


Cluster Randomized Trial of a Church-Based Peer Counselor and Tailored Newsletter Intervention to Promote Colorectal Cancer Screening and Physical Activity Among Older African Americans

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Abstract

Action Through Churches in Time to Save Lives (ACTS) of Wellness was a cluster randomized controlled trial developed to promote colorectal cancer screening and physical activity (PA) within urban African American churches. Churches were recruited from North Carolina ($n = 12$) and Michigan ($n = 7$) and were randomized to intervention ($n = 10$) or comparison ($n = 9$). Intervention participants received three mailed tailored newsletters addressing colorectal cancer screening and PA behaviors over approximately 6 months. Individuals who were not up-to-date for screening at baseline could also receive motivational calls from a peer counselor. The main outcomes were up-to-date colorectal cancer screening and Metabolic Equivalency Task (MET)-hours/week of moderate–vigorous PA. Multivariate analyses examined changes in the main outcomes controlling for church cluster, gender, marital status, weight, and baseline values. Baseline screening was high in both intervention (75.9%, $n = 374$) and comparison groups (73.7%, $n = 338$). Screening increased at follow-up: +6.4 and +4.7 percentage points for intervention and comparison, respectively ($p = .25$). Baseline MET-hours/week of PA was 7.8 (95% confidence interval [6.8, 8.7]) for intervention and 8.7 (95% confidence interval [7.6, 9.8]) for the comparison group. There were no significant changes ($p = .15$) in PA for intervention (−0.30 MET-hours/week) compared with the comparison (−0.05 MET-hours/week). Among intervention participants, PA increased more for those who participated in church exercise programs, and screening improved more for those who spoke with a peer counselor or recalled the newsletters. Overall, the intervention did not improve PA or screening in an urban church population. These findings support previous research indicating that structured PA opportunities are necessary to promote change in PA and churches need more support to initiate effective peer counselor programs.

Keywords

African American, church-based, colorectal cancer screening, peer counseling, physical activity, tailored health messages

Colorectal cancer (CRC) is the second leading cause of cancer mortality in the United States, responsible for an estimated 50,310 deaths in 2014 (American Cancer Society, 2014). As with many cancers, there are disparities in both CRC incidence and mortality. African Americans face higher rates of CRC than any other racial or ethnic group (Ward et al., 2004). Regular screening has the potential to significantly reduce CRC incidence and mortality (Frazier, Colditz, Fuchs, & Kuntz, 2000; Kahi, Imperiale, Juliar, & Rex, 2009; Kahi, Rex, & Imperiale, 2008; Mandel et al., 2000). In addition to screening, the American Cancer Society concluded

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that there was convincing evidence that maintaining a healthy weight and increasing physical activity (PA) would help reduce CRC risk (Byers et al., 2002; Kushi et al., 2006). African Americans are not only more likely to be overweight or obese than other groups but also have lower rates of both CRC screening and PA (August & Sorokin, 2011; Centers for Disease Control and Prevention, 2010).

Disparities in cancer-related morbidity and mortality persist despite current intervention efforts. More innovative approaches may be needed to promote adoption of CRC prevention behaviors among African Americans. These interventions must be culturally sensitive and address the barriers to behavior change in communities of color. One approach is working with faith communities where churches can serve as an effective channel for health promotion efforts (Campbell et al., 2007; Demark-Wahnefried et al., 2000). The WATCH (Wellness for African Americans Through Churches) Project was effective at increasing both CRC screening and PA in rural African American churches (Campbell et al., 2004). WATCH showed that a tailored print and video intervention produced significant improvements in recreational PA and stool card screening (Campbell et al., 2004). Furthermore, participants who reported having spoken with a lay health advisor were more likely to have a stool card test.

While churches have shown promise as a venue for improving health behaviors, little is known about how these programs might work if they were implemented by the churches themselves. This is important to understand as few effective programs are disseminated for widespread use. Action Through Churches in Time to Save Lives (ACTS) of Wellness used the most effective, scalable pieces of WATCH: tailored messages and lay health advisors. For ACTS, churches were encouraged, but not required, to plan their own events related to PA and screening. The research team offered resources such as an evidence-based CRC screening decision aid similar to one used in previous studies (D. P. Miller et al., 2011) and free and reduced-price access to screening tests.

