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Predicting Incongruence between Self-Reported and Documented Colorectal Cancer Screening in a Sample of African American Medicare Recipients

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Abstract

Assessments of colorectal cancer (CRC) screening rates typically rely on self-reported screening data, which are often incongruent with medical records. We used multilevel models to examine health-related, socio-demographic and psychological predictors of incongruent self-reports for CRC screening among Medicare-insured African Americans (N = 3740). Results indicated that living alone decreased, and income increased, the odds of congruently self-reporting endoscopic CRC screening. Being male and having greater number of comorbidities decreased, and having less than a high school education increased, the odds of congruently self-reported fecal occult blood tests. Living alone, age and income had the most robust effects across classifications into one of four mutually exclusive categories defined by screening status (screened/unscreened) and congruence of self-reports. The results underscore the clinical importance of gathering socio-demographic data via patient interviews, and the relevance of these data for judging the veracity of self-reported CRC screenings behaviors.

Keywords

Colorectal cancer screening; self-report incongruence; African-Americans; socio-demographics

Introduction

African Americans (AA) are approximately 1.5 times more likely to die from colorectal cancer (CRC) compared to European Americans (EA).^{1,2} Yet AAs are screened for CRC less regularly than EAs,^{1–3} despite evidence that screening decreases CRC mortality.⁴ Assessments of CRC screening rates typically rely on self-reported screening data,^{3,5–7} which may be problematic because self-reported data are burdened with estimates of screening rates that are larger than actual screening rates and estimates of time since last screening that are smaller than actual time since last screening.^{8–22} These fallible estimations lead to incongruencies between patients' self-reports of cancer screening and

their objective cancer screening data (i.e., medical records). Previous meta-analyses^{18,21} indicated that the average sensitivities of self-reported CRC screening (the percentage of documented screenings for which there were corresponding self-reports) were 82% for fecal occult blood tests (FOBT) and 79% for colonoscopy – incongruently self-reported CRC screening failed to correctly identify approximately 20% of the documented CRC screenings. The average specificities of self-reported CRC screening (the proportion of documented failures-to-screen for which there were corresponding self-reports) were 78% for FOBT and 90% for colonoscopy - incongruencies resulted in incorrectly classifying 10% to 20% of failures to screen as screening successes. A more recent meta-analysis corroborated sensitivity (78%) and specificity (80%) for FOBT self-reports and specificity for colonoscopy self-reports (86%) while finding higher sensitivity for colonoscopy self-reports (89%).²³ Given the importance of CRC screening for reducing CRC mortality, and for addressing racial disparities in CRC mortality, it is imperative to improve our understandings of who is more likely to incongruently self-report his or her CRC cancer screening status.

Previous studies have examined when, and among whom, incongruent self-reports were more likely. Fairly consistent evidence indicates that respondents from various minority groups are more likely to incongruently self-report,^{14,18,22,24,25} suggesting that between-race differences in CRC screening rates could be larger than has been reported. However, data are inconsistent when it comes to associations between other variables and incongruent self-reports. For example, two previous studies have indicated that higher levels of education was associated with more congruent recall,^{26,27} one indicated that more education was associated with less congruent recall,²⁸ [mammogram outcome] and three indicated no effects of education.^{22,28} [Pap smear outcome],²⁹ For the effects of age, two studies indicated that older individuals had less congruent self-reports,^{10,30} one found that older individuals had more congruent self-reports,¹² and two indicated no effect.^{22,29} For other predictors, one study demonstrated an effect of having a first degree relative with breast cancer on incongruent self-reports for mammograms.²⁷ Separate evidence failed to support significant associations of gender²⁹ and income²² with incongruent self-reporting. Given the lack of *consistent* evidence for the effects of age and education, and the general lack of evidence for effects of family history of cancer, gender and income, we sought to clarify the influences of these variables on incongruent self-reports in the context of CRC screening among a sample of elderly AAs.

Controlling for self-reported health status, we also explored whether the number of comorbidities, marital status and living alone influenced incongruent self-reporting. Individuals who are being treated for multiple comorbidities may not accurately recall all their medical procedures, hence increasing the potential for incongruent self-reports. We expect persons who are either unmarried or living alone to have less accurate recall of previous medical procedures, likely because they lack the cognitive benefits of collaborative aging,^{31,32} hence increasing incongruent self-reporting.

