

Perceived Barriers and Benefits to Colon Cancer Screening among African Americans in North Carolina: How Does Perception Relate to Screening Behavior?¹

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Abstract

This study investigated perceived barriers and benefits, as conceptualized by the Health Belief Model, in relation to screening for colorectal cancer (CRC) among African-American adults participating in a church-based health promotion program. CRC is one of the most common cancers and is the second leading cause of cancer death for men and women. Screening can be effective at detecting cancer at treatable stages, but a large proportion of people at risk have not been screened or are not screened regularly, as recommended by national guidelines. In this study, logistic regression was used to assess the relation of barriers and benefits to self-reported history of fecal occult blood testing (FOBT), flexible sigmoidoscopy, and colonoscopy. Barriers were significantly negatively related to recent FOBT and recent sigmoidoscopy. Benefits were significantly related to having a recent sigmoidoscopy and a recent colonoscopy but not to recent FOBT. Results suggest that the way people perceive sigmoidoscopy and colonoscopy may differ from FOBT with respect to the relative importance of perceived benefits versus barriers. Findings are discussed within the context of these Health Belief Model constructs and implications for health promotion programming.

Introduction

CRC³ is the third most common cancer diagnosed and is the second leading cause of cancer death among men and women

living in the United States, accounting for ~11% of all cancer deaths (1, 2). In 2001, an expected 135,400 people in the United States were diagnosed, and 56,700 died from CRC. In North Carolina, the incidence rate is slightly lower than the national rate (2). When detected in early stages, CRC is highly treatable with 5-year survival rates as high as 90%; however, many cases are not diagnosed until later stages, when survival rates decline sharply (2). African Americans have higher incidence and lower survival rates compared with white Americans. This pattern is especially evident in North Carolina, where the mortality rates for CRC (1991–1995) were 26.9 and 20.5 per 100,000 among African-American men and women, respectively, compared with 19.9 and 13.5 per 100,000 for the mortality rates for white American men and women (2). These data demonstrate that African Americans in North Carolina are at elevated risk for developing CRC and dying from it.

Empirical evidence suggests that both primary (*e.g.*, diet and physical activity) and secondary (*e.g.*, screening and early detection) prevention strategies are effective means of reducing CRC incidence and mortality (3). Secondary prevention through regular screening is valuable because CRC can have a lag period during which the disease is detectable but asymptomatic (4). Screening is particularly vital among persons who previously had adenomatous polyps or certain types of bowel disease, because those persons are at increased risk for a malignancy in the colon (5).

Along with a marked increase in the survival rate when CRC is detected early, the above studies present a strong argument for regular screening, early detection, and removal of colorectal polyps. Screening strategies involve either individual tests or a combination of tests. The ACS and the United States Preventive Services Task Force are among the organizations that publish screening guidelines for average-risk persons 50 years of age and older. The United States Preventive Services Task Force recommends annual FOBT and flexible sigmoidoscopy every 5 years, using either test individually or in combination. The ACS recommends annual FOBT and flexible sigmoidoscopy every 5 years or colonoscopy every 10 years. Several studies have demonstrated that screening is cost effective in improving CRC outcomes (6), is associated with decreased mortality (7, 8), and that routine screening (9) and colonoscopic removal (4) of adenomatous colorectal polyps has been associated with decreased CRC incidence.

Despite the national recommendations and positive evidence, CRC screening has not been widely adopted by the American public, and a majority of people are not adherent to the guidelines. The 1999 Behavioral Risk Factor Surveillance Study data showed that 20% of respondents ≥ 50 years of age had FOBT within the year preceding the survey, 34% had sigmoidoscopy within the preceding 5 years, and 44% had

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³ The abbreviations used are: CRC, colorectal cancer; ACS, American Cancer Society; FOBT, fecal occult blood test; HBM, Health Belief Model; OR, odds ratio; CI, confidence interval.

either FOBT or sigmoidoscopy within the recommended time periods (10). The screening rate is similar for the state of North Carolina, but the rate of FOBT in the preceding year is slightly higher than the national average, and the rate for sigmoidoscopy in the preceding 5 years is slightly lower than national rate (10). Although 42.0% of African Americans in North Carolina have ever had a FOBT test (and 67.5% of those tests were in the preceding year), only 28.7% had ever had sigmoidoscopy (11). Comparatively, for Caucasians in North Carolina, 45.2% ever had FOBT, and 32.8% ever had sigmoidoscopy (11).