The present intervention was designed to be scalable so that, if found to be effective, the next step would be to test dissemination and implementation. We tested the intervention in urban areas in two different regions of the country, North Carolina and Michigan, to improve generalizability of the results. The aim was to evaluate the effect of ACTS of Wellness on CRC screening and PA rates of urban African American church members compared with members at churches who were randomly assigned to a comparison group. The comparison group received a previously tested intervention called *Body & Soul*, which focused on fruit and vegetable consumption (Resnicow et al., 2004).

Method

Church Recruitment and Eligibility

Churches were recruited in the city of Flint, Michigan, and Wake, Durham, and Guilford counties in North Carolina. In

North Carolina, a database was created containing the names of all predominantly African American churches in the target counties. In Michigan, churches were recruited through their affiliation with a University of Michigan School of Public Health partner working in African American communities, Faith Access to Community Economic Development. No eligible churches refused participation. Churches were randomized to intervention or comparison on a rolling basis.

Eligible churches had to have a predominantly African American congregation and at least 100 active members aged 50 years or older. Pastors signed an agreement and nominated a church coordinator (who was a staff member or parishioner at the church) to assist the research staff with participant recruitment. Each church coordinator was asked to advertise study participation to all church members aged 50 years and older with a goal of recruiting at least 50 members. All participants provided written consent prior to baseline survey completion.

Churches were given \$300 at sign-on, an additional \$300 after baseline survey completion, and a final \$300 after follow-up survey completion. An additional \$200 was given to churches that had 90% or more of baseline participants completing the follow-up survey. Church coordinators were offered \$150 at baseline and another \$150 after follow-up survey completion. Participants received pedometers and aprons as incentives for completing the survey and were offered healthy refreshments at survey events. This study was approved by the institutional review board at the University of North Carolina at Chapel Hill.

Intervention

The ACTS of Wellness intervention included (a) peer counselor (PC) program, (b) tailored newsletters, (c) PA and/or screening church-wide events, and (d) screening resources. This intervention was informed by the previously described WATCH intervention and updated based on findings from formative focus groups. The primary theories on which both interventions were based included social cognitive theory, the health belief model, and social support models (Bandura, 1989; Israel, 1985; Janz & Becker, 1984). Additional discussion of the theory can be found in the WATCH outcomes paper (Campbell et al., 2004), and examples of how theoretical constructs were used in each intervention component is described below. Comparison churches received the *Body & Soul* (Resnicow et al., 2004) program, which focused on increasing fruit and vegetable consumption;¹ a report of the *Body & Soul* implementation in comparison churches is described elsewhere (Allicock et al., 2013). We chose to offer an alternate intervention to the comparison group, rather than a no intervention control, based on our past experience with churches and feedback during the proposal development phase from our community partners.

Peer Counselor Program. The PC program was designed to provide information, increase motivation, and promote social

support for behavioral change through the “natural” social networks of individuals at the church (Israel, 1985). Church pastors and coordinators selected church members who were considered natural leaders/advisors in the church community to serve as PCs (which is what we called the lay health advisor component in this study). The number of PCs needed for each church depended on the number of participants not up-to-date with CRC screening, that is, one for every three to four such participants. Both female and male PCs were recruited, all older than age 50. All PCs completed a 3- to 4-hour training session, led by the church coordinator using a training DVD and manual adapted from previous studies (Allicock et al., 2010). A member of the research team observed trainings and provided technical assistance if needed. The PC program was developed using social support theory and core principles of motivational interviewing (W. R. Miller & Rollnick, 2002). The trainings also covered issues related to maintaining confidentiality. Church coordinators were encouraged to convene regular meetings after the initial training to continue practicing these skills. After the training, formal technical assistance was not provided, but the study team helped the coordinator troubleshoot problems as requested.

Study staff provided each coordinator with a list of all participants in their church who were not currently up-to-date with CRC screening (based on responses to the baseline survey). Following the training, each PC was assigned three or four participants to call and were asked to attempt to contact each participant at least three times (or until they were screened or declined future contact) prior to the follow-up survey.

