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Spiritually-based intervention to increase colorectal cancer screening among African Americans: Screening and theory-based outcomes from a randomized trial

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Abstract

Colorectal cancer screening has clear benefits in terms of mortality reduction, however it is still underutilized and especially among medically underserved populations including African Americans, who also suffer a disproportionate colorectal cancer burden. This study consisted of a theory-driven (Health Belief Model) spiritually-based intervention aimed at increasing screening among African Americans through a community health advisor-led educational series in 16 churches. Using a randomized design, churches were assigned to receive either the spiritually-based intervention or a non-spiritual comparison, which was the same in every way except that it did not contain spiritual/religious content and themes. Trained and certified peer Community Health Advisors in each church led a series of two group educational sessions on colorectal cancer and screening. Study enrollees completed a baseline, 1-month, and 12-month follow-up survey at their churches. The interventions had significant pre-post impact on awareness of all four screening modalities, and self-report receipt of fecal occult blood test, flexible sigmoidoscopy, and colonoscopy. There were no significant study group differences in study outcomes, with the exception of fecal occult blood test utilization, where those in the non-spiritual intervention reported significantly greater pre-post change. Both of these community-engaged, theory-driven, culturally-relevant approaches to increasing colorectal cancer awareness and screening appeared to

have an impact on study outcomes. While adding spiritual/religious themes to the intervention was appealing to the audience, it may not result in increased intervention efficacy.

Keywords

colorectal cancer; church-based; cancer screening; African American; health disparities; spiritually-based intervention

Colorectal cancer (CRC) is the third leading cause of cancer mortality in the US (American Cancer Society [ACS], 2011_a). African Americans suffer a disproportionate burden of CRC relative to other racial/ethnic groups (ACS, 2011_b). CRC is third in both incidence (7,940; 8,710) and mortality (3,520; 3,530) among African Americans in both men and women, respectively (ACS, 2011_b). Though it is accepted that CRC reduces mortality rates (Mandel et al., 1993; Hardcastle et al., 1996; Kronberg, Fenger, Olsen, & Sondergaard, 1996; Faivre, et al., 1999; Cuzick, 2006), screening, particularly among African Americans, is underutilized (ACS, 2011_b). Screening recommendations include for average risk patients age 50–75, one of the following: annual fecal occult blood test or fecal immunochemical test; flexible sigmoidoscopy every 5 years; barium enema every 5 years; or colonoscopy every 10 years (American Cancer Society, 2012; Agency for Healthcare Research and Quality, 2008; Rex, et al., 2000). Though some view colonoscopy as the “gold standard”, the yearly fecal immunochemical test has recently, and since this intervention has been conducted, gained recognition. This is due to increased accuracy over fecal occult blood test, accessibility, and similar results in detecting cancer compared to colonoscopy (Quintero, et al., 2012). Screening rates among non-Hispanic African Americans are 48.9% compared to 56.0% for non-Hispanic Whites (flexible sigmoidoscopy within 5 years or colonoscopy within 10 years; or fecal occult blood test); (ACS, 2011_b).

Church-based approaches to CRC control

Faith-based organizations have historically played a central role in the African American community (Lincoln & Mamiya, 1990). Given the important role of religiosity in African American culture, the church has been and continues to be a viable access point for reaching African American community members. Members have looked to the church for leadership in areas other than spirituality and religion. As the most stable community organization, the church has played a significant role in such areas as the civil rights movement, economic development, and politics (Thomas, Quinn, Billingsley, & Caldwell, 1994). Many churches are also addressing health issues through health ministries, which vary from informal educational activities such as blood pressure screening, to health fairs and structured activities, to large or “mega churches” which may even have their own health centers to serve members. The church is also a place to reach individuals who may not otherwise report to a doctor’s office for screening.

Several CRC interventions have targeted faith-based venues when attempting to reach this population. The Wellness for African Americans Through Churches (WATCH) Project used lay health advisors and tailored intervention materials to promote CRC prevention behaviors among African American church members in rural North Carolina (Campbell, et al., 2004).

The WATCH project increased participants' fruit and vegetable consumption and physical activity. The "F.A.I.T.H. study" used a faith-based educational intervention to increase CRC knowledge and colonoscopy among African Americans in church and community-based organizations (Morgan, Fogel, Tyler, & Jones, 2010). More than 25% of participants received a colonoscopy within three months compared to only 4% of participants in the delayed intervention group.

