

## Original Article

# Factors associated with colorectal cancer screening intent and uptake among adult Non-Hispanic Black men

Charles R Rogers<sup>1</sup>, Roger Figueroa<sup>2</sup>, Ellen Brooks<sup>1</sup>, Ethan M Petersen<sup>1</sup>, Carson D Kennedy<sup>1</sup>, Darrell M Gray II<sup>3</sup>, Michael Sapienza<sup>4</sup>, Man Hung<sup>5</sup>

<sup>1</sup>University of Utah School of Medicine, Department of Family & Preventive Medicine, 375 Chipeta Way, Suite A, Salt Lake, UT 84108, USA; <sup>2</sup>Cornell University, College of Human Ecology, Division of Nutritional Sciences, 244 Garden Avenue, Ithaca, NY 14853, USA; <sup>3</sup>The Ohio State University, College of Medicine, 1590 N High St. Suite 525, Columbus, OH 43201, USA; <sup>4</sup>Colorectal Cancer Alliance, 1025 Vermont Ave. NW, Suite 1066, Washington, DC 20005, USA; <sup>5</sup>College of Dental Medicine, Roseman University of Health Sciences, 10894 South River Front Pkwy, South Jordan, UT 84095, USA

Received August 30, 2021; Accepted November 24, 2021; Epub December 15, 2021; Published December 30, 2021

**Abstract:** Non-Hispanic (NH) Black men in the United States have the lowest five-year colorectal cancer (CRC) survival rate across all racial/ethnic and sex subgroups and are less likely than their NH White counterparts to complete CRC screening. We hypothesized that greater masculinity barriers to medical care (MBMC) would be negatively associated with CRC screening uptake. Employing a survey design, we examined the MBMC scale and other psychosocial factors influencing CRC screening intent and uptake in a sample of 319 NH Black men aged 45 to 75 years residing in Minnesota, Ohio, and Utah. A series of ordinary least squares and logistic regression models were run with intention and uptake as the outcome variable while controlling for various demographic characteristics. Independent variables in all models included average score on the MBMC; CRC screening knowledge, beliefs and values; and barriers to and social support for CRC screening. Social support, marital status, and age were positively associated with CRC screening intention. Increased CRC screening knowledge and older age were associated with a greater likelihood of completing a stool-based screening test for CRC. Fewer masculinity-related and CRC screening barriers were associated with a greater likelihood of undergoing a sigmoidoscopy or colonoscopy. Contrary to our primary hypothesis, lesser MBMC-related perceptions were associated with increased CRC screening uptake among NH Black men. Our findings inform future CRC promotion programs and emphasize the need for multilevel interventions tailored toward this marginalized population to reduce disparities in screening and survival.

**Keywords:** Colonic neoplasms, community-based participatory research, early detection of cancer, health disparities, men's health, surveys and questionnaires

## Introduction

Colorectal cancer (CRC) is the second leading cause of cancer death and third most-diagnosed cancer among both men and women in the United States [1]. CRC incidence is 31% higher in men than in women, while men aged 55 to 74 years have the highest incidence rate across all racial/ethnic and sex subgroups [2-4]. Non-Hispanic (NH) African-American/Black men and women experience a disproportionate burden of CRC, with incidence rates 24% and 19% higher, respectively, than their NH White counterparts [2, 5]. Between 2011 and 2015, CRC incidence rates for NH Black

men and women were 55.2 and 40.7 per 100,000, respectively, compared with 44.6 and 34.2, respectively, for NH White men and women [5].

Between 1990 and 2014, across all racial/ethnic subgroups, one in every 10 new CRC diagnoses occurred in an individual aged under 50 years [6]. Between 1995 and 2014, CRC incidence increased by 2.41% among individuals aged 25 to 29 years [7]. These data demonstrate a trend of increasing incidence of early-onset CRC (EOCRC), defined as CRC diagnosed in a person aged 50 years or younger [8-12]. Compared with NH White men, NH Black men

## Colorectal cancer screening behaviors among Black men

have a higher age-adjusted incidence rate of EOCRC and are diagnosed at an earlier age [6, 13]. Furthermore, higher mortality is observed in NH Black men diagnosed with EOCRC than in their NH White counterparts [13, 14].

For over 25 years, NH Black men have been less likely than NH White men to complete CRC screening [2, 15-19]. A complex interplay of masculinity, racism, and attitudes toward CRC screening contributes to screening inequities among NH Black men [20-28]. Because higher CRC screening completion rates correspond with lower CRC-related morbidity and mortality [2, 22, 29-31], efforts to increase CRC screening uptake among NH Black men in the United States should be a public health priority.