Qualitative data analyses have reported similar rates (12). Screening rates in other studies are notably lower in African-American populations (12, 13), especially for sigmoidoscopy (11, 14), both nationally and statewide. Even among previously screened populations, return rates for future screening are low (15). Therefore, motivating people to get screened in adherence to guidelines (in addition to initial screening) is an important goal for prevention researchers and clinicians. To effectively increase participation rates of screening, it is crucial to understand the barriers and promoters of people's behavior.

Theoretical Background

The constructs of perceived benefits and barriers are common to many health behavior theories, and they are among the core elements in the HBM (16–18). The HBM places the constructs of barriers and benefits within a value-expectancy framework; as perceived barriers begin to outweigh the anticipated benefits, the behavior becomes less likely. The benefits-barriers-behavior association has been found for several cancer-related behaviors including mammography (19) and genetic testing for cancer risk (20).

Studies examining perceived barriers and benefits in relation to CRC screening have identified specific issues associated with behavior. Mandelson *et al.* (21) found that, among older women, uncertainty about the effectiveness of tests and lack of awareness that CRC can run in families were barriers to screening. Across studies, other barriers to CRC screening include absence of symptoms, unpleasantness of the test, not having a family history of colon cancer, and not having been encouraged by a health care provider to get screened (21–23). Misconceptions or lack of knowledge about CRC were evident among participants of several studies (12, 23). Similar barriers have been identified for follow-up screening. A study of persons who had been screened at least once but did not return for future screening found that lack of awareness that screening was due, business/time constraints, insurance issues, and unpleasantness/discomfort with the tests were reasons for not getting tested again (15). Many of these barriers appear to be related to the widespread lack of adoption of CRC screening among the public. Barriers have been reported and studied more extensively than benefits.

Current Study

The purpose of this study was to examine perceptions of barriers and benefits to CRC screening in a sample of predominantly older African-American church members residing in North Carolina. The primary aims of this analysis were to: (a) describe the proportion of the sample who have been screened for CRC and who are "adherent" to screening guidelines; and (b) investigate the relationships between perceived barriers and perceived benefits to CRC screening and self-reported screening behavior. Specifically, it was hypothesized that barriers and

benefits would be significantly associated with behavior even after the effects of sociodemographic variables were accounted for. The outcome behaviors were whether the respondent had recently been screened for CRC with FOBT, flexible sigmoidoscopy, or colonoscopy or through a combination of tests. The data did not differentiate between screening and diagnostic uses of CRC tests.

Subjects and Methods

Sample and Data Collection. Participants were church members ($n = 850$) from five rural northern North Carolina counties whose churches ($n = 12$) were participating in the WATCH (Wellness for African Americans Through Churches) Project. WATCH is a church-based colon cancer prevention research study aimed at increasing fruit and vegetable consumption, reducing fat intake, increasing regular physical activity, and increasing cancer screening among church members. The overall project compared the effectiveness of two interventions: (a) Tailored Education Materials; and (b) a Lay Health Advisor program implemented with volunteers within each church. Data reported here reflect the cross-sectional baseline assessment collected between October 1998 and October 1999.

Health fairs conducted at the beginning of the study, along with church announcements and mailed notifications, were used to alert church members of their church's involvement in the study and to increase participation rates. Participating churches provided the project with rosters that included names, addresses, and telephone numbers of church members. Only those persons who were >18 years and reported attending church services or church activities at least once per month were eligible for the survey. The survey was designed to be administered over the telephone; multiple attempts were made to reach participants via telephone over a 3-month period. Rosters obtained from churches tended to be inflated substantially by persons who were ineligible because they were deceased ($n = 10$), had moved out of state ($n = 137$), were no longer members of the participating church ($n = 79$), were <18 ($n = 67$), other reasons ($n = 84$) such as medically incapable or in a nursing home, or because their phone numbers were incorrect, disconnected, or unlisted ($n = 640$). A total of 274 people declined to participate, most often because of their reported not being interested ($n = 49$), being busy or feeling that the survey would take too long ($n = 14$). The eligibility and refusal status of several potential participants were considered "unknown" because persons were called multiple times but never reached in person ($n = 374$). The simple response rate, considering these "unknowns" as ineligible, was 76%. A method suggested by the Council of American Survey Organizations (CASRO) was applied, applying the eligibility rate to these "unknowns" before calculating the response rate. The CASRO response rate was 66%.