The "Your Body is the Temple" project was conducted in African American and White churches (Holt, et al., 2011). Using a community health advisor approach resulted in significant increases in CRC knowledge, perceived benefits of CRC screening, awareness of the screening modalities, and decreases in perceived barriers to screening. This intervention utilized a "spiritually-based" approach, meaning that the community health advisors provided spiritual themes and scripture to support the core health content, and the study print materials also contained spiritual themes to support the CRC screening cue to action. However, the screening data in this preliminary pre-post study was inconclusive, in some cases with self-report screening rates decreasing from pre- to post-test, reflecting participant confusion between the multiple screening modalities. This suggested that a randomized controlled trial was needed to determine whether a spiritually-based approach is effective for increasing CRC screening in African American churches.

Community health advisors

Community health advisors (CHAs) have played and continue to play a fundamental role in the community empowerment process in under-served communities. Community lay persons have fostered a trusting relationship between healthcare agencies and the community. CHAs have consistently demonstrated their effectiveness in promoting health among groups lacking access to adequate care (Witmer, Seifer, Finocchio, Leslie, O'Neil, 1995; U.S. Department of Health and Human Services, 1994_a; U.S. Department of Health and Human Services, 1994_b; Fendall, 1984). Ethnically, linguistically, socio-economically, and experientially indigenous to the community in which they work, these trusted "insiders" serve as cost-effective conduits of information, resources, and services often to lower-income populations (Witmer, Seifer, Finocchio, Leslie, O'Neil, 1995; Walt, 1990; Indian Health Service, 1991; Giblin, 1989). As vital links between health care consumers and providers, CHAs have addressed a broad range of community health issues in various settings (U.S. Department of Health and Human Services, 1994_a; U.S. Department of Health and Human Services, 1994_b). Numerous studies have shown the ability of CHAs to do effective preventive work, reduce cultural and linguistic barriers to care, help patients successfully navigate in complex health systems, and improve the quality and cost-effectiveness of care (Witmer, Seifer, Finocchio, Leslie, O'Neil, 1995).

The present study

The purpose of the present study was to evaluate the efficacy of a spiritually-based CHA intervention aimed at increasing CRC screening among African Americans in church settings, using a group randomized controlled design. The comparison (non-spiritual) intervention was equivalent in all other ways to the spiritually-based intervention except that

it did not contain spiritual references or content. Both interventions were theory-based, utilizing Health Belief Model (Rosenstock, Strecher, & Becker, 1988) constructs in both the intervention content and evaluation. The following research questions were proposed: 1) did study participants actually perceive the spiritual nature of the spiritually-based intervention [e.g., manipulation check]; and 2) was the spiritually-based intervention more, less, or equally effective for primary CRC screening-related outcomes and secondary Health Belief Model-based outcomes, than the non-spiritual intervention. The present study actively encouraged patient informed choice among the four recommended methods of CRC screening, a gap recently identified in interventions (Vernon, et al., 2011).

It was expected that, 1) the spiritually-based intervention would be perceived as significantly more spiritual in nature than the non-spiritual comparison; and 2) the spiritually-based intervention would result in significant increases in CRC screening-related outcomes [awareness, screening behaviors] and greater pre-post changes in Health Belief Model-based outcomes [increased benefits, decreased barriers], relative to the non-spiritual comparison.

Method

Church recruitment

The study methodology is described in detail elsewhere (Holt, et al., In Press). All procedures were approved by the University of Alabama at Birmingham and University of Maryland Institutional Review Boards. Figure 1 provides an outline of main study procedures. A convenience sample of 16 African American churches in the Birmingham area were recruited by program staff. Each church identified two members to serve as a CHA, a lay person who receives training and can then educate their fellow community members on a health topic (Witmer, Seifer, Finocchio, Leslie, & O'Neil, 1995; US Department of Health and Human Services, 1994_a, US Department of Health and Human Services, 1994_b). Participating churches received an incentive in the amount of \$500 to defray program costs such as space and utilities.

CHA recruitment and training

Pastors or key church staff members identified 2 potential CHAs in each church. The 16 participating churches were randomly assigned to deliver either the spiritually-based or the comparison intervention. CHAs in the two study arms were trained separately to avoid intervention contamination. CHAs completed two half-days of training and then completed a mock educational session in which they practiced their delivery of the material.