Whether to reduce the recommended age at which to begin CRC screening in NH Blacks has been a matter of debate since 2008 [22, 32, 33]. Although those diagnosed with CRC before age 50 years are more likely to have advanced disease at diagnosis, they are also more likely to have better overall survival than those who are aged 50 or older at diagnosis [34].

The National CRC Roundtable established the 80% in Every Community initiative to focus on increasing CRC screening rates to 80% in every community by 2024 [35]. To achieve this goal, barriers to CRC screening faced by NH Black men require deeper investigation, including examination of psychosocial factors such as knowledge and attitudes, masculinity barriers, medical mistrust, and access to care [28, 36-38]. Accordingly, the purpose of this study was to explore the association of masculinity barriers to medical care (MBMC) constructs developed by the study's first author, along with other psychological factors such as knowledge, attitudes, beliefs, and social support, with CRC screening intention and uptake. The study employed a survey design in a sample of NH Black men aged 45 to 75 years residing in Minnesota, Ohio, and Utah. Our central hypothesis was that greater masculinity barriers to medical care would be negatively associated with CRC screening uptake.

### *Conceptual framework*

A conceptual framework integrating constructs of the Theory of Planned Behavior (TPB) guides this study, coined #CuttingCRC. The TPB posits

that behavior is a function of intention, which is influenced by a person's attitudes and beliefs [39]. Our conceptual framework has been transformed since it was initially proposed, where medical mistrust was hypothesized to be a standalone construct [40]. After conducting 11 focus groups in Minnesota, Ohio, and Utah (to inform development of our team's masculinity barriers to medical care [MBMC] scale [41], followed by 10 cognitive interviews with CRC advocate-survivors (to improve the MBMC scale's face validity) and item review by two experts in NH Black men's health and one survey-methodology expert (to improve the MBMC scale's content validity), revision of the MBMC scale resulted in six factors (Provider Role, Health-related Self-Reliance, Health Problem Minimization, Restrictive Emotionality, Fear of being Perceived as Gay, and Medical Mistrust). **Figure 1** illustrates how the updated MBMC construct, other psychosocial factors, and demographic characteristics (e.g., age, insurance status) may influence CRC screening intention and ultimately uptake among NH Black men.

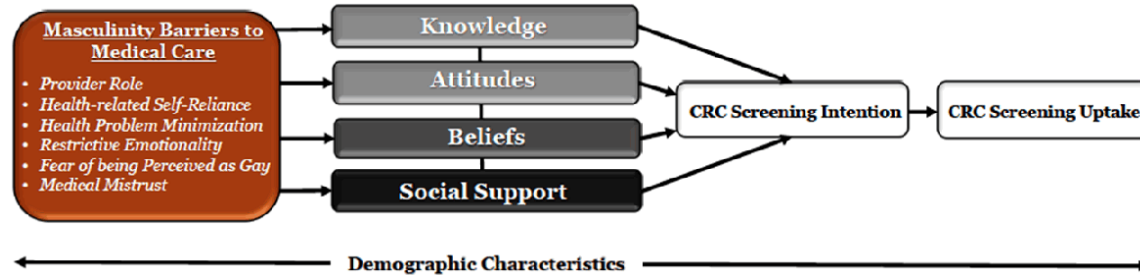
### **Materials and methods**

#### *Study design and samples*

Men were eligible for the study if they (a) self-identified as NH Black; (b) were aged 45 to 75 years; (c) were born in the United States; (d) resided in Minnesota, Ohio, or Utah; (e) understood and spoke English; and (f) had a telephone or computer/tablet with internet access. The University of Utah's institutional review board approved the study protocol prior to data collection.

Between March and December 2020, a convenience-sampling plan was employed online and via 11 barbershops and three churches. From March to October, survey data were collected via the Internet-based survey research tool PsychData. During November and December, data were collected via the Qualtrics online survey platform. Smartphones were primarily used to complete the survey. NH Blacks outpace all demographic groups for smartphone use [42]; moreover, the use of smartphones and computers soared during the COVID-19 pandemic. Additionally, a central website permitted participation by eligible men who did not frequent barbershops.

## Colorectal cancer screening behaviors among Black men



**Figure 1.** Conceptual model of factors influencing CRC uptake among African-American men.

A total of 343 NH Black men completed the online survey (n=208 via PsychData, n=135 via Qualtrics), of whom 319 (93%) met all inclusion criteria after missing data were assessed; 189 surveys were completed on smartphones, 114 on computers or tablets.

### Recruitment

Participants were initially recruited through culturally tailored flyers and handbills shared across social media platforms (e.g., Facebook, Twitter); email listservs; gastroenterology centers; and predominantly NH Black-serving barbershops and churches [40]. Due to unforeseen recruitment challenges stemming from the forced closures of barbershops and churches during the COVID-19 pandemic, in November and December 2020 the research team partnered with the software company Qualtrics to recruit additional participants from sources such as online gaming sites, permission-based online networks, and loyalty web portals.