Current study

Our research utilized a sample of elderly African American (AA) patients who took part in a demonstration project funded by the Center for Medicare and Medicaid Services (CMS). Utilizing this sample allowed us to examine predictors of incongruent self-reporting among a sample of individuals who are disparately impacted by CRC, ^{1,2} less likely to be screened for CRC, ¹⁻³ and more likely to incongruently self-report having been screened. ^{17-19,24,25,33} All participants in our sample were insured and all were patients within a large hospital system serving the Detroit, MI area; hence, there is a greater likelihood of uniform standards for the maintenance of patients' medical records. We use a multilevel modeling approach to account for different CRC screening modalities (FOBT and CRC endoscopies), and different outcomes for each modality (e.g., incongruent self-reports for FOBT and congruent self-reports for endoscopies), nested within individuals. In addition to examining *whether* participants congruently or incongruently self-reported, we examined *how* respondents congruently or incongruently self-reported by classifying individuals' outcomes into one of four mutually exclusive categories comprised of two factors (whether participants [1] congruently or incongruently self-reported being [2] screened or unscreened) for each CRC screening modality.

In summary, we examined predictors of incongruent self-reporting for CRC screening among Medicare-insured AAs. We used multilevel models to examine the unique effects of health-related, socio-demographic and psychological variables on the odds of being classified as (1) congruent or incongruent and (2) mutually exclusive categories defined by congruence and screening status across different CRC screening modalities.

Methods

Participants and Procedure

The participants for the current study were selected from a larger CMS 4-year longitudinal demonstration study examining the efficacy of patient navigation on cancer screening behaviors among elderly AAs (N = 5,783). Participants were eligible if they were AA, received Medicare, and either did not report or were not in active treatment for any cancers with the exception of colorectal, breast, cervical, prostate and lung cancers, which were the focus of the parent study. Participants were recruited through hospital records via letters, through hospital satellite clinics, and senior events. Participants were interviewed in person after signing a consent form and assessed for eligibility. Participants were recruited continuously for the duration of the study; thus not all participants were in the study for all four years. After list-wise deletion for missing outcomes and covariates, the sample for these analyses consisted of 1190 men and 2675 women (N = 3865) with a mean age of 73.95 (SD = 10.86), who were all part of the same hospital system in the Detroit area and who did not report a previous cancer.¹ Since we were interested in incongruent self-reporting, and not whether individuals were screened according to recommended CRC screening guidelines,

¹Data for 17.5% of self-reported FOBT and 13.1% of self-reported SIGCOL were missing. Using medical record and available self-report data, we were able to classify CRC screening self-report congruence for 4645 respondents for CRC endoscopies, and 4409 respondents for FOBT before listwise deletion for missing covariates. Because we were hesitant to use our substantial theoretical covariates to both impute missing outcome data and test hypotheses, we did not impute missing outcome data. While missingness was

we did not exclude participants who were younger than 50 (3.3% of sample) and we did not include an upper age limit.

Institutional review board (IRB) approval for the parent study was granted and reviewed annually by the Henry Ford Health System IRB. IRB approval for this secondary analysis of existing de-identified data and for acquiring and merging the de-identified medical record data described below was granted by the Wayne State University Institutional Review Board.

Measures

Self-Reported Cancer Screening—At baseline assessment (i.e., upon entering the study), participants indicated whether they had received fecal occult blood tests and sigmoidoscopy or colonoscopy. If “Yes”, they indicated when they had last received the screenings. Cancer screening guidelines from relevant organizations^{e.g., 34,35,36} were used to designate each respondent as current or not current for each cancer screening behavior.

FOBT: Participants were asked whether they had “...ever had a blood stool test, using a home test kit.” Those who responded “Yes” were asked to indicate how long ago it had been (*Within the past year; within the past 2 years; within the past 5 years; 5 years or more ago*). We defined screen-current FOBT participants as those who had been screened within the past year.

CRC Endoscopies: For sigmoidoscopy and colonoscopy (SIGCOL), the endoscopies were defined and one item queried whether the participants had either of those exams and how long ago it had been (*Within the past year; within the past 2 years; within the past 5 years; within the past 10 years; 10 years or more ago*). We defined screen-current SIGCOL participants as those who indicated that they had received a sigmoidoscopy/colonoscopy in the past 10 years. Though CRC screening guidelines suggest sigmoidoscopy every 5 years and colonoscopy every ten years, we defined current participants as having being screened with either modality in the past ten years, given that one item was used to assess both screening modalities.