Newsletters. All intervention participants received four 4-page individually tailored colored newsletters developed by the study team and mailed to participants' homes at 1- to 2-month intervals. All newsletters included the participant's name and a message from the church pastor. They also included targeted graphics and photos based on PA level, age, sex, and preference for secular or religious focus in health materials. If participants were up-to-date with CRC screening, the newsletter focused mainly on increasing PA and its role in CRC prevention. Those who were not up-to-date received primarily CRC screening messages. The first three newsletters, mailed between the baseline and follow-up surveys, were tailored based on answers to the baseline survey including behaviors, risk factors, health belief model constructs, social support constructs, and relationship with provider. Each newsletter was unique to the participant. For example, newsletters reinforced perceived benefits of screening and activity endorsed by individual participants on their surveys and emphasized the importance of unrecognized benefits. They also were designed to raise perceived susceptibility to colon cancer by highlighting how participants' current behaviors and attributes affected their risk. Strategies were also provided for overcoming perceived barriers to screening and PA cited by participants. We also included stories modeling how others have sought social support for screening/PA, which were tailored on several factors including level of self-efficacy for screening/PA and the

type of person they said they prefer to get support from (family member, spouse, friend, or church member). The fourth newsletter was delivered after the follow-up survey and was updated to reflect participants' answers to the follow-up survey.

Church-Wide Events. Churches were encouraged to host events related to colon cancer screening and/or PA. To assist with this, churches were given (a) a motivational DVD about the importance of CRC screening for African American church members developed for WATCH and (b) a CRC DVD screening decision aid describing and comparing colonoscopy and stool card testing (D. P. Miller et al., 2011), which some churches planned to show at group events. The CRC DVD and decision aid were both updated for the present study based on feedback received from prestudy focus groups. DVDs included testimonials designed to improve screening expectations and provide opportunities for observational learning. The DVDs were also made available for PCs to share with individual participants who requested them. PA events planned by churches included walking clubs and exercise classes.

Screening Resources. Social cognitive theory emphasizes the importance of the interaction between the individual and their perception of the environment. We addressed environmental-level barriers to screening by making individuals aware of screening resources and providing additional resources where they were currently lacking. All intervention participants who were not up-to-date for screening at baseline received a screening resource sheet with their first newsletter. The resource sheet listed local providers who offered free or reduced-priced colonoscopies for study participants. It also included instructions for requesting a free stool card test, which could be mailed back to the study team and analyzed at no charge. The stool card test kit was a specially developed version that included easy-to-follow, step-by-step instructions and pictures.

Data Collection

All data were collected via self-administered survey. While we planned to collect follow-up surveys at 6 months, follow-up data collection occurred on average 13 months postbaseline (range 9-20) due mainly to delays in starting the intervention. Participants completed surveys as a group after church events or filled out the survey on their own and returned it via mail or the church coordinator. Survey completion took between 15 minutes and 1 hour. Both surveys included questions on demographic characteristics, health status, source of and payment for health care, fruit and vegetable consumption, CRC screening and PA behavior, and related attitudes and beliefs. Additional questions on the follow-up survey asked about participation in the intervention (i.e., process outcomes).

Outcome Variables. CRC screening behavior was ascertained using established measures (Vernon et al., 2004; Vernon et al., 2008). We created our main screening outcome

variable indicating whether individuals were up-to-date, based on average-risk guidelines for *any CRC screening*: stool blood test in the past year, colonoscopy in the past 10 years, flexible sigmoidoscopy in the past 5 years, double-contrast barium enema in the past 5 years, or virtual colonoscopy in the past 5 years (Levin et al., 2008).

PA was assessed using a measure developed and validated for the WATCH study (Campbell et al., 2004). Aerobic recreational moderate–vigorous intensity PA (MVPA) included seven preselected activities (run/jog, bike, active sports, dance, swim, walk/hike, and aerobics) and an “other” question where participants could self-report activity. When “other” activity was reported it was reviewed case-by-case; we assigned a MET (Metabolic Equivalency Task) score to that activity to indicate its intensity using Ainsworth’s compendium of PA (Ainsworth et al., 2000). “Other” activities that were considered MVPA (MET value >3) were included when calculating each participant’s score. For each activity they selected, participants indicated frequency (rarely or never, 1–3 times/month, 1–2 times/week, 3–4 times/week, or ≥ 5 times/week) and duration of activity: <20 minutes (computed as 15 minutes) or ≥ 20 minutes (computed as 30 minutes). These numbers were multiplied for each activity, and the resulting minutes/week multiplied by the MET value for the activity to create an activity MET score. All activity MET scores were summed to create a total MET score for MVPA (Campbell et al., 2004). We also created a dichotomized variable based on whether they were meeting the recommendation of 150 minutes/week of MVPA (Centers for Disease Control and Prevention, 2009).