Using a randomly permuted blocks technique, eight churches were randomized to conduct the spiritually-based approach and the other eight to conduct the non-spiritual intervention. The spiritually-based intervention frames core health material with spiritual themes. The non-spiritual comparison intervention covered the same CRC content but did not involve spiritually-based material. Intervention development is described in detail elsewhere (Holt, et al., 2009).

Participant recruitment and screening

Each church had a recruitment goal of 30–35 individuals age 50–74. Individuals were told about the project by the CHAs and/or in church announcements, and invited to attend a series of two educational sessions about CRC. Participants were provided with an incentive of \$25 for completion of project surveys for each session they attended. Those who were interested in the project called program staff to be screened for eligibility: African American, age 50–74, no history of CRC, and able to complete a self-administered questionnaire written at 5th grade reading level. CRC screening guidelines were used to determine eligibility for the study. For individuals at average risk for CRC, screening should begin at age 50 and conclude at age 75 (Agency for Healthcare Research and Quality, 2008). Those age 75 were not included in analyses because they would become ineligible for screening during the study period.

Educational sessions

Individuals eligible to participate were invited to attend the first educational session, which began with informed consent. Participants then completed the self-administered baseline questionnaire. The CHAs conducted the educational group session using standardized power point presentations. The sessions typically began with prayer, and were a combination of didactic and interaction, ending with a question and answer period. In the event that the CHA could not answer a question, study staff contributed with a response. Testimonials and stories from audience members were spontaneous and frequent occurrences. For those in the spiritually-based intervention, the slides and materials also included spiritual content. CHAs distributed print materials developed for the project (Holt, et al., 2009). These full-color materials were professionally-designed and produced, covering: an overview of cancer and CRC, incidence and prevalence statistics, risk factors, symptoms, screening tests, and barriers to screening. The materials in the spiritually-based intervention additionally included relevant scripture and spiritual themes such as:

- God is such a loving God that He gave his only son so that you and I might have life. It is to Him that we give our thanks and praise. But with His gift comes a responsibility. We have a responsibility to care for our bodies in the best way that we can.

The non-spiritual intervention provided the same core colorectal cancer content, but in a non-spiritual manner, and used messages such as:

- Don't wait until you start feeling bad to get tested. Now is as good of a time as ever. An ounce of prevention is better than a pound of cure.

The second session was conducted one month later, focusing more on insurance coverage, where to receive screening, and CRC treatment. The first session lasted 1.5–2 hours due to the informed consent and baseline survey, while the educational components in each session typically lasted for 1 hour.

The intervention addressed constructs from the Health Belief Model in several ways. With *perceived severity* in this community, the objective is typically not to try and convince people that cancer is a significant health threat. This is because many tend to view cancer as

a “death sentence”. Therefore, the intervention provided the testimony of role models who are survivors, which can serve to reduce cancer fear. The intervention addressed *perceived susceptibility* by providing information about the disproportionate burden of CRC incidence and mortality in the African American community, and discussing other risk factors such as age. *Perceived barriers* to screening such as cost, fear, transportation, access, lack of provider recommendation, pain, bowel preparation, and embarrassment, were a significant focus of the intervention. Such barriers are particularly salient in CRC screening, and therefore were given a great deal of emphasis in the intervention messaging. *Perceived benefits* of screening were also highlighted, including prevention of CRC through removal of pre-cancerous polyps, and being there for one’s family or to see grandchildren grow up. *Self-efficacy* was a focus through empowering people to talk to their doctors about screening, even if their doctor had never talked to them about it. A great deal of patient empowerment was discussed in the sessions, engendering a consumer-oriented approach. Finally, CHAs delivered the *cue to action* for all age-eligible participants to get screened for CRC.

Follow-up questionnaire

One year post-enrollment, study staff went to each church, providing participants with a study update, and report of baseline descriptive findings. The session began with completion of the final questionnaire. Participants were highly interested in project updates and data, so this was effective for increasing participant retention. A number of participants did not attend but completed their surveys by mail (N=72).

Measures

Perceived benefits of CRC screening—Perceived benefits of CRC screening were assessed using a previously validated instrument (Rawl, et al., 2001) (e.g., “Finding CRC early will save your life.”). Participants provided agree, disagree, or not sure responses. Benefits were summed to result in an index score with higher scores reflecting more perceived benefits. Internal reliability was reasonable in the present sample ($\alpha = .57$) given its brevity (Nunnally & Bernstein, 1994).