Medical Record Review—Participants provided consent for the researchers to have access to their medical records via the initial consent form. Patients’ charge codes were used to retrieve cancer screening data for both screening and diagnostic exams between the years 2000 and September of 2012 from the participating hospital system in Detroit. Study authors used unique identifiers to merge medical record data with survey data. Records indicate that 3200 (82.8%) participants had been screened by FOBT and 2139 (55.3%) had been screened by SIGCOL. We used the year in which the participant had received each cancer screening to identify the years for which the participant was current for each cancer screening. For example, if a participant had been screened via FOBT test in 2004 and again in 2008, the participant was FOBT current from 2004 to 2005 and from 2008 to 2009. Likewise, if a

negligible for most covariates (0.5% for self-reported health status, 0.4% for gender, 2.9% for number of comorbidities, 4.6% for family history CRC, 1.3% for living alone, 0.5% for education, 0.4% for partner status, 0.4% for age and 0.5% for income), 20.1% of respondents either refused to indicate their income or indicated that they did not know what it was (i.e., the data were not missing; rather, they were consciously withheld). Given that this did not constitute random missing data, we did not employ imputation techniques for this covariate.

participant had a colonoscopy in 2004, the participant was SIGCOL current from 2004 to 2012.

Self-Report Congruence—We dummy coded the congruence of self-reports for each cancer screening exam, within participant by year, by coding whether their self-reported screen-currency status corresponded with their medical record screen currency status. Where self-reports and medical records were in agreement, that instance was coded as *Congruent* (coded as “1”), and when they were not in agreement, the instance was coded as *Incongruent* (coded as “0”). Note that this led to independent appraisals of incongruent self-reporting within participants (e.g., someone may have congruently reported FOBT and incongruently reported SIGCOL).

Screening Classification—We also classified screening outcomes for each CRC screening test into one of four mutually exclusive categories. Participants were coded as either *screened* or *unscreened* if both their self-reported and medical record data corresponded for the respective outcomes. Participants were coded as *incongruently screened* if they self-reported that they had been screened and their medical records failed to verify their self-reports. Participants were coded as *incongruently unscreened* if their self-reports indicated that they had *not* been screened and their medical records indicated that they had been screened.

Family History and Comorbidities—Participants indicated family history with responses to the item “*Have your father, mother, sister, brother, son, or daughter ever been diagnosed with colorectal cancer and/or had polyps removed from their colon?*” To assess comorbidities, participants indicated whether a doctor had told them that they had any of the following conditions: High blood pressure/hypertension; Diabetes/high blood sugar; Chronic lung disease; Heart problems (e.g., coronary heart disease, angina); Stroke; Gastrointestinal problems (e.g., irritable bowel disease); Emotional or psychiatric problems; Arthritis or rheumatism; Memory-related disease; Other. After examining open-ended responses to the “Other” category, we created an additional category of kidney related comorbidities (e.g., kidney failure, kidney transplants, receiving kidney dialysis). Participants were categorized as having one, two or three or more comorbidities.

Self-reported health status—Participants’ self-reported health status were assessed with responses to the item “*In general, would you say your health is...*” with responses from 1 (Poor) to 5 (Excellent).

Socio-demographic Variables—We used participants’ date of birth to calculate each participant’s age; age was standardized for all analyses. Participants indicated whether they were married, living with a partner, widowed, divorced, separated or never married – with married or partnered as the reference category, we used two dummy coded variables to indicate whether participants were (1) widowed, or (2) divorced, separated or never married. Participants indicated whether they lived alone or with others. Using high school graduate as the reference category, we used two dummy coded variables to indicate whether participants reported (1) less than a high school education or (2) more than a high school education (e.g., vocational school, some college, Bachelor’s degree, etc.). In the same manner, we also

coded whether participants reported household incomes greater than \$30,000 per year (1,075 respondents [20%] who either refused to indicate income, or indicated that they didn't know their income were excluded from analyses).

Analyses

To examine which variables predict incongruent self-reporting, we used HLM 7.0³⁷ to fit 2-level binomial logistic hierarchical linear models (HLM), under full maximum likelihood with Laplace estimation, with incongruent self-reports as outcomes nested within participants. The use of HLM is appropriate and important for this specific question given the need to explicitly account for the within-person association between the odds of incongruently self-reporting SIGCOL and FOBT in the statistical model.³⁸ We specified SIGCOL as the reference category and included a dummy variable at level one (the within-person level) as an indicator for the FOBT outcome. We explicitly refer to the coefficient associated with the FOBT indicator as the "FOBT OR" to distinguish it from the odds of congruently reporting FOBT. We included the person-level predictors at level two (the between-person level) of the model, where the associated coefficients represent the effects of the respective predictors on either (1) log-odds of congruently reporting SIGCOL (i.e., the intercept) or (2) the FOBT OR. We included family history of CRC, comorbidities (grand mean centered), self-reported health status (grand mean centered) and the socio-demographic variables as person-level predictors. Covariance of the random effects associated with the level-1 coefficients represent covariance in the odds of incongruent self-reporting for SIGCOL and in the OR for FOBT.

