Factors associated with the accurate self-report of cancer screening behaviors among women living in the rural Midwest region of the United States

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ABSTRACT

This study examines the accuracy of the self-report of up-to-date cancer screening behaviors (Mammography, Papanicolaou (Pap)/Human Papillomavirus (HPV) tests, Fecal Occult Blood Test (FOBT)/Fecal Immunochemical Test (FIT), Colonoscopy) compared to medical record documentation prior to eligibility determination and enrollment in a randomized controlled trial of an intervention to increase cancer screening among women living in rural counties of Indiana and Ohio. Women (n = 1,641) completed surveys and returned a medical record release form from November 2016-June 2019. We compared self-report to medical records for up-to-date cancer screening behaviors to determine the validity of self-report. Logistic regression models identified variables associated with accurate reporting. Women were up-to-date for mammography (75 %), Pap/HPV test (54 %), colonoscopy (53 %), and FOBT/FIT (6 %) by medical record. Although 39.6 % of women reported being up-to-date for all three anatomic sites (breast, cervix, and colon), only 31.8 % were up to date by medical records. Correlates of accurate reporting of up-to-date cancer screening varied by screening test. Approximately-one-third of women in rural counties in the Midwest are up-to-date for all three anatomic sites and correlates of the accurate reporting of screening varied by test. Although most investigators use medical records to verify completion of cancer screening behaviors as the primary outcome of intervention trials, they do not usually use medical records for the routine verification of study eligibility. Study results suggest that future research should use medical record documentation of cancer screening behaviors to determine eligibility for trials evaluating interventions to increase cancer screening.

1. Introduction

Adults living in rural regions of the United States (U.S.) have higher cancer incidence and mortality rates, due to many factors including lower rates of cancer screening compared to adults from urban areas (Yabroff et al., 2020; Henley and Jemal, 2018; Kurani et al., 2020). Given that new cases of cancer and cancer deaths could be avoided if rural populations were adherent to screening guidelines, it is important to develop, implement, and evaluate behavioral interventions to promote cancer screening. One critical factor that has implications for the
primary outcome of randomized controlled trials when testing newly developed behavioral interventions to promote cancer screening is accurately identifying individuals who are eligible to participate (i.e., not up-to-date with current screening guidelines).

In studies comparing the self-report of receipt of cancer screening within guidelines to documentation in the medical record, individuals tend to over-report their screening behaviors (reporting up-to-date screening but not documented in medical records) (Ferrante et al., 2008; Howard et al., 2009; McPhee et al., 2002; Shokar et al., 2011; Champion et al., 1998; Caplan et al., 2003). This trend to over-report cancer screening behaviors within guidelines has been specifically reported among rural populations (Reiter et al., 2013; Katz et al., 2015). The over-reporting or under-reporting (reporting not up-to-date screening but screening is documented in medical records) of screening behaviors depends on the cancer screening test and the population (Rauscher et al., 2008). For example, it has been shown that the self-report of colorectal cancer (CRC) screening behavior varies depending on an individual’s age, gender, history of cancer, timing of last health center visit, cognitive functioning, and which screening test was completed (Rauscher et al., 2008; Katz et al., 2015; Reiter et al., 2013; Daly et al., 2010; White et al., 2013; Griffin et al., 2009; Dodou and de Winter, 2015).