Perceived benefits/barriers to FOBT—Perceived benefits of and barriers to the FOBT were assessed using an 11-item index (Rawl, et al., 2001). Items assessed perceived benefits such as early detection (e.g., “An FOBT will help find CRC early.”) and decreasing CRC worry (e.g., “An FOBT will help you not worry as much about CRC”). Perceived barriers included embarrassment (e.g., “An FOBT is embarrassing”), and time (e.g., “I do not have time to do an FOBT”). Participants provided responses in strongly agree, agree, neutral, disagree, or strongly disagree, format. Items were summed to yield an FOBT benefits and FOBT barriers score, with higher scores reflecting more perceived benefits and barriers. Internal reliabilities were acceptable in the present sample ($\alpha = .75$ benefits; $r = .86$ barriers).

Perceived benefits/barriers to colonoscopy—Perceived benefits (e.g., “The cost would keep me from having a colonoscopy.”), and barriers specific to colonoscopy such as preparation (e.g., “Having to follow a special diet and take a laxative or enema would keep

me from having a colonoscopy.”) were assessed (Rawl, et al., 2001). Participants provided agree, disagree, or not sure responses. Items were summed to yield a colonoscopy benefits score and a colonoscopy barriers score, with higher scores reflecting more perceived benefits and barriers. Internal reliabilities were acceptable in the present sample ($\alpha = .82$ benefits; $r = .60$ barriers).

CRC screening—These items were based on the Behavioral Risk Factor and Surveillance System (Centers for Disease Control and Prevention, 2006). A definition was provided to introduce each screening method, coupled with a picture depicting the method. CRC screening awareness was assessed by asking participants if they had ever heard of the test (yes/no/not sure). In accord with screening recommendations (Agency for Healthcare Research and Quality, 2008), participants then reported when they had their last exam using the appropriate time frame categories.

Manipulation check—Participants completed a brief series of questions assessing the extent to which they perceived that the educational sessions were spiritual in nature. A series of five items with Likert-type response options (e.g., “Spirituality was discussed in the sessions.”; “The sessions ‘spoke to’ my spiritual needs.”; strongly disagree...strongly agree); ($\alpha = .94$), were followed by a single item assessing the extent to which spiritual content was included in the sessions (not at all spiritual...very spiritual).

Demographics—Demographic data included sex, age, race, date of birth, marital status, health insurance coverage, educational attainment, employment status, household income before taxes, and family history of CRC.

Design/Analysis—The primary outcomes were the CRC screening-related variables including awareness (heard of the screening method), whether the participant had ever had the screening, and whether they had had the screening within the recommended time frame. Secondary outcomes included changes in scores for scales representing CRC knowledge, perceived benefits/barriers of CRC screening, perceived benefits/barriers to FOBT, and perceived benefits/barriers to colonoscopy. Scores were calculated by summing item responses. Since the interest was in counts of target outcome responses, missing values were treated as non-response, and were coded as negative or zero responses. A total of six change scores were calculated for the scales and subscales. Unadjusted means and standard deviations were calculated for baseline, follow-up, and changes from baseline to follow-up. Primary outcomes were compared between the intervention groups using mixed-model logistic regression analysis implemented with generalized estimating equations to account for the cluster-randomized study design. Each model included fixed effect terms for intervention group, time (baseline or follow-up), participant age, and a group by time interaction term. A term representing church was included as a random effect. The statistical test that was of primary interest was that for group by time interaction, as this evaluates equality of baseline to follow-up changes between the intervention groups. The main effect of time was also considered, in order to judge whether significant changes in mean response occurred between baseline and follow-up. The analysis of continuous measures utilized the same model structure described above, implemented as mixed-model analysis of variance.

Statistical analyses were implemented using SAS® Release 9.2 software (Cary, NC). Analyses were conducted only among participants age-eligible for screening (e.g., 50–74).

Results

Participant demographic characteristics

Three hundred and eighty seven individuals were assessed for eligibility and 316 met full inclusion criteria. Of the 316 enrolled participants, 285 reported both baseline and follow-up data and serve as the analytical sample for this paper. Participants retained at 12 months did not differ from those who dropped out of the study on demographic variables (all p values $> .05$).