Covariates. Continuous variables included age and comorbidities. A comorbidities index was created by summing all positive responses to the question, “Have you been diagnosed with any of the following illnesses: high blood pressure, heart disease, diabetes, arthritis, or cancer?” Categorical variables included state (North Carolina or Michigan), gender, marital status, education, health insurance, history of polyps, family history of colon cancer, health status, and income.

Process Outcomes. The follow-up survey included measures to assess exposure to and participation in the intervention. We examined whether participants remembered receiving newsletters, how many they recalled, and topics they covered. We also examined whether participants spoke with a PC and if CRC screening was discussed. Last, we asked if they had watched the ACTS of Wellness DVD, which included the decision aid, or participated in other intervention events.

Data Analysis. All data reported are for the study cohort that completed both baseline and follow-up surveys. Sample means were calculated for continuous outcomes and sample proportions were calculated for binary outcomes along with 95% confidence intervals (CIs) that were adjusted for within-church clustering. Linear mixed effect models with church-specific random intercepts were used to compare continuous outcomes

between treatment groups at follow-up while controlling for baseline outcome and other covariates. Similarly, generalized linear mixed effect models with church-specific random intercept compared binary outcomes between treatment groups at follow-up while controlling for baseline outcome and other covariates. The number of participants in the study gave us power to detect a 12% difference in screening assuming a baseline rate of 40%, which was in line with estimated rates in the target population when the study was designed.

Subgroup analyses examined outcomes between those who engaged with the intervention versus those who did not. Subgroup analyses for the screening outcome were limited to participants who were unscreened or due for screening in the next year only. All analyses were conducted in SAS 9.2 (SAS Institute Inc., Cary, NC).

Results

Nineteen churches participated in the study (9 comparison, 10 intervention): 12 churches in North Carolina and 7 churches in Michigan. Churches represented four denominations: Baptist, Methodist, African Methodist Episcopal, and Catholic. Initially, seven additional churches were enrolled (four in North Carolina and three in Michigan), but were unable to provide the required number of participants completing the baseline survey. These churches were dropped from the study and did not receive the intervention. Within the participating churches, 955 church members completed the baseline survey. Our final study cohort consisted of 712 participants who also completed follow-up surveys (75% response rate): 374 intervention participants and 338 comparison participants. Final participation across churches ranged from 19 to 72 members. Follow-up survey completers were more likely to be married than noncompleters (56.3% vs. 45.6%, $p = .005$). There were no other statistically significant differences between completers and noncompleters.

Participant Characteristics

Characteristics of the study cohort are shown in Table 1. The average age of the sample was 62.8 years. The majority of participants were female (68.6%) and married/living with a partner (56.3%). This was a highly educated sample, with 40.1% of participants reporting college completion or postgraduate degree. The median income ranged from \$20,000 to \$49,999, and 80.1% reported some form of health insurance. Comparison group participants were more likely than intervention participants to be female ($p = .04$). There were no other statistically significant between-group differences.

Screening Outcomes

At baseline, 73.7% ($n = 349$) of comparison group participants and 75.9% ($n = 284$) of intervention participants

Table 1. Characteristics of ACTS of Wellness Project Study Cohort.