The purpose of this study was to examine the self-report of up-to-date cancer screening behaviors compared to the documentation of screening in medical records. Self-report of cancer screening behaviors (e.g., mammography, Papanicolaou (Pap) tests, colonoscopy, etc.) (Ferrante et al., 2008; Howard et al., 2009; McPhee et al., 2002; Caplan et al., 2003; Shokar et al., 2011; Champion et al., 1998; Rauscher et al., 2008) may be inaccurate, therefore, we corroborated self-report of cancer screening with medical record verification for women living in rural counties of Indiana and Ohio prior to determining eligibility and enrolling them in a randomized controlled trial which tested the comparative effectiveness of two interventions to improve cancer screening for multiple anatomic sites (breast, cervix, and colon). We report colonoscopy and Fecal Occult Blood Test (FOBT)/Fecal Immunochemical Test (FIT), separately because the focus is to compare self-report to medical record for each screening modality. The information from this study is critical for the accurate determination of initial eligibility (overdue for screening according to guidelines) and, ultimately, the efficacy of the behavioral intervention being tested since the inclusion of ineligible participants may affect power and diminish our ability to detect a benefit of the intervention. Results of this study will provide valuable insight for identifying eligible patients and obtaining valid outcomes for cancer screening intervention trials in the future.

2. Methods

2.1. Setting and study participants

Women living in rural counties of Indiana or Ohio who responded to a recruitment strategy (e.g., posting of flyers, Facebook advertisements) for the study were contacted via telephone by a member of the study team. After the study was explained and women provided verbal consent, a trained interviewer administered a short telephone survey to...
assess study eligibility that included questions about the dates of their most recent mammogram, Pap/Human Papillomavirus (HPV) test, FOBT/FIT, and colonoscopy.

Following the initial response, we mailed potentially eligible women (n = 1,850) a baseline survey and a medical release form (Fig. 1). The return of a signed medical release form by 1,641 women gave the study team permission to obtain past dates of completion of these cancer screening tests from women’s healthcare providers as well as the dates of cancer screening tests that may be completed during the duration of the study. We sent women a $5 gift card for completing the telephone survey and a $10 gift card for returning the baseline survey and the signed medical release form. The study was approved by The Ohio State University and Indiana University Institutional Review Boards.

This report compares potentially study-eligible women’s self-report of cancer screening behaviors within the United States Preventive Services Task Force (USPSTF) recommended guidelines collected during the initial telephone call to medical record documentation of screening (Moyer and U.S. Preventive Services Task Force, 2012; U.S. Preventive Services Task Force et al., 2016; Siu and U.S. Preventive Services Task Force, 2016). Women completed the telephone interviews and returned a signed medical record release form from October 2016 through June 2019. To be eligible for the study a woman had to: a) be 50–74 year old; b) reside in a rural county of Indiana or Ohio and not plan to move during the next year; c) be able to speak and read English; d) be at average risk for cancer (e.g. no personal history of colon polyps, inflammatory bowel disease, cancer (except non-melanoma skin cancer) or family history (breast, cervical, or colorectal cancer in first degree relatives); e) not be within screening guidelines for one or more of the anatomic sites (breast, cervix or colon); f) not be pregnant; g) have a working telephone; and h) return a signed medical record release form.

2.2. Measures

2.2.1. Surveys

Information from women was collected by a brief telephone screening survey and a mailed survey to determine study eligibility. Surveys assessed demographic characteristics (age, race/ethnicity, marital status, educational level, health insurance, employment, annual household income, financial status, mother’s educational level), state of residency, smoking status, and body mass index. In addition, data were collected to assess socioeconomic deprivation (ranking of neighborhoods by socioeconomic disadvantage) (Center for Health Disparities, 2022), perceived social economic status (relative to others in their community and United States) (Adler et al., 2000), cancer knowledge and attitudes, screening communication, history of cancer, and history of cancer screening behaviors (mammography, Pap test, FOBT/FIT, colonoscopy), including most recent screening test dates. Survey items have been used in previous studies (Paskett et al., 2010; Champion et al., 2016; Rawl et al., 2001). Women also provided information about all their healthcare providers, including medical office addresses and phone numbers.

2.2.2. Medical record review

After receipt of a signed medical record release form, trained members of the study team called healthcare provider offices to inform them about the study, their patient’s potential participation in the study, and the request for cancer screening information about their patients. Following the initial telephone conversation, a request letter, a medical record request checklist (name of screening test and date completed), and the patient’s signed medical record release form were faxed to respective providers’ offices. The provider or office staff provided documentation of the patient’s history of their cancer screening tests, height and weight. If a provider’s office did not return completed documents to the study team within seven business days, research staff phoned the provider’s office to address any outstanding questions and to make a second request.