Study participants had a mean age of 59.78 ± 7.15 and most were female (69.82%). Participant demographic characteristics by study group appear in Table 1. None of the demographic differences between study groups were statistically significant with the exception of age, where those in the non-spiritual group were older, on average, than those in the spiritually-based group (age controlled in subsequent analyses).

Manipulation check

Independent t -tests indicated significant study group differences confirming the manipulation. Participants in the spiritually-based group perceived the sessions as significantly more spiritual ($M = 20.21$, $SD = 4.88$) than did those in the non-spiritual group ($M = 18.67$, $SD = 5.27$), $t(237) = 2.33$, $p = .02$. Similarly, participants in the spiritually-based group ($M = 3.40$, $SD = 0.67$) perceived the educational session content as significantly more spiritual in nature than did those in the non-spiritual group ($M = 2.95$, $SD = 1.00$), $t(214) = 3.98$, $p < .001$.

Screening-related outcomes

For the main study outcomes of awareness of the screening methods, ever having had the screening, and having had the screening in the recommended interval, only reporting FOBT within the previous 12 months showed a significant difference between the groups (group*time $p = 0.0257$), with the non-spiritual group showing a 9% increase and the spiritually-based group showing a 2% decrease in reported testing. Reporting having had a barium enema within the previous 5 years showed a near-significant difference (group*time $p = .06$), with the spiritually-based group showing a 6% increase and the non-spiritually-based group showing a 1.5% decrease. No other study group differences were significant (see Table 2). However, the interventions may have had some significant impact for some of the screening-related outcomes from baseline to the 12-month follow-up. There were significant time effects for increases in ever heard of FOBT ($p < .001$), ever had FOBT ($p < .05$) ever heard of flexible sigmoidoscopy ($p < .001$), ever had flexible sigmoidoscopy ($p = .05$), had flexible sigmoidoscopy in previous 5 years ($p < .001$), ever heard of colonoscopy ($p = .001$), ever had colonoscopy ($p = .01$), had colonoscopy in previous 10 years ($p < .01$), and ever heard of barium enema ($p < .001$).

Health Belief Model outcomes

For the outcomes including perceived barriers to and benefits of screening, no study group differences (group*time) were significant (see Table 3). However, the interventions appeared to impact some of the outcomes from baseline to the 12-month follow-up. Change was significant for increase in CRC screening benefits ($p < .001$), increase in FOBT perceived benefits ($p < .05$), increase in colonoscopy perceived benefits ($p < .01$), and decrease in colonoscopy perceived barriers ($p < .05$).

Discussion

This study evaluated the efficacy of a spiritually-based Community Health Advisor intervention to increase CRC screening among African Americans in church settings. The spiritual intervention was compared to a non-spiritual intervention that was identical in educational content, structure, and theoretical framework. This randomized controlled trial yielded mixed results. As hypothesized, the spiritually-based intervention was perceived as significantly more spiritual in nature compared to the non-spiritual intervention.

The second hypothesis, however, was not supported. The spiritually-based intervention was not superior to the non-spiritual comparison on CRC screening or pre-post changes in Health Belief Model outcomes. In fact, report of receiving an FOBT within the intervention period was greater in the non-spiritual group than in the spiritually-based group. This was a surprising finding and in fact opposite of the hypothesized direction. When such findings occur, explanations such as compensatory rivalry may be explored. This is where the control/comparison group becomes aware of the study hypothesis and overcompensates in such a way as to impact the dependent variable. However, because both interventions were nearly equivalent and of high quality, and due to the team's high community competence and use of community-engaged research practices throughout the project, this seems unlikely. There is a possibility that while participants embraced the spiritually-based messages as being familiar in the church setting, they may have perceived greater credibility in the non-spiritual approach. The curriculum was delivered by CHAs, and even though they had been trained and certified, issues of credibility and CHA confidence sometimes arose. It is also possible that there was a greater emphasis on the core medical information in the non-spiritual group because that group did not also contain the spiritual messaging, and both sessions were equal in length.

Given the minimal differences between the interventions, the current hypothesis was an ambitious test. Examining the time main effect findings, both interventions appeared to be effective for most study outcomes. These included awareness of the tests, as well as self-report of having received them. There are of course limitations in interpretation of these findings because without an untreated group, the findings may be due to reporting bias. However, use of community-engaged research methods discourages use of control groups from a social justice perspective. A delayed treatment control group may have been a feasible alternative.

