

A Trial of 3 Interventions to Promote Colorectal Cancer Screening in African Americans

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BACKGROUND: Colorectal cancer (CRC) is the second leading cause of cancer death in the United States. CRC incidence and mortality rates are higher among blacks than among whites, and screening rates are lower in blacks than in whites. For the current study, the authors tested 3 interventions that were intended to increase the rate of CRC screening among African Americans. **METHODS:** The following interventions were chosen to address evidence gaps in the Centers for Disease Control and Prevention's *Guide to Community Preventive Services*: one-on-one education, group education, and reducing out-of-pocket costs. Three hundred sixty-nine African-American men and women aged ≥ 50 years were enrolled in this randomized, controlled community intervention trial. The main outcome measures were postintervention increase in CRC knowledge and obtaining a screening test within 6 months. **RESULTS:** There was substantial attrition: Two hundred fifty-seven participants completed the intervention and were available for follow-up 3 months to 6 months later. Among completers, there were significant increases in knowledge in both educational cohorts but in neither of the other 2 cohorts. By the 6-month follow-up, 17.7% (11 of 62 participants) of the Control cohort reported having undergone screening compared with 33.9% (22 of 65 participants) of the Group Education cohort ($P = .039$). Screening rate increases in the other 2 cohorts were not statistically significant. **CONCLUSIONS:** The current results indicated that group education could increase CRC cancer screening rates among African Americans. The screening rate of $<35\%$ in a group of individuals who participated in an educational program through multiple sessions over a period of several weeks indicated that there still are barriers to overcome. *Cancer* 2010;116:922-9. © 2010 American Cancer Society.

KEYWORDS: colorectal cancer, health status disparities, minority health, health education, screening, community-based participatory research.

Colorectal cancer (CRC) is the third most commonly diagnosed cancer and is second only to lung cancer as a cause of cancer death in the United States. Each year, nearly 140,000 cases of CRC are diagnosed, and approximately 56,600 patients die of the disease.¹ Both incidence and mortality rates are higher among blacks than among whites (incidence per 100,000: 72.9 vs 61.4 for men; 56.1 vs 44.7 for women²; mortality per 100,000: 26.1 vs 19.3 for men; 22.4 vs 15.3 for women³).

CRC screening reduces morbidity and mortality, and screening by endoscopy reduces incidence by allowing the removal of precancerous polyps. However, low rates of CRC screening have been documented nationwide. The 2006 Behavioral Risk Factor Surveillance System reported that the median screening rates for adults aged ≥ 50 years who had had a fecal occult blood test within the past 2 years were 24.4% for whites and 23.6% for blacks, and the rates for those who had ever experienced sigmoidoscopy or colonoscopy were 59.1% for whites and 53.1% for blacks.⁴ It is estimated that between 50% and 60% of CRC deaths could be avoided if all individuals aged ≥ 50 years had regular screening tests.⁵

Subramanian et al,⁶ in a review of 30 articles, observed that older age, more education, health insurance, physician recommendation, and a positive attitude toward screening were factors associated with patient adherence to CRC screening guidelines. Those authors also reported that there are misconceptions and a lack of knowledge despite efforts to inform the public about cancer screening.

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Conversely, deterrents or barriers to screening include pessimism and fear of cancer,⁶ lack of knowledge,⁷ lack of a provider recommendation,⁸ attitudinal factors like fear or embarrassment,⁸ lack of insurance,⁹ and “life difficulty.”¹⁰ Fatalism—the belief that cancer inevitably leads to death—is a common deterrent among African Americans.¹¹ Many investigators have recommended education for the general population^{12,13} and specifically for African Americans^{14,15} as an approach to promoting CRC screening. Some also have recommended further research to determine which educational programs are effective.⁶

This report describes the Colorectal Cancer Screening Intervention Trial (CCSIT), in which the objective was to test 3 interventions to increase CRC screening rates among African Americans. Two of the interventions were educational, and the third intervention responded to financial barriers. The educational interventions were consistent with the contention that education could increase screening. These interventions also addressed gaps in the evidence, as summarized in the *Guide to Community Preventive Services* (the *Community Guide*); according to the *Community Guide*, each approach is considered to have “insufficient evidence” on which to base a recommendation.¹⁶