Sample Demographics. Most CRC screening recommendations begin at age 50; thus, only participants 50 years of age and above were included in these analyses ($n = 397$). The majority of the 50-and-older sample was female (72%) and African American (98%); the average age was 63 years (SD, 9.7). About 50% were currently married, 25% were widowed, and 14% were divorced. Thirty-seven % had education less than high school, 30% had a high school diploma or GED, 16% had some college or trade/beauty school, and 18% had a college degree or post-college education. Nearly half (46%) had incomes <\$20,000/year. In comparison with

the total sample, this over-50 sample was less likely to report college education and had a higher proportion of annual incomes <\$20,000.

Measures. The Institutional Review Board approved the study and the measurement instruments. The data instrument was a self-report telephone survey designed to collect information on diet, exercise, screening behavior, and health status and took ~40 min to complete. Participants were asked whether they had each of the screening tests, and if yes, when was their last test. The items included a brief explanation of the test in question. Items were described as follows: FOBT, “which is stool slides”; sigmoidoscopy, “which is a tube inserted in the rectum to look at colon and bowel”; and colonoscopy, “which is a tube inserted to look at the entire intestine, usually given in a hospital or specialist’s office.” Responses included “<1 year,” “1–2 years,” “3–5 years,” or “>5 years.” Persons were considered to have “recent” or up-to-date FOBT if they had the test within the preceding year; they were considered to have “recent” sigmoidoscopy if the procedure was reported within the preceding 5 years. Although current guidelines recommend colonoscopy every 10 years for average-risk people, we examined colonoscopy use in the past 5 years because of the limitations of the survey instrument. Although there is the potential that respondents may confuse sigmoidoscopy and colonoscopy, previous research suggests that when adequate descriptions are incorporated into the questionnaire, self-report of all three tests (FOBT, sigmoidoscopy, and colonoscopy) is accurate (24). Barrier and benefit items were derived primarily from focus groups with African-American church members conducted in two pilot churches not included in the study. In the focus groups, questions probed for reasons why participants would or would not be screened. In the survey, barriers and benefits were measured on Likert-type scales coded from “agree a lot” to “disagree a lot.” Items were coded such that a higher value indicated stronger agreement with the statement. Responses were then summed to form separate scale scores for benefits and barriers, which were used in this analysis. The two scales were only slightly negative correlated ($r = -0.06$), thus supporting the independence of the two construct scales used in this study. Psychometric analyses showed that the barriers and benefits scales were each internally reliable and consistent ($\alpha = 0.80$ and $\alpha = 0.79$, respectively) and each loaded on a single factor.

Analyses. Descriptive statistics were used to explore screening rates. Logistic regressions were conducted in SPSS 10.1 to assess whether perceived benefits or perceived barriers were statistically predictive of screening behavior beyond the effects of demographic variables. Regression models were run with sex, age, and education as the independent variables. These covariates were selected because they have shown associations with screening. Because income is highly correlated to education in this sample, it was not included as a covariate. Perceived benefits and barriers were subsequently incorporated in each model as a second “block,” and the added effects were assessed. The Hosmer-Lemeshow goodness of fit measure was used to evaluate the overall fit of the model before the effect of each covariate was examined.

Results

Descriptive Analysis. Almost one-fourth (23%) of all respondents reported having an FOBT in the preceding year and slightly more than half (55%) reported ever having an FOBT

Table 1 Most commonly reported perceived barriers and benefits to CRC screening^a

Barriers	
Doctor never recommended test	(55%)
Test would be painful	(45%)
Tests are too expensive	(32%)
Tests would be too embarrassing	(22%)
Preparation is too hard	(20%)
Benefits	
Will set a good example for family	(86%)
Will be taking care of body as God’s holy temple	(85%)
Will have better control over health	(75%)
Will be following doctor’s advice	(76%)
Will worry less	(73%)

^a Numbers reflect the percentage of respondents who reported “agree a little” or “agree a lot” to the referenced statement.