With regard to the non-significant study group differences, the most likely explanation is that the modest differences between the two interventions made it difficult to detect significant

group differences. A review of the literature (Husaini et al., 2002, Paskett et al., 1999) suggests that spiritually-based interventions to promote cancer screening are superior to control groups, but in studies in which two interventions are compared (Campbell et al., 1999), consistent with our findings, the interventions are comparable. Indeed, several previous studies that have identified more robust study group differences have either utilized control groups or delayed treatment control group designs (Morgan, Fogel, Tyler, & Jones, 2010; Walsh, et al., 2010). For example, the “F.A.I.T.H.” study resulted in 25% of participants receiving colonoscopy within three months compared to 4% in the control group (Morgan, Fogel, Tyler, & Jones, 2010), while the present study saw 14% and 15% increases from baseline to 12-month follow-up in self-report colonoscopy across the spiritual and non-spiritual groups, respectively. The study reported by Walsh and colleagues (2010) indicated more robust 12-month increases in self-report FOBT in a Latino and Vietnamese population, at 7.8% in the control group, 15.1% among those who received brochures, and 25.1% for those who received culturally tailored telephone counseling with the brochures.

Another potential explanation for the lack of study group differences are that the non-spiritual intervention became “spiritualized” because of the church setting. The team gave careful consideration as to whether the non-spiritual intervention could actually be delivered in a secular fashion, and produce a difference in “spiritual-ness” between the interventions. Study group differences in CHA training around this issue, and the CHA presentations being somewhat standardized by the power point slides helped to ensure, to the extent possible, that the non-spiritual group was as secular as possible. In addition, the manipulation check revealed that there were significant differences in the level of spirituality of the intervention as perceived by participants. However, it was also evident from the data that participants even in the non-spiritual group perceived the sessions to be at least somewhat spiritual in nature.

The secondary outcomes analysis indicated that while there were some pre-post changes in the Health Belief Model constructs, again there were no study group differences. The present study was not intended as a “test” of the Health Belief Model. The idea that theories may not operate optimally in diverse samples is one that is being increasingly recognized, but has yet to become fully realized in practice. This issue was addressed in a special issue of Health Education & Behavior. Pasick and colleagues (2009) examined the meaning of constructs from individual level behavior change theories in a mixed-methods study among Filipina and Latina women. They reported that the importance of social context may play a significant role in cancer control behaviors (e.g., mammography), suggesting that individual level theories alone may not be as appropriate with this population. It was recommended that a more social ecological approach be taken, incorporating people’s social context, culture, families, and communities (Burke, Joseph, Pasick, & Barker, 2009). Another study examined behavioral constructs in predicting mammography in multiethnic populations, including African Americans (Stewart, Rakowski, & Pasick, 2009). While several perceived benefits items were associated with screening, other items were not, suggesting the need for improved measurement among diverse groups.

Strengths and limitations

The present study has several strengths. Using a group randomized controlled trial, we tested two theory-based, culturally-targeted interventions. The interventions were developed using an iterative process with community participation throughout its development and pre-testing (Holt, et al., 2009). Second, by training church members to deliver the intervention, we increased the capacity of 16 churches to deliver CRC educational programs. This model is sustainable and has public health implications for dissemination. It is currently being employed in a second generation behavioral translational research study aimed at determining an optimal dissemination/implementation method for church-based cancer control interventions. Finally, we fill an important gap in the literature. As noted by Powe and colleagues (2010), the number of intervention studies designed to increase CRC screening among African Americans are relatively few (Powe, Faulkenberry, & Harmond, 2010).

The results of the present study should also be considered in light of its limitations. First, the intervention may have been more impactful if limited to participants not up-to-date with CRC screening. Future studies should aim to balance community considerations for inclusive studies with the importance of delivering and testing interventions among those who would derive the greatest benefit. Second, while we identified and reported intriguing and significant changes on CRC screening related outcomes from baseline to follow-up, these findings cannot for certain be attributed to the interventions.

Implications for practice

In sum, both of these community-engaged, theory-driven, culturally-relevant approaches to increasing CRC awareness and screening appeared to have an impact on study outcomes. While adding spiritual/religious themes to the intervention was appealing to the audience, it may not result in increased intervention efficacy in terms of screening.