MATERIALS AND METHODS

The CCSIT study was a randomized community intervention trial to assess the efficacy of 2 different behavioral and educational counseling interventions and a financial support intervention in promoting CRC screening. The project used community-based participatory research methods. The study protocol was reviewed by the Community Coalition Board¹⁷ of the Morehouse School of Medicine Prevention Research Center and was approved after that board’s suggestions were incorporated. The study also was approved by the Centers for Disease Control and Prevention and Morehouse School of Medicine Institutional Review Boards. The Metropolitan Atlanta Coalition on Cancer Awareness (MACCA), which is part of the Atlanta-based National Black Leadership Initiative on Cancer, participated in recruitment, as did members of the Community Coalition Board. MACCA consisted of representatives of community organizations and agencies concerned with cancer as well as unaffiliated cancer prevention advocates. Other community organizations, churches, and clinics also participated. We have shared the results of the project with these groups, and the Community Coalition Board approved this article.

Recruitment

The eligibility criteria for this project were: African American, aged >49 years, no history of CRC, and no previous CRC screening test within the recommended time interval. Two full-time and 1 part-time community health worker (CHW) made contacts in person at senior centers, churches, community centers, and public health clinics. The CHWs worked with MACCA and with members of the Community Coalition Board.

Eligible volunteers were invited to an introductory meeting, where they received logo gift bags containing a cookbook, message fan, pamphlets, and CRC screening information, including a National Cancer Institute-developed pamphlet. Also included was a “Resource Directory,” which included CRC screening guidelines; methods of referral for screening tests; Medicare, Medicaid, and selected insurance coverage policies; locations of sites (including low-cost sites) in metropolitan Atlanta where screening could be obtained; transportation routes to screening sites; and free or low-cost transportation services. At this meeting, participants completed informed consent forms and pretest questionnaires. At a second introductory meeting, participants were assigned to 1 of the 4 cohorts and, for the 2 educational interventions, were notified about the time and place of the next meeting. Participants were randomized by the site (church, community/senior center, or clinic) at which they volunteered. That is, all participants at a given site were assigned to the same study arm. This prevented the potential “contamination” that could result from participants in different arms of the study sharing information with each other. At this second introductory meeting, the participants also were shown a slide presentation on healthy living (“Down Home Healthy Living,” tailored for African Americans).

Interventions

We selected for testing 3 of the interventions for which the *Community Guide* stated that there was “insufficient evidence”: one-on-one education, group education, and reducing out-of-pocket costs (financial support).

One-on-One Education cohort

A health educator met individually with participants in this group for 3 45-minute sessions over 3 weeks to review educational materials on CRC risk and screening. All meetings took place at the recruitment site. The educational material included descriptions of CRC symptoms, diagnosis and treatment, screening tests, and screening recommendations.

Group Education cohort

For this approach, a health educator met with participants in groups of 4 to 14 individuals (average, 5 individuals) to review the educational material. Although the material was identical to that covered in the one-on-one counseling, there were more individuals at each meeting, and 4 sessions over 4 weeks were required to cover the material. Again, all meetings took place at the recruitment site.

Reduced out-of-pocket expense cohort (financial support)

In this group, participants were offered financial reimbursement up to \$500 for out-of-pocket expenses incurred for CRC screening, including transportation and other nonmedical expenses. A health educator was available to assist with negotiating direct payment and arranging transportation to the physician's office or medical clinic for the screening test. The health educator also provided letters of introduction and guarantee of payment for the patient to assist in scheduling the test visit.

The amount offered was more than sufficient to pay all costs involved in obtaining a fecal occult blood test but less than half the cost of a colonoscopy. For patients seeking an endoscopic screening, the amount could cover the copayment and/or deductible for those who had private insurance or Medicare or could pay the full cost of screening at a reduced-cost public facility. It is worth noting that the waiting list for reduced-cost screening generally was long.

Control cohort

Participants in this group attended the introductory session but received no intervention other than accepting the contents of the gift bag with the educational pamphlets. They received pretesting (at the introductory session), post-testing, and follow-up on a schedule identical to that of the participants in the other cohorts.