Variable	Entire sample (N = 712)	Comparison group (n = 338)	Intervention (n = 374)	p value ^a
Gender, %				.04
Male	31.4	28.2	34.2	
Female	68.6	71.8	65.8	
Age, mean	62.8	61.8	63.8	.20
Marital status, %				.23
Married/living with partner	56.3	54.0	58.3	
Never married	6.5	7.2	5.9	
Divorced/separated	18.8	22.1	15.9	
Widowed	18.4	16.7	19.9	
Education, %				.29
11th grade or less	6.7	5.4	7.8	
High school graduate/GED	20.3	23.3	17.6	
Trade/beauty/some college	32.9	34.9	31.1	
College graduate	18.7	19.1	18.4	
More than college	21.4	17.3	25.1	
Income (\$), %				.29
<20,000	17.7	15.7	19.5	
20,000-49,999	35.1	36.4	34.0	
50,000-99,999	27.1	28.7	25.7	
100,000+	10.8	9.8	11.8	
Income missing	9.3	9.5	9.1	
Have health insurance, %	80.1	82.5	77.8	.25
Weight group				.89
Normal weight	13.7	11.1	16.0	
Overweight	38.2	39.5	37.0	
Obese I	28.1	27.8	28.3	
Obese II+	20.1	21.6	18.8	
Comorbidities, mean	1.6	1.5	1.6	.18
Had polyps removed, %	33.3	32.2	34.3	.80
IBD (Crohn's or colitis), %	2.4	1.2	3.5	<.0001
Family history of CRC, %	10.7	9.2	12.1	.19
CRC survivor, %	2.3	1.2	3.2	.02
Health status, %				.14
Excellent	5.3	6.3	4.3	
Very good	35.4	30.9	39.4	
Pretty good	47.0	51.4	43.1	
Fair/poor	12.4	11.4	13.2	
CRC screening, %				
Any up-to-date screening	74.9	73.7	75.9	.53
Stool card test in past year	12.5	67.2	67.6	.91
Colonoscopy in past 10 years	67.4	14.5	10.7	.20
Moderate and vigorous recreational physical activity				
MET-hours/week, mean (SD)	8.2 (9.7)	8.7 (9.6)	7.8 (8.7)	.13
Minutes/week MVPA, mean (SD)	100.7 (121.5)	106.5 (114.0)	95.5 (114.4)	.14
≥150 min/week, %	32.0	33.4	30.7	.33

Note. IBD = inflammatory bowel diseases; CRC = colorectal cancer; MET = Metabolic Equivalency Task; MVPA = moderate–vigorous intensity physical activity.

^aAll p values are adjusted for clustering within church.

reported being up-to-date with CRC screening (Table 1). Reported screening rates were higher at follow-up for both groups (+4.7 percentage points for comparison and +6.4 percentage points for intervention), but there were no statistically significant differences between intervention and

comparison groups ($p = .37$). Among participants who were not up-to-date for screening at baseline and/or were due for screening during the intervention period ($n = 189$), 33.0% of intervention and 33.7% of comparison group participants reported receiving a screening in the past year ($p = .35$).

Table 2. Physical Activity Outcomes for Intervention and Comparison Groups.

Physical activity outcome	Comparison group (n = 338)	Intervention (n = 374)	p value ^a	Adjusted p value ^b
MET-hours/week MVPA, mean [95% CI]			.29	.15
Follow-up	8.6 [7.3, 9.9]	7.5 [6.6, 8.3]		
Change	-0.05 [-0.91, 0.80]	-0.30 [-1.27, 0.66]		
Minutes/week MVPA, mean [95% CI]			.42	.22
Follow-up	106.9 [95.2, 118.6]	94.7 [84.6, 104.8]		
Change	0.067 [-8.2, 8.3]	-0.74 [-12.5, 11.0]		
Meeting recommendation of ≥150 minutes/week MVPA, % (change from baseline)			.52	.34
Follow-up	32.0 (+1.4)	28.6 (+2.1)		

Note. CI = confidence interval; MET = Metabolic Equivalency Task; MVPA = moderate-vigorous intensity physical activity.

^aControlling for baseline values and church. ^bAdjusting for gender, body mass index group, and marital status.

Physical Activity Outcomes

Among study completers, baseline MET-hours/week of MVPA was 7.8 (95% CI [6.9, 8.7]) for intervention and 8.7 (95% CI [7.6, 9.8]) for comparison (Table 1); 30.7% of intervention and 33.4% of comparison group participants were meeting PA recommendations at baseline. Follow-up results for each PA measure are shown in Table 2. At follow-up, there were no significant overall differences ($p = .15$) in changes in MVPA for intervention (-0.30 MET-hours/week) versus the comparison group (-0.05 MET-hours/week).

Process Outcomes

Process outcomes for CRC screening and PA, based on participant report of intervention usage on the follow-up survey, are shown in Tables 3 and 4, respectively. Among intervention participants due for screening ($n = 99$), 82.8% recalled receiving the newsletters. About a quarter (25.6%) of participants reported receiving three newsletters. Only 23 (23.2%) of participants due for screening reported that they spoke with a PC. The DVD/decision aid and ACTS-related events were optional intervention components that only 18.2% and 12.1% of unscreened respondents reported attending, respectively. Among all intervention participants, 11% reported participating in exercise programs at their church.