To examine the odds of being classified into one of the four mutually exclusive categories defined by congruence and screening status we used HLM 7.0 to fit multinomial logistic HLMs with screening classification as the outcome. We defined Screened as our multinomial outcome reference category, and thus examined participants' odds of being Unscreened, Incongruently Screened or Incongruently Unscreened relative to being Screened. We defined SIGCOL as the screening reference category and included a dummy variable to indicate when the outcome was for FOBT. While our interests were mainly in predicting classification into the incongruent self-report categories, we included the Unscreened classification for appropriate model specification. The person-level (i.e., level-2) models, and interpretation of the coefficients, remained identical to those in the binomial model used to address the first aim.

Results

We were able to calculate SIGCOL self-report congruence for 3365 participants and FOBT self-report congruence 3137 participants. For SIGCOL, 44.5% of the participants were classified as screened, 16.4% were unscreened, 34.9% were incongruently screened and 4.2% were incongruently unscreened. For FOBT, 7.7% of the participants were screened, 70.1% were unscreened, 12.2% were incongruently screened and 9.9% were incongruently unscreened. For the covariates, about half (49.0%) of the sample reported living alone, and one quarter (24.9%) of the sample reported income greater than \$30,000. Most participants (47.7%) reported having a high school education, with 37.4% reporting less than, and 14.9%

reporting greater than a high school education. Most participants were unpartnered (38.4%), with a roughly equal number being partnered (29.6%) or widowed (32.0%). Most participants (59.8%) had three or more comorbidities, followed by those reporting two comorbidities (26.1%) and one comorbidity (14.1%). Most participants perceived that they were in generally good health ($M = 2.96$, $SD = 1.30$). Bivariate associations (examined with χ^2 and t -tests) between both recorded and self-reported CRC screenings and the covariates are presented in Table 1.

Self-Report Congruence

Unadjusted odds of congruently self-reporting SIGCOL was 1.57 (95% CI: 1.47, 1.69) and the unadjusted FOBT OR was 2.32 (95% CI: 2.07, 2.59). Adjusted ORs and model-implied probabilities for the binomial HLMs predicting self-report congruence for SIGCOL and FOBT are presented in Table 2. Results indicated that there was a small correlation (.23 for unadjusted model, .22 for adjusted model) between model coefficients β_0 and β_1 . By effect size standards,³⁹ this indicates that there is a small association between the odds of incongruently self-reporting SIGCOL and FOBT. The addition of the level-2 independent variables yielded a better model fit as indicated by a significant difference in the model deviance statistics, $\chi^2(24) = 126.61$, $p < .001$. Model results indicated that the odds of congruently self-reporting SIGCOL, compared to incongruently self-reporting SIGCOL, was 1.85 (probability = .65). The odds of congruently self-reporting SIGCOL decreased for participants who lived alone (OR = 0.63) and increased for participants with income greater than \$30,000 (OR = 1.45).

The significant intercept for the FOBT OR indicated that the odds of congruently self-reporting FOBT were larger than the odds of congruently self-reporting SIGCOL (OR = 2.33). Living alone (OR = 1.71) and income (OR = .66) influenced the FOBT OR. To examine person-level (i.e., level-2) effects on the model estimated *odds* of congruently self-reporting FOBT, we tested whether the sums of relevant coefficients were significantly different from zero. A significant Wald's test chi-square may be interpreted as a significant person-level effect on the odds of congruently self-reporting FOBT (see right-most column of Table 3 for model implied probabilities for a one unit increase in person-level predictors). Results indicated that being male ($\chi^2(1) = 11.63$, $p < .01$) and reporting three or more compared to one comorbidity ($\chi^2(1) = 6.85$, $p < .05$) both decreased the odds of congruent self-reporting FOBT. Having less than a high school education increased the odds of congruent self-reporting FOBT ($\chi^2(1) = 4.68$, $p < .05$).

Screening Classification

Relative to being classified as screened, the unadjusted odds of being classified as unscreened for SIGCOL was 0.37 (95% CI: 0.34, 0.41), and the FOBT OR was 25.64 (95% CI: 21.71, 30.28). The unadjusted odds of being classified as incongruently screened for SIGCOL was 0.78 (95% CI: 0.72, 0.85), and the FOBT OR was 2.04 (95% CI: 1.70, 2.45). The unadjusted odds of being classified as incongruently unscreened for SIGCOL was 0.09 (95% CI: 0.08, 0.11), and the FOBT OR was 13.70 (95% CI: 10.76, 17.45). Adjusted ORs and model-implied probabilities for the multinomial HLMs predicting congruence and screening classification SIGCOL and FOBT are presented in Table 3.