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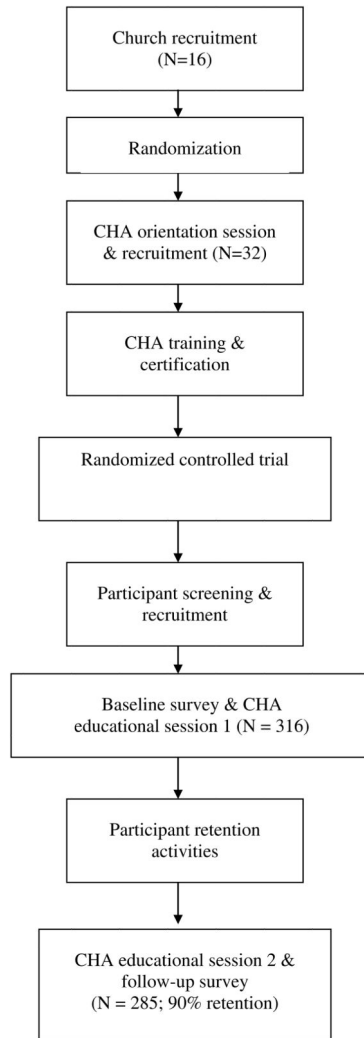


Figure 1.
Intervention diagram

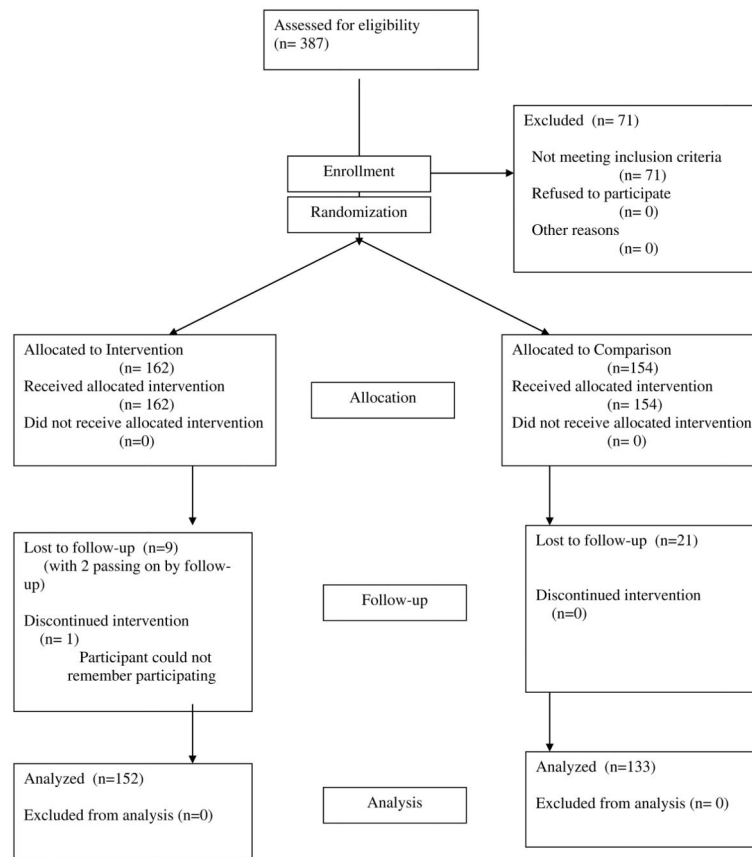


Figure 2.
CONSORT randomization diagram

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Table 1

Participant demographic characteristics

		Spiritually-based (N=152)	Non-Spiritual (N=133)	P Value
Sex	Male	51 (34%)	35 (26%)	.18
	Female	101 (66%)	98 (74%)	
Age mean (sd) **		58.56 (7.00)	61.16 (7.10)	.01
Age median		57	60	
Relationship status	Single	15.6%	15.2%	
	Living w/partner	0.7%	0.8%	
	Married	52.5%	46.4%	.84
	Separated or divorced	18.4%	20.8%	
	Widowed	12.8%	16.8%	
Education	Grades 1–8	2.2%	0.8%	
	Grades 9–11	10.1%	4.8%	
	Grade 12 or GED [^]	28.8%	21.6%	.17
	1–3 yrs college	32.4%	40.8%	
	4+ yrs college	26.6%	32.0%	
	Full time	52.6%	37.0%	
Work status	Part time	7.0%	10.2%	
	Not currently	8.8%	10.2%	.21
	Retired	22.8%	28.7%	
	Disability	8.8%	13.9%	
	< 5k	5.3%	3.6%	
	5–10k	13.0%	9.1%	
Income	10–20k	9.9%	18.2%	
	20–30k	17.6%	13.6%	
	30–40k	9.2%	12.7%	
	40–50k	12.2%	8.2%	.55
	50–60k	13.0%	7.3%	