Participants who recalled receiving newsletters ($n = 82$) were more likely to report a past-year screening at follow-up than those who did not (43.9 vs. 17.7, $p = .02$). Among intervention participants, 52.2% of those who recalled speaking with a PC reported a past-year screening at follow-up compared with 32.8% of those who did not speak with a PC, but this difference was not statistically significant ($p = .13$). Watching the ACTS DVD or recalling ACTS events at the church did not appear to have any effect on screening in the past year.

At follow-up, those who participated in exercise programs at their church reported, on average, 11.0 MET-hours/week of adjusted MVPA compared with 6.9 MET-hours/week among those who did not ($p = .05$). Although the *Body & Soul* intervention (comparison group) was intended to focus on fruit

Table 3. Past-Year CRC Screening Among Intervention Participants Eligible for Screening.

Process outcome variables	Screening in past year (%)	p value ^a
Recalled receiving ACTS newsletters		.02
No ($n = 17$)	17.7	
Yes ($n = 82$)	43.9	
Reported number of newsletters received		.83
1 ($n = 7$)	28.6	
2 ($n = 23$)	34.8	
3 ($n = 21$)	61.9	
4 ($n = 6$)	66.7	
More than 4 ($n = 5$)	0.0	
Do not know ($n = 20$)	45.0	
Recalled that newsletters mentioned CRC screening		.07
No ($n = 29$)	34.5	
Yes ($n = 53$)	49.1	
Spoke with a peer counselor		.13
No ($n = 67$)	32.8	
Yes ($n = 23$)	52.2	
Recalled discussing CRC screening with peer counselor		.78
No ($n = 9$)	55.7	
Yes ($n = 14$)	50.0	
Watched DVD with decision aid		.64
No ($n = 81$)	38.3	
Yes ($n = 18$)	44.4	
Recalled ACTS of Wellness events at church		.89
No ($n = 87$)	39.1	
Yes ($n = 12$)	41.7	

Note. CRC = colorectal cancer; ACTS = Action Through Churches in Time to Save Lives. This table only includes intervention participants who were eligible for screening during the intervention period ($n = 99$).

^aAll comparisons are adjusted for baseline values and clustering within churches.

and vegetable promotion, 36% of participants recalled *Body & Soul* events related to PA at their church. This group had significantly higher ($p = .01$) adjusted MVPA levels at follow-up (10.2 MET-hours/week) than those who did not recall events (7.5 MET-hours/week). There was no relationship

Table 4. Physical Activity Rates by Reported Participation in Study Activities.

Process outcome variables	Follow-up MVPA ^a	p value ^b
How many newsletters did you receive? (intervention only)		.28
1 (n = 21)	5.1	
2 (n = 121)	6.7	
3 (n = 83)	8.2	
4 (n = 22)	7.4	
More than 4 (n = 11)	6.9	
Do not know (n = 67)	9.1	
Recalled that newsletters mentioned PA (intervention only)		.29
No (n = 61)	5.4	
Yes (n = 265)	8.0	
Participated in exercise programs at church (intervention only)		.05
No (n = 333)	6.9	
Yes (n = 37)	11.0	
Recalled <i>Body & Soul</i> events related to PA (comparison group only)		.01
No (n = 218)	7.5	
Yes (n = 120)	10.2	

Note. PA = physical activity; MVPA = moderate-vigorous physical activity. ^aMET-hours/week of MVPA adjusted for baseline MVPA. ^bAll comparisons are adjusted for baseline values and clustering within church.

between recall of newsletters and PA at follow-up ($p = .29$). There also was no difference in follow-up MVPA between intervention participants who were up-to-date at baseline and received mostly PA content in their newsletters versus those who were unscreened (data not shown).

Discussion

Overall, our intervention did not increase CRC screening or PA in an urban, African American church population. We did find that unscreened intervention participants who reported reading the newsletters had higher screening rates than those who did not. Those who reported speaking with a PC also had somewhat higher screening rates, but those differences were not statistically significant. Our study is limited by several factors including selection bias, exposure of some comparison group members to PA-focused activities, low implementation of study activities resulting in small numbers for subgroup analyses, and self-reported measures of study implementation.