Measures

We requested medical records from the participants' physicians or healthcare facilities and abstracted the records to determine whether or not each participant, in fact, had been screened for CRC before enrollment in the study. The questionnaire survey (pretest/post-test) included an assessment of knowledge, attitudes, beliefs, and practices regarding general health issues and, in particular, knowledge about CRC risk and screening. Screening status for CRC was assessed by telephone and/or mail

during the follow-up assessment periods at 3 months and, if necessary, at 6 months after the intervention.

Educational Materials

Educational resources for the small groups and one-on-one participants included materials from the National Cancer Institute and the American Cancer Society as well as original materials prepared for the CCSIT project. The curriculum for the educational sessions described, in lay terms, the genetics, incidence, and mortality rates for CRC; disparities in detection and treatment; and the screening methods used to detect CRC. It also covered the effectiveness of diet and exercise in the prevention of CRC. Time was devoted to explaining the screening methods and relating screening to the early detection and prevention of CRC. We pilot-tested all measures and procedures at a senior citizens' center in Atlanta. On the basis of the experience and feedback from 9 participants, the materials were refined.

Training for Personnel

One of the CCSIT investigators (S.A.S.) conducted training for the staff responsible for recruiting participants and conducting the interventions.

Follow-Up

We administered the post-test questionnaires to participants in the 2 educational cohorts at their final intervention session; those in the Control and Financial Support cohorts were given their post-test questionnaires 2 weeks after the second introductory session. All participants were contacted by telephone approximately 3 months after completing their post-test questionnaires to determine whether they had been screened for CRC; if they had not been screened, then they were called again at 6 months.

If the telephone was not answered or if the participant was not available, then at least 2 repeat attempts were made either by telephone or through the mail. If the telephone had been disconnected or if the number was changed, then an attempt to identify a new number was made through Directory Assistance.

RESULTS

Study Population

From January 2003 through April 2005, we recruited participants from 34 churches, 13 senior residences, 11 community senior centers, 3 medical clinics, and 4 men's groups based at social organizations. All recruitment sites

Table 1. Demographics by Study Arm (N = 369 Participants at Baseline)

Characteristic	No. of Participants (%)				Statistical Analysis		
	Control Cohort, n=88	Financial Support Cohort, n=84	One-on-One Education Cohort, n=98	Small Group Education Cohort, n=99	F Statistic	Chi-Square	P
Mean age [SD], y	69.5 [10.3]	65.6 [10.4]	69.18 [9.1]	68.6 [11.5]	2.55 ^a		.056
Sex						3.1 ^a	.4
Men	21 (23.9)	23 (27.4)	23 (23.5)	33 (33.3)			
Women	67 (76.1)	61 (72.6)	75 (76.5)	66 (66.7)			
Highest level of education attained						8.0 ^b	.2
Elementary school	13 (14.9)	10 (11.9)	25 (26.0)	21 (21.2)			
High school or technical	45 (51.7)	40 (47.6)	40 (41.7)	46 (46.5)			
≥Some college	29 (33.3)	34 (40.5)	31 (32.3)	32 (32.3)			
Marital status						3.25 ^a	.4
Married	20 (22.7)	27 (32.5)	25 (25.5)	32 (32.3)			
Other ^c	68 (77.3)	56 (67.5)	73 (74.5)	67 (67.7)			
Insurance coverage						25.35 ^b	.0003
No insurance coverage	11 (12.6)	3 (3.6)	19 (20)	5 (5)			
Medicare/Medicaid	54 (62.1)	49 (58.3)	62 (65.3)	66 (66.7)			
Health insurance/HMO	22 (25.3)	32 (38.1)	14 (14.7)	28 (28.3)			

SD indicates standard deviation; HMO, health maintenance organization.

^aThree comparisons.

^bSix comparisons.

^cSingle, widowed, or divorced.

were in the Atlanta Metropolitan Area counties of DeKalb, Fulton, Cobb, and Clayton. Initially, 803 individuals expressed interest in participating in the study. Of these, 158 were ineligible because they had been screened previously, could not verify their screening status, or did not meet 1 or more of the other eligibility criteria. The remaining 645 eligible participants were randomized to an intervention group or the Control cohort. Of these randomized participants, 276 withdrew by refusing consent, failing to attend an intervention session, or otherwise dropping out. The remaining 369 participants completed an educational intervention or were in the Control or Financial Support cohorts. Of these, 259 participants (69.6%) completed the post-test survey and were contacted successfully at follow-up by 6 months to assess their CRC screening status. These participants were considered “completers.” The 110 individuals who did not complete the post-test survey or could not be contacted at follow-up were considered “noncompleters.” During the 3-month to 6-month follow-up, we were unable to contact non-completers because of death (3 individuals), because their telephone had been disconnected and they did not respond to the mailed requests for them to call for follow-up, or because they refused to participate in the follow-up telephone interview.