(lifetime measure). As expected, fewer (36%) reported ever having a flexible sigmoidoscopy, and 30% had the test in the past 5 years. Approximately one-fourth (26%) reported ever having a colonoscopy, and 20% had a colonoscopy within the past 5 years.

There was some overlap between the tests; of people who ever had FOBT, 49% also ever had sigmoidoscopy, and 33% had colonoscopy. Of people who ever had sigmoidoscopy, 55% also had colonoscopy. A third of the respondents (31%) were considered currently screened when a combination of tests was considered (FOBT within 1 year and sigmoidoscopy within 5 years, or colonoscopy within 5 years). It was not possible with these data to differentiate between screening and diagnostic uses of sigmoidoscopy or colonoscopy; thus, it is probable that a few persons may have had tests for diagnostic reasons.

As shown in Table 1, the most common individual barriers were the perceptions that the doctor had not recommended the test and that screening would be painful. Secondary barriers included the expense of the test and embarrassment. Respondents tended to agree with most of the listed benefits; there was little variability among the items. The strongest benefit in this sample was that getting screened would set a good example for the family.

Perceived Barriers, Perceived Benefits, and Screening Behavior. Logistic regression models examined the associations between benefits and barriers and CRC screening behaviors. Because associations were similar for “ever” (lifetime) and “adherent” (recent), we chose only to present the “adherent” analyses in this report. The dependent variable in each case was a dichotomous measure reflecting whether the respondent had the screening method in question within the recommended time period according to guidelines.

Benefits and barriers increased the predictive value and fit for adherence to FOBT screening when added to a logistic regression model that included demographic variables in which “adherent” was defined as having an FOBT within the past year. There was significant improvement in statistical fit after benefits and barriers were added to the model [Block χ^2 ($df = 2$) = 13.33; $P < 0.01$], and the omnibus model also fit well. These suggest that the regression equation fit the data well; additional detail on the results of all model testing can be found in Table 2. Of the covariates, only perceived barriers was significant. As predicted, higher barriers scores were associated with less likelihood of having been screened with an FOBT in the past year (OR, 0.91; 95% CI, 0.86–0.97).

Table 2 Omnibus fit measures and ORs for logistic regression models for recent CRC screening

Screening modality and covariate	ORs	95% CI
Hosmer-Lemeshow goodness of fit		
FOBT $\chi^2(df = 8) = 6.80^a$		
Sex	1.18	0.60–2.34
Age	0.95	0.97–1.03
Education	0.60	0.30–1.19
Benefits	1.08	0.97–1.20
Barriers ^b	0.91	0.86–0.97
Sigmoidoscopy $\chi^2(df = 8) = 9.70$		
Sex	0.99	0.51–1.92
Age ^b	1.07	1.04–1.11
Education	0.90	0.76–1.08
Benefits ^b	1.11	1.01–1.23
Barriers ^b	0.92	0.87–0.97
Colonoscopy $\chi^2(df = 8) = 6.37$		
Sex	0.69	0.34–1.39
Age ^b	1.06	1.02–1.09
Education	1.09	0.90–1.33
Benefits ^b	1.27	1.10–1.48
Barriers	0.95	0.90–1.01
Any on-time screening $\chi^2(df = 8) = 8.72$		
Sex	1.29	0.68–2.46
Age	1.01	0.98–1.05
Education	0.86	0.72–1.02
Benefits	1.13	1.02–1.25
Barriers	0.91	0.87–0.96

^a Hosmer-Lemeshow measure of Fit (χ^2). Nonsignificant values indicate adequate levels of fit; all values reported here were not significant.

^b Wald test was significant.