Potentially eligible women were classified as being within or not within the USPSTF recommended screening guidelines (with a one-month window) for the cancer screening tests at the time of enrollment in the study (Siu and U.S. Preventive Services Task Force, 2016; U.S. Preventive Services Task Force et al., 2016; Moyer and U.S. Preventive Services Task Force, 2012). Depending on their age, women were considered to be within guidelines for breast cancer screening if they had a mammogram within the past two years (ages 50–74), for cervical cancer screening if they completed a Pap test within the past three years or a Pap test and HPV co-test or HPV test in the past five years (ages 50–65), for CRC screening if they completed a home-based stool test (FOBT/FIT) in the past year or a colonoscopy in the past ten years (ages 50–75). Home-based stool tests and colonoscopy are reported separately to be able to compare to other reported research studies.

2.3. Statistical analysis

Cases were eliminated from comparison for one of the following reasons: 1) test was unverified on medical record (inconsistent or partial data); 2) test was documented as discontinued on medical record (for Pap test due to a patient’s history of a hysterectomy); 3) the woman did not know if she had ever had the test; and 4) the woman did not remember the year in which she had the test.

Descriptive statistics, including mean (standard deviation: SD) and frequencies (%), were used to report a range of demographic and health-related characteristics of the women. Comparisons between self-report and medical record-documented cancer screening data were used to calculate: 1) over and under reporting, 2) sensitivity, 3) specificity, 4) positive predictive value (PPV), 5) negative predictive value (NPV), 6) Kappa, and 7) concordance (agreement). Kappa was calculated using Fleiss-Cohen weights (Fleiss and Cohen, 1973). Exact binomial confidence intervals were calculated for sensitivity, specificity, PPV, NPV and concordance (Collett, 2003). Paired t-test was used to make comparisons between knowledge subscales.

Agreement between self-report and medical records for each cancer screening was coded as 1 (yes) for participants whose self-report agreed with medical records on being within guidelines (i.e., up-to-date) for each cancer screening test, and coded 0 (no) for participants who did not accurately report their screening test information. We used logistic regression to test associations between baseline characteristics and the dependent variable of agreement. All baseline variables that were associated with agreement at a p < 0.20 level in bivariate analyses were included in the initial pool of predictors in a backward removal selection process for constructing the multivariable models. Separate multivariable models were constructed for each cancer screening test. The logistic regression model results were described with odds ratios (OR), 95 % confidence intervals, and Wald test p-values. All analyses were performed using R base software (R Core Team, 2021) with epiR (Stevenson and Sergeant, 2022) and vcd (Meyer et al., 2021) packages.

3. Results

3.1. Demographic characteristics

Baseline demographic characteristics of the 1,641 potential study-eligible participants are presented in Table 1. The mean age was 59 years (Standard Deviation = 6.3). Women were predominantly white (98 %), married/living with a partner (80 %), had more than a high school education (86 %), had some type of health insurance (97 %), were employed part- or full-time (67 %), and had annual household incomes of $40,000 or more (80 %). Two-thirds of women reported having enough money to buy special things after paying their bills. Only 5 % of women reported being a current smoker and 15 % of the women had a normal body mass index.
Table 1
Demographic characteristics of potentially study-eligible women from rural Indiana and Ohio (n = 1,641)\textsuperscript{a}  