We compared completers with noncompleters among the 369 enrolled participants to identify demographic factors associated with completion. Participants who completed the study were similar to those who did not with respect to major demographic variables, including age, sex, marital status, and insurance coverage. However, completers were more educated than noncompleters, with a >50% greater rate of college graduation ($P = .026$).

Establishing Group Equivalence

Participants mostly were unmarried women, aged >65 years, with a high school diploma or some technical college. For all groups, Medicare and/or Medicaid covered most of the participants. The 4 groups were similar with respect to mean age, proportion of men and women, educational background, and marital status (Table 1). Approximately 33% had attended at least some college. However, insurance coverage was not distributed evenly among the groups. Individuals in the Financial Support cohort were more likely to have private health insurance than participants in any other group, whereas individuals in the One-on-One cohort were more likely to have no health insurance than any other group ($P < .0003$).

Effect of Group Intervention on Cancer Knowledge and Screening Behavior

Change in cancer knowledge

Cancer knowledge was determined by administering a 7-item pretest and post-test. We performed a pair-wise analysis of data within groups using the McNemar chi-square test for categorical data (Table 2). Knowledge increased significantly in the 2 educational cohorts on 6 of the 7 items. On the seventh item, (“Can you name an examination that can be done to find colorectal cancer in its very early stages?”), >90% of respondents knew the correct answer on the pretest; hence, there was little room for improvement on the post-test. The Financial Support cohort did not improve on any item, and the Control cohort improved on only 1 item.

Colorectal cancer screening behaviors

For the purposes of reporting the findings on cancer screening, the 3-month and 6-month follow-up assessments were combined and referred to as “follow-up.” Participants who were contacted at 3 months and indicated that they had been screened were considered to have completed the study and were not contacted again. Participants who had not been screened were encouraged to be screened and were contacted again at 6 months. At follow-up, 257 of the 369 enrolled participants were contacted for a telephone interview about whether or not they had had any type of CRC screening since the start of the project. We were unable to contact 112 participants.

We conducted 2 types of analyses. The first considered only those participants who were contacted successfully to determine their screening status postintervention. For the second analysis, we used the more conservative “intention-to-treat” approach, in which those who could not be contacted were categorized as not screened.

Follow-up results for each of the intervention groups are shown in Tables 3 and 4. Considering only the contacted group (Table 3) (n=237), the Group Education intervention resulted in significantly more participants screened (33.9%) compared with the Control cohort (17.7%; $P = .039$). The Financial Support cohort and the One-on-One cohort were similar in terms of the percentage of participants screened (22.2% and 25.4%, respectively), rates that exceeded that of the Control cohort but did not differ from it statistically in an individual chi-square comparison. For the intention-to-treat analysis (overall chi-square 4-group comparison with all participants), there was a similar trend but with only borderline statistical significance (Table 4).

DISCUSSION

Only 2 “client-based” interventions, client reminders and small media, are recommended by the *Community Guide* to promote CRC screening. The other 6 interventions are rated as “insufficient evidence.”¹ Moreover, the interventions listed were tested primarily on participants who were not African American, so that their potential for reducing health disparities is not clear.

To add to the evidence base, we tested 3 CRC screening interventions that fell into the “insufficient evidence” category. By testing them on African-American participants, we hoped to demonstrate an approach that would help reduce CRC disparities.

The results suggest that all 3 interventions had some efficacy. Knowledge was increased in the 2 cohorts that participated in an educational intervention compared with the 2 cohorts that did not. Each of the interventions appeared to be efficacious, although statistical significance was borderline. Because of shortfalls in recruitment and retention, the study was underpowered.

