.38) ^{***}	0.30 (0.24, 0.37) ^{***}
Alcohol use, past month (none)		
Alcohol use, without binge	1.17 (1.05, 1.30) ^{**}	1.14 (1.03, 1.25) [*]
Binge drinking, ≥ 1 episode	1.10 (0.95, 1.28)	1.10 (0.96, 1.26)
Smoking status (never)		
Former	1.13 (1.01, 1.26) [*]	1.12 (1.01, 1.23) [*]
Current	0.80 (0.70, 0.92) ^{**}	0.80 (0.70, 0.91) ^{**}

Characteristics (reference group)	Ever Tested	Up-to-Date Test
	OR (95% CI)	OR (95% CI)
Body weight (normal)		
Overweight	1.02 (0.91, 1.14)	0.97 (0.88, 1.08)
Obese	1.21 (1.06, 1.39)**	1.06 (0.93, 1.19)
English proficiency (only English)		
Speaks English well	0.90 (0.79, 1.03)	1.05 (0.93, 1.19)
Speaks English <i>poorly</i> or not at all	0.68 (0.54, 0.85)**	0.90 (0.72, 1.13)
Year of Survey (2001)		
2003	0.91 (0.80, 1.03)	0.78 (0.70, 0.88)***
2005	0.96 (0.85, 1.08)	0.89 (0.79, 0.99)*

^a Analytic sample size of 19,117 is 98.5% of original sample of 19,410. Up-to-date analysis excluded 192 men with histories of CRC.

*
p<0.05

**
p<0.01

p<0.001 from design-adjusted t tests.