| Characteristic                                | n (%)    |
|-----------------------------------------------|----------|
| **Age:** mean years (SD); range (50 – 74 years) | 59.0 (6.3) |
| **Age:** years                                |          |
| 50–54                                         | 477 (29 %) |
| 55–59                                         | 455 (28 %) |
| 60–64                                         | 342 (21 %) |
| 65+                                           | 356 (22 %) |
| **Race/Ethnicity:**                          |          |
| White, non-Hispanic                          | 1,597 (98 %) |
| Non-White                                     | 33 (2 %) |
| Hispanic                                      | 10 (0.6 %) |
| **Marital status:**                          |          |
| Married/Living with as married                | 1,304 (80 %) |
| Divorced/Widowed/Separated/Single             | 324 (20 %) |
| **Education level:**                         |          |
| High School/GED or less                      | 233 (14 %) |
| Some college or Associates Degree             | 625 (38 %) |
| College degree                                | 419 (26 %) |
| Master’s degree or higher                    | 353 (22 %) |
| **Employment status:**                       |          |
| Not working                                   | 536 (33 %) |
| Full-time                                     | 773 (47 %) |
| Part-time                                     | 321 (20 %) |
| **Annual household income:**                 |          |
| <$40,000                                      | 253 (16 %) |
| $40,000–$79,999                               | 565 (35 %) |
| $80,000+                                      | 737 (45 %) |
| **Current household’s financial situation:** |          |
| Has enough money for special things           | 1,078 (67 %) |
| Can pay bills, but little extra money         | 402 (25 %) |
| Has to cut back or has difficulty paying bills | 135 (8.4 %) |
| **Social Economic Ladder:**                  |          |
| Community                                     | 68.2 (17.7) |
| United States                                 | 62.1 (1.6) |
| Area Deprivation Index: National              | 66.0 (15.5) |
| **Mother’s educational level:**               |          |
| High school/GED or less                       | 925 (57 %) |
| Some college or Associate Degree              | 385 (24 %) |
| College Degree                                | 187 (11 %) |
| Graduate Degree                               | 109 (6.7 %) |
| **Residency:**                                |          |
| Indiana                                       | 590 (36 %) |
| Ohio                                          | 1,040 (64 %) |
| **Smoking status:**                           |          |
| Never                                         | 1,121 (69 %) |
| Former                                        | 394 (24 %) |
| Current                                       | 84 (5 %) |
| **BMI categories:**                           |          |
| Normal                                        | 246 (15 %) |
| Overweight                                    | 373 (23 %) |

\textsuperscript{a}Totals may not equal total sample due to missing data.

Table 1 (continued)  

| Characteristic | n (%)    |
|----------------|----------|
| Obese          | 561 (35 %) |
| Unknown        | 445 (27 %) |

SD: Standard Deviation; GED: General Educational Development; BMI: Body Mass Index.

Social Economic Ladder (Community and United States): Higher values = higher perceived social economic status relative to others.

Area Deprivation Index: Higher values = highest disadvantage.

BMI: Height and weight were provided by health care providers from which BMI was calculated.

3.2. Cancer screening

The majority of women reported being up-to-date for mammography (77.5 %), Pap test (65.3 %), and colonoscopy (57.2 %) (Table 2). Only 7.3 % reported being up-to-date for FOBT/FIT; however, up-to-date for colon cancer screening needs to be interpreted as being up-to-date for either colonoscopy or FOBT/FIT. Potentially eligible participants (39.6 %) self-reported being up-to-date for all three anatomic sites. Medical record documentation showed that 74.9 % of women were up-to-date for mammography, 54.4 % for Pap/HPV test, 53.0 % for colonoscopy, and 5.6 % for FOBT/FIT. Only 31.8 % of women had up-to-date screening for all three anatomic sites by medical record review.

Concordance was excellent for colorectal cancer screening tests (colonoscopy, 0.90; and FOBT/FIT, 0.94) and mammography (0.91), while being good for Pap test (0.82). Sensitivity was high for mammography (0.96), colonoscopy (0.95), Pap test (0.94). Sensitivity for FOBT/FIT was lower (0.58), but specificity was good (0.96). The PPV varied for the different tests; PPV was high for mammography (0.93), good for colonoscopy (0.88) and Pap test (0.78), but low for FOBT/FIT (0.45). The NPV was good for all tests ranging from mammography (0.87) to FOBT/FIT (0.97).