The least successful of the interventions was Financial Support. This may be attributed to the finding that randomization was not successful with respect to the distribution of health insurance among our participants. The Financial Support cohort, the most heavily insured group, probably needed the support the least. Still, the prospect of reimbursement of out-of-pocket costs should have been attractive because, even with insurance, copayments, deductibles, transportation costs, etc, can be substantial.

The most successful intervention was Group Education, which was modeled on social support theories, such as Social Ecological Theory¹⁸ and Social Cognitive Theory.¹⁹ These theories suggest that the informational and emotional support received by participants in a support network may buffer barriers related to cancer screening. The involvement of family members, friends, volunteers, and others can promote cancer early detection and augment treatment.²⁰

Limitations and Challenges

Recruitment

The recruitment of participants was labor-intensive, with more than 2000 individuals being approached over 3 years (Fig. 1). However, we were unable to reach our enrollment and retention target of 500 individuals. This was not a result of reluctance on the part of potential participants: >800 individuals volunteered to participate, but only approximately 20% were ineligible, mostly

Table 2. Cancer Knowledge Change Over Time by Study Arm (N = 257)

Cancer Knowledge Item	% With Correct Response								Overall <i>P</i> ^a
	Control Cohort, n=62		Financial Support Cohort, n=63		One-on-One Education Cohort, n=67		Small Group Education Cohort, n=65		
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	
What do you think are the 3 most common cancers?	51.6	64.5	54.8	48.4	57.1	73 ^b	56.9	73.9 ^b	<.0001
What is colorectal cancer?	73.8	85.3	77.1	86.9	73	90.5 ^b	69.4	91.9 ^c	<.009
Can colorectal cancer be prevented?	72.1	78.7	67.2	72.1	58.1	93.6 ^c	71.4	94.3 ^c	<.0001
Detecting and removing polyps may be a way of preventing colorectal cancer	64.4	84.8 ^b	71.7	75	54	82.5 ^c	61.8	89.7 ^c	<.0001
Individuals who have a condition in which the lining of the colon becomes inflamed, called ulcerative colitis, are more likely to develop colorectal cancer	39.7	55.2	39.3	55.7	25.4	68.3 ^c	36.2	71 ^c	<.0002
Colorectal cancer screening tests are used to detect cancer, polyps that may become cancerous, and/or other abnormal conditions	75.4	88.5	72.6	80.7	58.7	88.9 ^c	70	92.9 ^c	<.0001
Can you name an examination that can be done to find colorectal cancer in its very early stages?	93	98	94.8	96.7	94.6	100	91.7	100	<.273

Pre indicates before the intervention; Post, after the intervention.

^a Overall *P* value refers to the statistical significance of between group differences in post-test outcomes adjusted for pretest differences (using the analysis of covariance statistic).

^b Comparison differed significantly at $.001 < P < .03$.

^c Comparison differed significantly at $P < .001$. Percentages within groups were compared using the McNemar test for categorical data.

Table 3. Screening Status by 6-Month Follow-Up For All Contacted Participants (N = 257)

Cohort	No. of Participants Contacted	No. Screened for Colon Cancer	% Screened	<i>P</i> (Intervention Versus Control)
Control	62	11	17.7	
Financial support	63	14	22.2	NS
One-on-one education	67	17	25.4	NS
Small group education	65	22	33.9	.039
Total	257	64	24.7	

NS indicates not significant.

Table 4. Screening Status by 6-Month Follow-Up for All Enrolled Participants (N = 369)

Cohort	No. of Participants Enrolled	No. of Participants Contacted	No. Screened for Colon Cancer	% Screened	<i>P</i> (Intervention Versus Control)
Control	88	62	11	12.5	
Financial support	84	63	14	16.7	NS
One-on-one education	98	67	17	17.4	NS
Small group education	99	65	22	22.2	.0817
Total	369	257	64	17.34	

NS indicates not significant.