Unscreened—The adjusted odds of being classified as unscreened relative to screened for SIGCOL were 0.33. Respondents with 3 or more comorbidities relative to one comorbidity (OR = 0.85), with family histories of CRC (OR = 0.55), older respondents (OR = 0.62) and respondents with higher income (OR = 0.37) had lower odds of being unscreened. Living alone (OR = 1.55) and being widowed (OR = 1.50) or unpartnered (OR = 1.49) all significantly increased the odds of being unscreened.

The odds of being unscreened for FOBT were significantly greater than the odds of being unscreened for SIGCOL (OR = 32.06). The probabilities of being unscreened for FOBT were significantly higher among participants who lived alone ($\chi^2(1) = 10.76, p < .01$), and were significantly lower among older participants ($\chi^2(1) = 4.91, p < .05$) and participants with higher income ($\chi^2(1) = 9.25, p < .01$).

Incongruently Screened—The adjusted odds (0.66) indicated a lower probability of being incongruently screened relative to being screened for SIGCOL. Odds of being incongruently screened for SIGCOL were higher among participants who lived alone (OR = 2.01), and were lower among older participants (OR = 0.88) and participants with more income (OR = 0.56).

The odds of being incongruently screened for FOBT were significantly higher than the odds of being incongruently screened for SIGCOL (OR = 2.04). Men ($\chi^2(1) = 3.49, p < .10$) had a marginally higher probability of being incongruently screened. Participants who lived alone ($\chi^2(1) = 16.08, p < .001$) had a higher probability of being incongruently screened for FOBT. Participants who had less than a high school education ($\chi^2(1) = 7.54, p < .01$), older participants ($\chi^2(1) = 9.42, p < .01$) and participants with higher income ($\chi^2(1) = 5.67, p < .05$) were less likely to be incongruently screened for FOBT.

Incongruently Unscreened—The adjusted odds of being incongruently unscreened for SIGCOL were 0.08. The odds were significantly lower for older participants (OR = 0.59) and marginally lower for participants with more income (OR = 0.64).

Participants were significantly more likely to be incongruently unscreened for FOBT (OR = 14.35). Those with higher self-reported health status had lower probabilities of being classified as incongruently unscreened ($\chi^2(1) = 10.81, p < .01$).

Discussion

In our study, we examined person-level variables that predicted incongruent self-reporting of CRC screening. In particular, we examined the unique association of self-reported health status, family history of CRC, the number of comorbidities and a number of socio-demographic predictors (age, education, gender, income, marital status, living alone) with incongruent self-reporting for CRC endoscopies and FOBT. We examined the outcome in two different ways: classifying individuals based on congruent or incongruent self-reports regardless of screening status, and classifying individuals based on self-report congruence and screening status. Importantly, we accounted for within-person covariance between the two distinct types of self-reported CRC screenings with HLMs.

Results from both the binomial and multinomial models converged to indicate that respondents who lived alone had lower odds of congruently self-reported CRC screening; additionally, results from the multinomial model indicated that those who lived alone had higher odds of being unscreened. In other words, as we expected, cohabiting older AAs were more likely to have congruently self-reported positive CRC screening status. Research consistently indicates that aging adults accrue cognitive benefits from collaborative interactions^{32,40–42}; thus, it may be that, compared to respondents who live alone, cohabiting respondents benefit from increased cognitive abilities, including improved memory and recall, via more opportunities for collaborative cognition (i.e., “cognitive activity occurring in the context of more than one individual”⁴⁰(p268)). However, older AAs who lived alone were also more likely to congruently self-report being unscreened by both CRC screening types; but, living alone did not predict being incongruently unscreened, which brings into question the role of cohabitation on memory and recall and points more so to the benefits of practical assistance (e.g., transportation, reminders of appointments, etc.) among cohabiting AAs. Altogether, AAs who lived alone were more likely to be unscreened for CRC, and given no effects of living alone on incongruent self-reports of being *unscreened*, the benefits of cohabiting, in this instance, accrue via actual CRC screening behaviors more so than CRC screening recall.

Multinomial results indicated that respondents who were older, and those who had more income, were *less* likely to incongruently self-report being screened with CRC endoscopies and FOBT. The age effects were consistent with a previous study that examined self-report accuracy of FOBT testing among a sample of older women of whom 5.2% were AA¹²; however, they were inconsistent with other studies indicating that older AA women had worse recall for Pap smears,³⁰ and that older respondents (of whom 17% were AA) had worse recall for CRC screening tests.¹⁰ These differing effects for age suggests that separate variables, such as the type of screening or the organ system being screened,⁴³ can influence the magnitude and direction of age effects on self-report congruency. The influence of income on congruent self-reporting, consistent across both multinomial and binomial analyses, may be due to several interrelated factors. Previous data indicate that higher income patients are more likely to be prescribed CRC screening,^{44,45} and evidence indicates that having received a doctor’s recommendation for screening increased the probability of accurately recalling past screenings.¹² When considered together, these data suggest mediational paths in which higher income increases the probability of doctor’s recommendation for CRC screening, which decreases the odds of incongruently self-reporting positive screening.