3.3. Cancer knowledge, attitudes, and communication

Participants had higher cancer knowledge scores (range: 0–5; Table 3) about breast cancer (mean = 3.9) compared to cervical (mean = 2.9) and colorectal (mean = 2.5), and higher cervical cancer knowledge score compared to colorectal cancer knowledge score (all p < 0.001). Additionally, participants reported receiving more reminders about breast cancer screening from their doctor’s office and more provider recommendations for breast cancer screening than for either cervical or colorectal cancer screening. Furthermore, more women reported they intended to complete breast cancer screening in the next six months (48 %) compared to cervical (27 %) and colorectal cancer (18 %) screening.

3.4. Correlates of accurate reporting of cancer screening

Logistic regression models for the accurate reporting of each cancer screening test are provided in Table 4A and 4B. The accurate reporting of having an up-to-date mammogram by participants included having greater breast cancer knowledge, having fewer barriers to mammography screening, and having less intention to be screened within the next six months (all p < 0.05) (Table 4A). Participants were also more likely to accurately report having a mammogram if they reported difficulty paying bills (p < 0.05). There were no factors that predicted the accurate reporting of Pap test.

Logistic regression models for the accurate reporting of FOBT/FIT and colonoscopy are listed in Table 4B. Participants who received a doctor recommendation for FOBT/FIT or a colonoscopy were less likely to accurately report up-to-date screening behaviors (p < 0.05).
Additionally, who were 55 years and older were less likely to accurately report being within guidelines for a colonoscopy.

4. Discussion

Previous research has provided evidence that different populations over- and under-report their cancer screening behaviors within guidelines compared to documentation in medical records (Ferrante et al., 2008; Howard et al., 2009; McPhee et al., 2002; Caplan et al., 2003; Shokar et al., 2011; Champion et al., 1998; Katz et al., 2015; Reiter et al., 2013; Rauscher et al., 2008; Daly et al., 2010; White et al., 2013; Griffin et al., 2009; Dodou and de Winter, 2015). The current study of women living in rural areas of the Midwest United States provides evidence for the same pattern for over- and under-reporting of cancer screening behaviors compared to medical records. In this study, the over- and under-reporting of cancer screening behaviors varied by screening test and women over-reported (4.0% – 14.3%) more than under-reported receiving cancer screening tests (2.3% – 3.4%). The reasons for this trend may be due to many factors including but not limited to recall bias (e.g., forward telescoping: remembering events as being more recent than the actual date), confusion of Pap tests versus pelvic examinations, social desirability, embarrassment, and errors in or incomplete medical records (Rauscher et al., 2008; Vernon et al., 2008; Gaskell et al., 2000; Romm and Putnam, 1981; Pizarro et al., 2002). We found that the correlates of accurate reporting of cancer screening within guidelines varied by screening test, and that participants reported better knowledge of breast cancer and receiving more recommendations and reminders to complete breast cancer screening. This finding may be a result of breast cancer advocacy and suggests that behavioral interventions targeted at multiple levels (individual, healthcare providers, system, and society) are needed to increase cancer screening of all anatomic sites among rural women (Meissner et al., 2004; Braun, 2003).

Since there is a known discordance between self-report and medical record documentation for cancer screening tests (Ferrante et al., 2008; Howard et al., 2009; McPhee et al., 2002; Caplan et al., 2003; Shokar et al., 2011; Champion et al., 1998; Katz et al., 2015; Reiter et al., 2013; Rauscher et al., 2008; Daly et al., 2010; White et al., 2013; Griffin et al., 2009; Dodou and de Winter, 2015), we decided to use the last cancer screening test documented in the medical record as an inclusion criterion in our current study. Medical record documentation of cancer screening has been suggested for the primary outcome of interventions to increase cancer screening, however, the use of medical record documentation for enrollment in behavioral interventions creates additional challenges. These challenges include access to medical records, and the extra time, effort, and resources needed to screen potentially study-eligible participants. Although these challenges are important to consider, this process provides the opportunity to enroll individuals who are truly eligible for participation in a study, allowing accurate evaluation of the efficacy of the intervention.