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	Spiritually-based (N=152)	Non-Spiritual (N=133)	P Value
60-70k	5.3%	5.5%	
70-80k	2.3%	8.2%	
80-90k	5.3%	4.5%	
90-100k	1.5%	4.5%	
More than 100k	5.3%	4.5%	

^ GED = General Equivalency Diploma

Table 2

Analysis for screening-related outcomes¹

	Spiritually-based		Non-spiritual		Time p-value ²	Time*Group p-value ³
	Baseline	12-month	Baseline	12-month		
Heard of fecal occult blood test	92 (60.5)	134 (88.2)	83 (62.4)	118 (88.7)	<.01	.95
Ever had fecal occult blood test	51 (33.6)	58 (38.2)	45 (33.8)	55 (41.4)	.03	.55
FOBT in last 12 months	15 (9.9)	12 (7.9)	8 (6.0)	20 (15.0)	.09	.03
Heard of flexible sigmoidoscopy	59 (38.8)	115 (75.7)	57 (42.9)	102 (76.7)	<.01	.69
Ever had flexible sigmoidoscopy	30 (19.7)	39 (25.7)	23 (17.3)	37 (27.8)	.05	.52
Flexible sigmoidoscopy in last 5 years	25 (16.5)	123 (80.9)	16 (12.0)	103 (77.4)	<.01	.71
Heard of colonoscopy	108 (71.0)	136 (89.5)	101 (75.9)	116 (87.2)	.001	.16
Ever had colonoscopy	83 (54.6)	99 (65.1)	72 (54.1)	91 (68.4)	.01	.55
Colonoscopy in last 10 years	77 (50.7)	98 (64.5)	64 (48.1)	84 (63.2)	.01	.88
Heard of barium enema	59 (38.8)	110 (72.4)	70 (52.6)	98 (73.7)	<.01	.12
Ever had barium enema	22 (14.5)	20 (13.2)	19 (14.3)	17 (12.8)	.08	.32
Barium enema in last 5 years	11 (7.2)	20 (13.2)	19 (14.3)	17 (12.8)	.17	.06

¹ Data shown are frequencies and percentages (in parentheses) who participants who said “yes” (missing recoded as “no” as described in the text), among study participants for whom follow-up data were available.

² p-value for the time main effect, representing the difference between baseline and 12-month means, across groups

³ p-value for the time*group interaction effect, representing the difference in mean change between the two groups

Table 3

Comparisons of change in perceived barriers to and benefits of screening

Dependent Variable (/total possible score)	Spiritually-based (N = 152)			Non-spiritual (N = 133)			Time* Group p-value**
	Baseline Mean (SD)	12-Month Mean (SD)	Change*	Baseline Mean (SD)	12-Month Mean (SD)	Change*	
CRC screening benefits (/2)	1.66 (0.61)	1.81 (0.52)	0.15 (0.69)	1.56 (0.70)	1.85 (0.44)	0.29 (0.74)	.16
FOBT perceived benefits (/15)	11.42 (1.89)	11.44 (1.65)	0.08 (2.11)	11.20 (2.45)	11.18 (2.25)	0.10 (3.23)	.20
FOBT perceived barriers (/40)	16.52 (5.89)	14.79 (4.97)	-1.86 (5.71)	16.11 (5.43)	14.91 (5.50)	-1.44 (5.23)	.33
CS perceived benefits (/3)	2.35 (1.03)	2.64 (0.66)	0.30 (1.01)	2.20 (1.08)	2.45 (0.90)	0.26 (1.16)	.80
CS perceived barriers (/10)	0.72 (1.09)	0.43 (1.03)	-0.29 (1.10)	0.69 (1.23)	0.53 (1.36)	-0.17 (1.38)	.54

* Mean changes are the raw means, not adjusted church or age

**

The time*group interaction p-value is for the comparison of mean change between the groups, adjusted for the clustering effect of churches, baseline value and age