Some covariates significantly influenced the odds of congruently self-reporting FOBT while having no effects on the odds of congruently self-reporting SIGCOL. Both the multinomial and binomial results indicated that women were more likely to congruently self-report being screened by FOBT. The simultaneous *absence* of a gender effect for CRC endoscopies replicate effects noted by Baier and colleagues²⁹ in their study of accurate recall of CRC screening. It may be that attitudes towards different attributes of the tests themselves, in that preferences for FOBT are driven by it being comparatively more comfortable and less invasive compared to endoscopies,^{46,47} play some as yet undetermined role in the gender differences in accurate screening recall. Also, respondents with less than a high school

education (compared to high school graduates) were less likely to incongruently self-report being screened by FOBT. A similar relation between education and incongruent self-reporting has been reported in a previous study in which college graduates were less accurate in their reporting of mammograms.²⁸ The researchers speculated that this may have been due to small sample of college graduates in their study; however, our results suggest that this may be a replicable phenomenon worth further investigation.

Our study is not without limitations. The items used to assess cancer screening self-reports inquired whether participants had particular cancer screening tests within particular time frames (i.e., one year ago, less than two years but more than one year, etc.). In contrast, the medical records had dates of particular cancer screening tests. To compare self-reported screening and actual screening, we recoded medical record data to indicate whether respondents were current for CRC screenings in particular years. Future studies may include items asking participants to recall the month and year for their most recent screening, thereby allowing more fine-tuned assessment of congruence between assessments of actual screening in contrast to congruence between assessments of yearly screening status. Another limitation pertains to the fact that one item was used to simultaneously examine colonoscopy and sigmoidoscopy self-reports; thus, we cannot be sure which endoscopic procedure was being referenced when participants responded to this item. Nonetheless, concerns regarding this limitation may be tempered for the following reasons: 1) data indicate that colonoscopies are more common than sigmoidoscopies,^{48,49} 2) the use of colonoscopies have increased over time while sigmoidoscopies have decreased over time among Medicare recipients,⁵⁰ 3) physicians prefer colonoscopies,⁵¹ and 4) we identified screen current CRC endoscopies using the guidelines for colonoscopy, which is the more common endoscopic procedure. Altogether, therefore, it is most likely that relatively few non-current sigmoidoscopy recipients were erroneously coded as screen current. Nonetheless, future studies ought to utilize procedure specific items. Finally, we collected data specifically among AA Medicare recipients from one hospital system in Detroit. Hence, we suggest caution when considering to whom these results may be generalized. Future research examining similar hypotheses ought to comprise samples from different racial and ethnic populations in different geographic areas.

Practice Implications

In practice, establishing prior cancer screening history is necessary for decision-making about subsequent screenings. Previous studies have suggested caution when interpreting self-reported cancer screening.^{e.g., 18,21,26} We present data suggesting that when self-reported CRC screening data is being extracted from elderly AA patients, caution ought to be more prescribed when patients are men, when they live alone, have less income and are younger. These results underscore the clinical importance of gathering socio-demographic data via patient interviews, and the relevance of these data for judging the veracity of reported CRC screenings behaviors.

Conclusions

We presented compelling evidence that AA individuals who lived alone were more likely to be unscreened for CRC, and were more likely to incongruently self-report being screened. Older and higher income AA individuals were more likely to be screened and less likely to incongruently self-report being screened. Physicians' recognition of the fallibility of self-reported screening histories, and their understanding of who is more likely to provide unreliable self-report screening histories, stands to improve AAs CRC screening rates by signaling when to independently verify patients' self-reports and, where necessary, take appropriate measures to ensure that AA patients are screened in accord with health guidelines.

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Table 1

Bivariate associations: χ^2 tests for association and t-tests for between group differences.