In addition to the fact that women over- and under-reported being within guidelines for each cancer screening test, we also documented that less than one third of the women living in the rural Midwest were within guidelines for all three anatomic sites. This finding is one factor that provides evidence for the ongoing need for interventions to promote cancer screening among rural populations.

Our study suggests that using medical record documentation of cancer screening tests to determine eligibility of participants in cancer behavioral interventions to increase screening is important. We do not believe that women intentionally reported inaccurate information to us, however, it may be difficult to remember the actual date of a screening test when answering questions on a survey or during an interview. Study strengths include a population with a known cancer burden, a large population-based sample, and medical record documentation of cancer screening behaviors.

4.1. Limitations

Limitations of the study include that women had to have a working telephone, live in a rural county of Indiana and Ohio, and provide a signed medical record release form. It is possible that women who provided consent to access medical records were different than women who refused to give consent. Thus, the generalizability of our findings to other rural regions of the United States is unknown. In addition, there is potential that medical records were not accurate, and we were limited to checking for screening test completion in the medical records kept by healthcare providers identified by participants. Finally, providers’ offices may not have responded to requests for information.
Table 3
Knowledge, attitudes, and communication associated with cancer screening among potentially study-eligible women from rural Indiana and Ohio (n = 1,641).

| Characteristic                          | mean (SD) |
|-----------------------------------------|-----------|
| Cancer Knowledge Score (range: 0–5)a    |           |
| Breast                                  | 3.9 (1.0) |
| Cervical                                | 2.9 (1.2) |
| Colonrectal                             | 2.5 (1.3) |
| Perceived Barriers Scoreb               |           |
| Mammography (range: 9–45)               | 17.3 (5.2)|
| Pap (range: 8–40)                       | 14.9 (4.9)|
| FOBT/FIT (range: 7–35)                 | 14.3 (4.9)|
| Colonoscopy (range: 10–50)              | 20.5 (6.5)|
| Perceived Screening Benefits Score (range: 3–15)c | 11.8 (2.5)|
| Perceived Cancer Risk Score (range: 3–9)d | 5.5 (1.2)|
| Perceived Cancer Screening Self-Efficacy Score (range: 4–20)e | 18.1 (2.6)|

| Screening Reminders                     | n (%)     |
|-----------------------------------------|-----------|
| Mammography                             | 1,036 (65 %) |
| Pap                                     | 548 (35 %) |
| FOBT/FIT                                | 79 (4.9 %) |
| Colonoscopy                             | 281 (18 %) |
| Doctor Recommendation                   |           |
| Mammography                             | 1,585 (98 %) |
| Pap                                     | 1,477 (91 %) |
| FOBT/FIT                                | 559 (35 %) |
| Colonoscopy                             | 1,358 (84 %) |

Screening Intention: Next Six Months (n = 1439)

| Characteristic                          | OR 95 % CI |
|-----------------------------------------|-----------|
| Mammography                             |           |
| Age (years)                             |           |
| 50–54                                   | — —       |
| 55–59                                   | 0.80 0.50, 1.29 |
| 60–64                                   | 1.10 0.65, 1.92 |
| 65+                                     | 1.80 0.99, 3.39 |

How would you describe your household’s financial situation right now?

| Financial Situation                      | n (%)     |
|-----------------------------------------|-----------|
| Can pay bills, but little extra money   | 0.97 0.63, 1.50 |
| Has to cut back or has difficulty paying bills | 4.01* 1.57, 13.6 |

Are you planning to have a mammogram in the next 6 months?

| Planning to have a mammogram in the next 6 months? | n (%)     |
|---------------------------------------------------|-----------|
| Yes                                               | 0.43*** 0.29, 0.64 |
| No                                                | — —       |