The results for sigmoidoscopy were similar to those for FOBT. Respondents were described as “adherent” if they had a sigmoidoscopy within the preceding 5 years. The incorporation of benefits and barriers to the model resulted in a significant improvement [Block $\chi^2(df = 2) = 16.32$; $P < 0.001$], and the model demonstrated good fit. Older persons were slightly more likely to have had a recent sigmoidoscopy (OR, 1.07; 95% CI, 1.04–1.11). Higher perceived benefits (OR, 1.11; 95% CI, 1.01–1.23) were associated with greater likelihood of sigmoidoscopy, and perceived barriers (OR, 0.92; 95% CI, 0.87–0.97) were associated with lower likelihood of sigmoidoscopy in the preceding 5 years.

The results for colonoscopy were slightly different from those for FOBT and sigmoidoscopy. The addition of benefits and barriers showed significant improvement [Block $\chi^2(df = 2) = 17.53$; $P < 0.001$]. Increasing age (OR, 1.06; 95% CI, 1.02–1.09) and higher perceived benefits (OR, 1.27; 95% CI, 1.10–1.48) were associated with greater likelihood of reporting a colonoscopy. Perceived barriers were not significantly associated with colonoscopy.

The same method was applied to examine the relationship between benefits and barriers with any screening within guidelines, either through an individual test or a combination of tests. This model fit the data well, and the addition of benefits and barriers significantly improved the fit of the model [Block $\chi^2(df = 2) = 19.44$; $P < 0.001$]. Both perceived benefits (OR, 1.27; 95% CI, 1.02–1.25) and perceived barriers (OR, 0.91; 95% CI, 0.87–0.96) were significant in the hypothesized directions.

To better understand the associations between barriers, benefits, and behavior, the items were examined individually in relation to each screening behavior using analysis of variance. These findings simply reinforce the associations found between

the barriers and benefits scales and behavior, and they shed light on the nature of the benefits and barrier concepts. This was an exploratory analysis, and its generalizability is limited by the effect of multiple tests on increasing type I error. For being “adherent” on FOBT, the individual barriers significantly associated with not having screening were lack of a family history ($P = 0.04$), doctor did not recommend ($P = 0.00$), and not having symptoms ($P = 0.03$). No benefit items were significantly associated with reporting a recent FOBT. The result pattern was the same when “ever” having a FOBT was examined. For recent sigmoidoscopy, perception of pain ($P = 0.02$), lack of family history ($P = 0.02$), doctor not recommending ($P = 0.00$), and not having symptoms ($P = 0.03$) were the significant barriers. Significant benefits included setting a good example for the family ($P = 0.02$), taking care of the body as God’s holy temple ($P = 0.00$), and following doctor’s advice ($P = 0.01$). In addition, perception of expense ($P = 0.03$) was associated with “ever” but not recent sigmoidoscopy. Lack of recommendation by the doctor ($P = 0.00$) and lack of symptoms ($P = 0.04$) were associated with not having had colonoscopy in the past 5 years. However, the overall scale was not significantly associated. Significant benefits were setting a good example ($P = 0.00$), taking care of the body as God’s holy temple ($P = 0.02$), worrying less ($P = 0.00$), and following the doctor’s advice ($P = 0.00$).

Discussion

In this cross-sectional study, rates of reported CRC testing were low (45% never had FOBT) but were similar to rates found in other studies. There were significant associations between history of CRC screening and perceived barriers and benefits to screening, depending on which test was under examination. The most common individual perceived barrier was that a health care provider had not recommended testing. Most people perceived that testing would be beneficial and would set a good example for family, help take care of the body as “God’s holy temple,” and allow control over one’s health.

Self-reported history of FOBT was negatively associated with perceived barriers but did not demonstrate significant association with perceived benefits. This indicates that respondents with a stronger perception of barriers were less likely to report a recent FOBT, but that higher perceived benefits did not significantly affect FOBT rates. A similar pattern for perceived barriers emerged with sigmoidoscopy, in which higher scores on perceived barriers were associated with lower rates of recent sigmoidoscopy. In addition, perceived benefits were positively associated with higher rates of recent sigmoidoscopy. People who perceived more benefits to screening and stronger agreement with those benefits had a higher likelihood of reporting a sigmoidoscopy within the past 5 years. For colonoscopy, perceived benefits were significantly associated with having a test within the past 5 years, but perceived barriers were not. When a combination of tests was considered, both barriers and benefits demonstrated significance.