	Percent Screened			
	HR SIGCOL (N = 3865)	SR SIGCOL (N = 3367)	HR FOBT (N = 3865)	SR FOBT (N = 3139)
Living Alone				
No	54 ^a	81 ^a	21 ^a	20 ^a
Yes	35 ^b	78 ^b	13 ^b	20 ^a
χ^2 (1)	136.28 ^{**}	6.35 [*]	41.15 ^{**}	0.06
Education				
< High School	44 ^a	79 ^a	19 ^a	18 ^a
High School	44 ^a	79 ^a	16 ^b	21 ^a
> High School	49 ^b	82 ^a	17 ^{ab}	20 ^a
χ^2 (2)	4.85 [†]	1.81	6.76 [*]	3.18
Marital Status				
Partnered	60 ^a	85 ^a	20 ^a	21 ^a
Widowed	41 ^b	80 ^b	17 ^b	19 ^a
Unpartnered	36 ^c	74 ^c	16 ^b	20 ^a
χ^2 (2)	151.66 ^{**}	44.48 ^{**}	12.03 ^{**}	1.07
Income > 30K				
No	39 ^a	76 ^a	16 ^a	19 ^a
Yes	62 ^b	88 ^b	22 ^b	23 ^b
χ^2 (1)	158.04 ^{**}	54.05 ^{**}	16.05 ^{**}	5.02 [*]
Fam History CRC				
No	44 ^a	79 ^a	18 ^a	20 ^a
Yes	52 ^b	85 ^b	15 ^a	21 ^a
χ^2 (1)	13.04 ^{**}	9.00 ^{**}	2.36	0.22
Gender				
Female	42 ^a	79 ^a	16 ^a	19 ^a
Male	50 ^b	81 ^a	19 ^b	22 ^b
χ^2 (1)	17.44 ^{**}	2.20	4.22 [*]	4.74 [*]
Comorbidities				
One	44 ^a	77 ^a	16 ^a	17 ^a
Two	45 ^a	79 ^a	16 ^a	21 ^a
Three or more	45 ^a	80 ^a	18 ^a	20 ^a
χ^2 (2)	0.18	2.62	3.14	3.09

Group Means by Screening Status				
	HR SIGCOL	SR SIGCOL	HR FOBT	SR FOBT
Age				
Unscreened	73.14	70.72	73.73	73.89
Screened	74.96	75.17	75.02	73.95
<i>t</i> (df)	5.21 (3863) **	10.46 (3365) **	2.80 (3863) **	0.14 (3137)
Self-reported Health Status				
Unscreened	2.94	2.86	2.98	2.95
Screened	3.00	3.01	2.92	3.07
<i>t</i> (df)	1.80 (3863) [‡]	3.60 (3365) **	1.32 (3863)	2.65 (3137) **

**
p < .01,

*
p < .05,

[‡]
p < .10, superscript letters = cell proportions within column that do not significantly differ at .05 level. HR = hospital record, SR = self-report

Table 2

Results of binomial logistic regression predicting self-report congruence

Fixed Effects	SIGCOL			FOBT Odd-Ratio		
	OR	95% CI	p	OR	95% CI	p
Intercept	1.85 [*]	1.49 2.28	.65	2.33 [*]	1.67 3.24	.81
Self-reported Health	0.93 [†]	0.86 1.01	.63 [†]	1.12 [†]	0.99 1.27	.82
Male	1.07	0.90 1.27	.66	0.67	0.52 0.87	.75 [*]
CRC Fam Hist	1.06	0.85 1.31	.66	1.06	0.76 1.48	.83
Live Alone	0.63 [*]	0.52 0.75	.54 [*]	1.71 [*]	1.28 2.29	.82
< HS ^a 1	1.11	0.94 1.30	.67	1.12	0.87 1.45	.84 [*]
> HS ^a 1	1.01	0.82 1.26	.65	1.20	0.85 1.68	.84
Widowed ^a 2	1.00	0.78 1.28	.65	0.81	0.56 1.19	.78
Unpartnered ^a 2	0.86	0.68 1.10	.61	1.03	0.72 1.49	.79
Age (Standardized)	1.01	0.93 1.10	.65	1.02	0.90 1.16	.82
Income > 30K	1.45 [*]	1.19 1.76	.73 [*]	0.66 [*]	0.48 0.90	.80
2 Comorbidities ^a 3	0.95	0.85 1.07	.64	1.08	0.88 1.31	.82
3 or more comorbidities ^a 3	0.97	0.87 1.08	.64	0.86 [†]	0.73 1.03	.78 [*]

^{*} $p < .05$,[†] $p < .10$. Indicators for OR = significantly different from 1. p = probability of category membership given one unit change in predictor. Indicators of significance for probabilities = significant difference in log-odds, relative to the effect's intercept, for one unit change in the between-person predictor. HS = High school education.^aReference categories for categorical predictors with > 2 levels.¹High school graduates²Married³One comorbidity

Table 3
Results of multinomial logistic regression predicting congruence by screening category