Perceived barriers to mammography screening score

| Perceived barriers to mammography screening score | n (%)     |
|--------------------------------------------------|-----------|
| (range: 9–45)                                    |           |
| 0.94** 0.90, 0.98                               | — —       |

Breast cancer knowledge score (range: 0–5)

| Breast cancer knowledge score (range: 0–5) | n (%)     |
|--------------------------------------------|-----------|
| 1.28** 1.06, 1.54                           | — —       |

Boldface indicates statistical significance (*p < 0.05, **p < 0.01, ***p < 0.001). OR = Odds Ratio, CI = Confidence Interval.

Table 4A
Logistic regression model for the accurate reporting of up-to-date mammography.

5. Conclusion

Women living in the rural Midwest over-reported having mammography, Pap test, colonoscopy and FOBT/FIT. Due to this issue, we recommend medical record documentation of cancer screening tests be used as an eligibility criterion for future cancer screening intervention studies. By addressing this critical issue, investigators will ensure the accuracy of the evaluation of behavioral interventions developed to improve cancer screening prior to dissemination.

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Data availability

The data can be shared upon request addressed to vchampio@iu.edu or electra.paskett@osumc.edu.

CRediT authorship contribution statement

Mira L. Katz: Conceptualization, Methodology, Writing – original draft, Writing – review & editing. Timothy E. Stump: Formal analysis, Visualization, Writing – review & editing. Patrick O. Monahan: Formal analysis, Visualization, Writing – review & editing. Brent Emerson: Visualization, Writing – review & editing. Ryan Baltic: Visualization, Project administration, Writing – review & editing. Gregory S. Young: Formal analysis, Visualization, Writing – review & editing. J. Madison Hyer: Formal analysis, Visualization, Writing – review & editing. Victoria L. Champion: Conceptualization, Methodology, Writing – review & editing. Susan M. Rawl: Conceptualization, Methodology, Writing – review & editing.

Declaration of Competing Interest

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Table 4B
Logistic regression model for the accurate reporting of up-to-date FOBT/FIT and Colonoscopy.

| Characteristic | OR  | 95 % CI |
|----------------|-----|---------|
| **FOBT/FIT (N = 1441)** |     |         |
| Age (years) |     |         |
| 50–54 | —   | —       |
| 55–59 | 0.69 | 0.39, 1.19 |
| 60–64 | 2.04 | 0.98, 4.48 |
| 65+ | 1.00 | 0.54, 1.84 |
| Has a doctor or health care provider ever recommended that you do a stool blood test? |     |         |
| No |     |         |
| Yes | 0.26** | 0.16, 0.41 |
| Perceived barriers to FOBT screening score (range: 7–35) | 1.04 | 0.99, 1.09 |
| CRC knowledge score (range: 0–5) | 0.88 | 0.73, 1.04 |
| National percentile of block group ADI score | 0.99 | 0.97, 1.00 |
| **Colonoscopy (N = 1534)** |     |         |
| Age (years) |     |         |
| 50–54 | —   | —       |
| 55–59 | 0.83* | 0.31, 0.89 |
| 60–64 | 0.40*** | 0.23, 0.68 |
| 65+ | 0.41** | 0.24, 0.70 |
| Where would you place yourself on this ladder (community)? | 0.92 | 0.82, 1.03 |
| Has a doctor ever recommended you have a colonoscopy? |     |         |
| No |     |         |
| Yes | 0.30** | 0.13, 0.61 |
| Perceived benefit of screening score (range: 3–15) | 0.95 | 0.88, 1.02 |
| Perceived cancer risk score (range: 3–9) | 0.87 | 0.75, 1.01 |

**Boldface indicates statistical significance (*p < 0.05, **p < 0.01, ***p < 0.001). OR = Odds Ratio, CI = Confidence Interval.**

FOBT = Fecal Occult Blood Test
FIT = Fecal Immunochemical Test.

Data availability

Data will be made available on request.

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