The largest distinction in these results is that between FOBT and colonoscopy, because only barriers were associated with FOBT, whereas only benefits were associated with colonoscopy. These findings suggest that colonoscopy, which is used as both a screening and diagnostic test, and to some extent sigmoidoscopy, are perceived differently from FOBT by patients. At the time of this data collection, however, colonoscopy was rarely used as a screening test and was most often a diagnostic tool.

The results presented here are consistent with previous

literature on the HBM. In a review of studies that used constructs from the HBM, Janz and Becker (25) found that barriers was the construct most consistently associated with preventive health behavior, followed by susceptibility, and then benefits. Perceived benefits was a more important factor for sick-role behaviors than for preventive health behaviors. Our findings can readily be interpreted within this context. FOBT is purely a screening/preventive behavior where barriers play the strongest role in relation to behavior. Colonoscopy, on the other hand, appears to function more as an early detection or sick-role behavior, where anticipated benefits emerge as the stronger factor and barriers become less important in determining behavior. Although the cross-sectional nature of these data certainly limit interpolation of the results, the data suggest a distinction between these two preventive behaviors (FOBT and colonoscopy) that is not always made in prevention programming, where a single approach may be used to promote multiple behaviors.

It is important to interpret these results in terms of their cross-sectional and limited nature. Causal or predictive relationships cannot be distinguished here, and we must wait for longitudinal studies to determine the temporal nature of these relationships. For example, it is possible that the act of getting an FOBT reduces perceived barriers, or that people who went for a diagnostic colonoscopy because they had symptoms and thus experienced the benefits (rather than barriers) may be more likely to engage in future screening. Furthermore, it is possible that the low percentages of people who had a colonoscopy and the smaller variability in perceived benefits compared with barriers contributed to the findings.

Several interesting findings emerge from these data. The perceived barriers were concordant with what has been reported from other studies. However, this African-American church-based sample allowed us to detect perceived benefits that are perhaps unique to this sample, such as the importance of setting an example for family and the value of taking care of the body as part of "God's holy temple." An additional finding was that the benefit-barrier-behavior relationships held whether the dependent variable was a measure of current ("adherent") testing or lifetime ("ever") testing. It is unclear what these results mean for maintenance of screening as opposed to initiation of screening. This phenomenon may be partially because a high percentage of those "ever" screened had been screened within the recommended timeframe; nonetheless, further study of maintenance and relapse *versus* initiation is needed.

The divergent results, especially between FOBT and colonoscopy, are important as they suggest that intervention programs would benefit from examining the psychosocial correlates and determinants specific to the behaviors targeted by the program. These results presented here suggest multiple mechanisms for improving rates of CRC screening in lower income and minority populations. This is a unique sample of persons, drawn from rural African-American churches in North Carolina. Approximately half of the sample reported annual incomes of <\$20,000, and only 18% had completed a college degree. The demographic profile of this rural, low-income, African-American population places our participants at particular risk for colorectal cancer and makes regular screening especially important in reducing disease burden. Addressing barriers may be a productive way to increase FOBT, but if the objective is to raise colonoscopy rates, increasing perceived benefits may be more effective; flexible sigmoidoscopy may require a combination of both approaches. If an intervention is designed to target multiple screening tests such as FOBT, flexible sigmoidoscopy, and colonoscopy, the messages may

need to differ slightly for each test with an emphasis on barriers for FOBT, an emphasis on benefits for colonoscopy, and a dual emphasis for sigmoidoscopy. At the time of this study, colonoscopy was more commonly used diagnostically and less so as a preventive strategy; however, such a distinction was not possible with these data. This also means that reimbursement (or lack of) may have been a factor. However, because expense was one of the listed barriers, it was reflected to some extent in the barriers scale. Expense was not routinely associated with behavior when examined individually. Still, if colonoscopy becomes more common as a preventive strategy, the lines of distinction discussed here may become blurred, and intervention approaches may need to change so as to emphasize the role of perceived barriers in the preventive context of colonoscopy.

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