Participant Recruitment

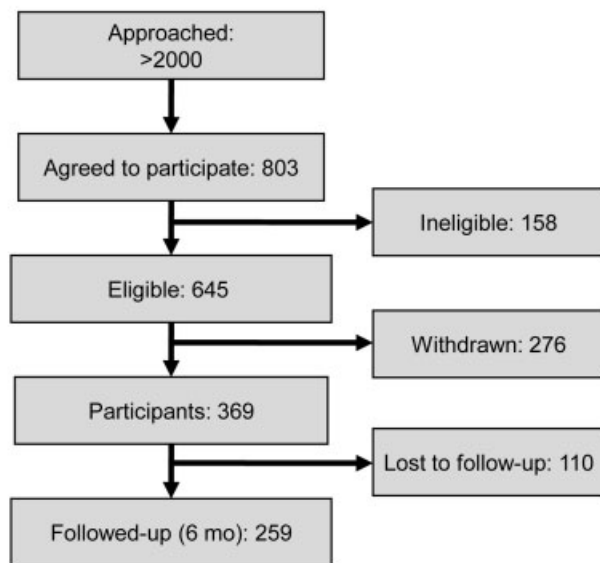


Figure 1. Participant recruitment for a colorectal cancer screening intervention trial is shown.

because of age or previous screening exclusion criteria. This still left >600 eligible participants.

Our success in this area can be attributed to the active participation of our community partners. The Prevention Research Center Community Coalition Board and the Metropolitan Atlanta Coalition on Cancer Awareness participated in the design of the interventions and, along with other community partners, played a major role in recruitment.

Retention

Retaining participants in the study was our greatest challenge: >40% of participants failed to complete the intervention. Three of these participants died, but the remainder dropped out. Retaining participants in a community-based prevention initiative like this is a common problem, especially among low-income and poorly educated participants. Continued participation represents a low priority for participants, especially because the benefits may not be apparent. We have observed this in previous projects,²¹ as have others; in particular, low income, less education, and African-American race have been associated with attrition from research projects.²² Brown and colleagues²³ identified lack of awareness, lack of transportation, interference with work/family responsibilities, financial costs, negative side effects, and burdensome procedures as barriers, and it is likely that all of these played a role in our project. Financial incentives some-

times are effective in retaining participants,²⁴ but we did not offer significant financial incentives to participants in our educational interventions, because the comparison intervention was based on a financial incentive. We offered only minor incentives to participate, such as key rings and supermarket gift cards.

Randomization

Randomization of our sample was not entirely successful: Members of the Financial Support cohort were more likely to be insured than members of the other cohorts. Insured individuals could have taken advantage of our offer to reimburse out-of-pocket expenses to cover copayments, deductibles, transportation costs, etc, but relatively few did. It would be interesting to do a subset analysis of this cohort to learn whether there was a significant difference in screening rates between insured and uninsured individuals. However, because there were only 3 uninsured participants in the group, this was not possible.

Screening rates

Only a modest percentage of participants, regardless of intervention group, were screened even after completing the intervention. In the most responsive arm (group education), participants attended 6 meetings (the 2 introductory sessions and the 4 educational sessions) and continued participation in the program through the 6-month follow-up. Still, only approximately 33% of participants were screened. Education and social support together doubled the rate at which participants were screened compared with controls, but that rate was relatively low. The remaining barriers could be fear of or aversion to endoscopy, revulsion at handling feces, or other cultural or behavioral obstacles.

A factor that possibly contributed to the low screening rates is the likelihood that the target population was resistant to CRC screening. Approximately half of the African-American population aged >49 years already has been screened (and, hence, was ineligible for our study). The remaining population from which we recruited participants was not generally ignorant of the fact that screening could prevent CRC mortality; approximately 66% of completers and noncompleters alike knew at baseline that CRC could be prevented and that CRC screening tests could be used for this purpose. Nonetheless, they had remained unscreened. Regardless of the reason (financial, fear, distrust, or denial), it was more difficult to promote screening to this group than would be the case if we were recruiting from a naive population.

In conclusion, for the current project, we tested 3 interventions to promote CRC screening in African Americans, which is the population with the highest CRC incidence and mortality rates. Compared with controls, the group education intervention doubled the rate at which participants were screened, at least in the cohort of participants who completed the study. Hence, this intervention offers potential for reducing CRC disparities. The other 2 interventions (reduced out-of-pocket expense and one-on-one education) showed promise, but their level of efficacy compared with the control group did not reach statistical significance. Only approximately 33% of the individuals who participated in the group education intervention obtained screening afterward, indicating that more effective interventions are needed.

CONFLICT OF INTEREST DISCLOSURES

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