Fixed Effects	Unscreened			Incongruently Screened			Incongruently Unscreened					
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p			
SIGCOL												
Intercept	0.33 [*]	0.24	0.45	.25	0.66 [*]	0.52	0.85	.40	0.09 [*]	0.06	0.15	.08
Self-reported Health	0.93	0.83	1.04	.23	1.05	0.96	1.16	.41	1.00	0.82	1.21	.08
Male	0.94	0.74	1.20	.24	0.92	0.76	1.12	.38	0.97	0.65	1.45	.08
CRC Fam Hist	0.55 [*]	0.39	0.77	.15 [*]	0.81	0.64	1.04	.35	0.76	0.44	1.31	.06
Live Alone	1.55 [*]	1.20	2.01	.34 [*]	2.01 [*]	1.62	2.50	.57 [*]	0.93	0.60	1.43	.08
< HS ^{a,1}	0.98	0.78	1.24	.24	0.86	0.71	1.04	.36	1.31	0.88	1.93	.11
> HS ^{a,1}	1.00	0.73	1.37	.25	0.99	0.77	1.26	.40	0.98	0.57	1.69	.08
Widowed ^{a,2}	1.50 [*]	1.06	2.13	.33 [*]	1.06	0.80	1.40	.41	1.12	0.63	1.99	.09
Unpartnered ^{a,2}	1.49 [*]	1.07	2.09	.33 [*]	1.22	0.93	1.60	.45	1.52	0.91	2.56	.12
Age (Standardized)	0.62 [*]	0.55	0.70	.17 [*]	0.88 [*]	0.80	0.98	.37 [*]	0.59 [*]	0.49	0.72	.05 [*]
Income > 30K	0.37 [*]	0.27	0.51	.11 [*]	0.56 [*]	0.45	0.69	.27 [*]	0.64 [†]	0.40	1.03	.05 [†]
2 Comorbidities ^{a,3}	1.00	0.84	1.19	.25	1.05	0.92	1.21	.41	1.06	0.80	1.40	.09
3 or more comorbidities ^{a,3}	0.85 [*]	0.73	1.00	.22 [*]	1.00	0.89	1.14	.40	0.83	0.64	1.07	.07
FOBT Odds-Ratio												
Intercept	32.06 [*]	19.73	52.12	.91	2.04 [*]	1.20	3.47	.58	14.35 [*]	7.18	28.68	.56
Self-reported Health	1.01	0.83	1.22	.91	1.02	0.83	1.25	.59	0.72 [*]	0.55	0.95	.48 [*]
Male	1.04	0.70	1.53	.91	1.57 [*]	1.03	2.38	.66 [†]	1.29	0.74	2.23	.62
CRC Fam Hist	1.88 [*]	1.12	3.17	.92	1.39	0.81	2.38	.61	0.93	0.43	1.98	.48
Live Alone	1.17	0.76	1.80	.95 [*]	1.24	0.77	2.02	.77 [*]	1.03	0.56	1.90	.55
< HS ^{a,1}	0.87	0.60	1.28	.90	0.67 [†]	0.44	1.03	.44 [*]	0.67	0.39	1.15	.53
> HS ^{a,1}	0.95	0.58	1.57	.91	0.77	0.45	1.33	.51	0.86	0.41	1.80	.52
Widowed ^{a,2}	0.63 [†]	0.36	1.08	.91	0.95	0.52	1.75	.58	1.16	0.53	2.53	.63

Fixed Effects	Unscreened			Incongruently Screened			Incongruently Unscreened		
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Unpartnered ^{a,2}	0.56 [*]	0.33 0.94	.90	0.64	0.36 1.15	.51	0.74	0.36 1.53	.59
Age (Standardized)	1.33 [*]	1.08 1.63	.90 [*]	0.82 [†]	0.66 1.03	.50 [*]	1.59 [*]	1.20 2.11	.55
Income > 30K	1.60 [*]	1.02 2.50	.86 [*]	1.07	0.67 1.71	.45 [*]	1.19	0.64 2.23	.50
2 Comorbidities ^{a,3}	0.92	0.70 1.21	.91	0.94	0.69 1.27	.57	0.76	0.51 1.14	.51
3 or more comorbidities ^{a,3}	1.08	0.84 1.40	.91	1.13	0.85 1.49	.61	1.29	0.90 1.86	.58

^{*} $p < .05$.

[†] $p < .10$. Reference category = congruently screened. Indicators for OR = significantly different from 1. p = probability of category membership given one unit change in predictor. Indicators for probabilities = significant difference in log-odds, relative to the effect's intercept, for one unit change in between person (level-2) predictor. HS = High school education

^aReference categories for categorical predictors with > 2 levels.

¹High school graduates

²Married

³One comorbidity