Participants self-selected for the study and may not reflect the average member of African American churches in the target communities. For example, unscreened individuals may have been less likely to participate in a CRC study. The percentage of participants who were up-to-date with screening at baseline was nearly 13 percentage points higher than national screening rate of 62% among African Americans (Centers for Disease Control and Prevention, 2010). Our sample was also highly educated and had health

insurance (80.1%) so access to care may not have been a major barrier.

As CRC screening rates were high at baseline, most participants received a PA-focused intervention. Some control group members also reported engaging in PA activities related to *Body & Soul*. Individuals who reported participating in church PA programs were more likely to report that they increased their PA, regardless of intervention condition. These findings highlight the need for interventions to not only promote PA and its benefits but to also facilitate structured opportunities for participants to engage in exercise. Interestingly, in WATCH only the tailored print and video intervention had a statistically significant effect on PA (not the lay health advisor intervention). The current study did not result in higher rates of PA for those who read the newsletters, but this may have been because PA was treated as a secondary behavior for those who were up-to-date for screening, whereas in WATCH all behaviors were treated equally. We also learned that promoting fruit and vegetable intake in the control group may have had the unintentional effect of encouraging PA programs. Individuals interested in improving diet were generally also focused on weight loss, and therefore wanted to incorporate PA into programs at control churches. Future studies should expect that addressing one behavior (either diet or exercise) will most likely have an impact on the other as well.

This study was meant to be a more disseminable replication of a previous effective study (WATCH). If this study had been effective, we had planned to prepare the materials for dissemination and further study; however, we would not recommend this study for dissemination at this time given the null findings and implementation issues. Subgroup analyses indicate that those who reported participating in study activities were more likely to get screened or exercise, but implementation of those activities were low overall, which may explain the overall null findings. This is especially notable in relation to church-wide events. During the WATCH intervention, when the study team ran the lay health advisor (i.e., PC) program and required lay health advisors to host events, between 16.5% and 32.5% of people participated (Campbell et al., 2004). For this study, we asked churches to initiate events and run a PC program and only provided technical assistance and support as requested and only about 10% of study participants recalled exercise events at their church. Delivery of newsletters by the study team was the same in both studies and we accordingly saw that that most people (about 75% in WATCH and 87% in the current study) recalled receiving the newsletters.

Compared with WATCH, where lay health advisors were asked to talk to all study participants, we reduced the burden on PCs in the current study by asking them to only talk to people who needed to be screened. This led to more of the target population recalling speaking with a PC (about in the 26% of unscreened individuals in the current study compared with about 10% of all participants in WATCH); however, improvements in screening were similar (about a 20 percentage point difference for those who talked to PCs over those who did not

in both studies). Varying participation in intervention components reflects our implementation strategy. Report of receiving newsletters, which were sent by the research team, was higher than usage of the PC program that was run by the church and required by the research team. Reported participation was lowest for church-wide events that were run by the church and encouraged, but not required by the research team. While we originally thought that giving the churches freedom to choose and implement their own events would improve sustainability and boost involvement, we found that without the necessary support, this approach was unsuccessful. This finding mirrors previous research indicating that a high level of training and support is needed to effectively implement church-based health promotion programs (Allicock et al., 2010).

Based on our findings, we recommend that church-based interventions take an approach more similar to the original WATCH study in order to maintain fidelity and increase the likelihood of an effect. This includes requiring church coordinators to have periodic PC meetings (posttraining) and prescribing a minimum number of church events. Providing a menu of options and additional planned technical assistance would also improve implementation. Findings from the implementation of the *Body & Soul* program, published elsewhere, provide further in-depth discussion of the challenges associated with church-based health promotion programs and suggestions for researchers and practitioners interested in implementation of similar programs (Allicock et al., 2013).

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Note

1. *Body & Soul* components include church-wide nutrition activities such as a kick-off event, forming a project committee,

conducting at least three nutrition events, plus one additional event involving the pastor, and making at least one policy change (e.g., establishing guidelines for the types of foods served at church functions or changing snacks served at youth camps). Additional church-wide activities include hosting guest speakers and cooking demonstrations and taste tests, and providing self-help materials such as a cookbook, video, and educational pamphlets. More information about *Body & Soul* is available on the Research-tested Intervention Programs website (<http://rtips.cancer.gov/rtips/programDetails.do?programId=257161>).

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