### Data collection

The survey was housed at CuttingCRC.com. Informed consent was obtained online from all study participants before they started the survey. Participants who completed the survey via PsychData could enter a random drawing for one of five incentives in the form of items often wanted by men. Participants who completed the survey via Qualtrics were compensated through various sources that they agreed upon before entering the survey, including frequent flyer miles, retail-outlet points, and gift cards.

### Measures

We employed the new Masculinity Barriers to Medical Care, Psychosocial Factors, and CRC Screening instrument derived from our previ-

ous, psychometrically sound Male Role Norms, Knowledge, Attitudes, and Perceptions associated with CRC Screening (MKAP-CRCS) survey [43]. We made some modifications to the survey for this study to increase its relevance to our conceptual model (**Figure 1**). First, our new MBMC scale replaced the masculine role-norms questions. This key independent variable was followed by three additional independent variables, namely the knowledge, attitudes, and perceptions sections of the MKAP-CRCS survey, removing items for which  $\alpha$  was less than 0.5 in our previous study [27].

Next, we used two Behavioral Risk Factor Surveillance System (BRFSS) questions to assess our outcome variable, CRC screening uptake: (1) "A blood stool test is a test that may use a special kit at home to determine whether the stool contains blood. Have you ever had this test using a home kit?"; And (2) "Sigmoidoscopy and colonoscopy are exams in which a tube is inserted in the rectum to view the colon for signs of cancer or other health problems. Have you ever had either of these exams?" [44]. Lastly, we included demographic covariates such as age, marital status, educational level, and income, as previous studies by our group and others have found that these factors are related to CRC screening behaviors among NH Black men [22, 45-47]. Additional details regarding both the characteristics and psychometric properties of these items are documented elsewhere [43, 48].

### Data analyses

All analyses were conducted using Stata version 14 (StataCorp, College Station, TX, USA), with statistical significance set at  $P < 0.05$ . Descriptive statistics summarize participants' demographic characteristics and main outcome variables. To explore associations among

## Colorectal cancer screening behaviors among Black men

**Table 1.** Participant and item characteristics

Demographic variables ( <i>n</i> =319)	Summary statistics	
	N	%
<b>Age</b>		
45-49 years	68	21.3
50-55 years	58	18.2
56-64 years	138	43.3
65-75 years	52	16.3
<b>Educational level</b>		
Partial high school	5	1.7
GED or equivalent	8	2.7
High school diploma	40	13.6
Bachelor's degree	77	26.1
Partial college (at least one year)	56	19.0
Two year college/associate degree	61	20.7
Master's/advanced degree	48	16.3
<b>Marital Status</b>		
Married	134	45.4
Other	161	54.6
<b>State</b>		
Minnesota	52	17.39
Ohio	139	46.49
Utah	105	35.12
<b>Sexual orientation</b>		
Heterosexual/straight	278	94.24
Homosexual/gay	10	3.39
Bisexual	5	1.69
<b>Household income</b>		
Less than \$15,000	21	7.24
\$15,000-\$24,999	21	7.24
\$25,000-\$34,999	37	12.76
\$35,000-\$49,999	39	13.45
\$50,000-\$74,999	50	17.24
More than \$75,000	122	42.07
<b>Work</b>		
Full-time	169	57.29
Part-time	27	9.15
Laid off	15	5.08
Retired	84	28.47
<b>Health insurance</b>		
Yes	274	92.88
No	21	7.12
<b>CRC diagnosis</b>		
Yes	7	2.38
No	287	97.62
<b>Access to PCP</b>		
Yes	259	87.50
No	36	12.16

the proposed constructs (see [Supplementary Table 1](#)), we ran a series of ordinary least squares (OLS) and logistic regression models with intention and uptake as the outcome variables while controlling for various demographic characteristics. CRC screening intention was the outcome variable in the OLS model, whereas CRC screening uptake was the outcome variable in the logistic regression models. The independent variables in all models included the average score of the following constructs: MBMC (24 items), knowledge about CRC screening (6 items), beliefs and values about CRC screening (5 items), barriers to CRC screening (4 items), and social support for CRC screening (4 items).

### Results

#### *Sample characteristics*

Study participants were 319 NH Black men residing in Minnesota (*n*=52), Ohio (*n*=139), and Utah (*n*=105). Most were aged between 56 and 64 years (43.3%), married (45.4%), and had at least a high school diploma. Most of the study sample (94.24%) identified as heterosexual. Many participants had an income greater than \$75,000 (42.07%) and were employed full-time (57.29%). **Table 1** presents additional descriptive information and frequencies for the key independent and dependent outcomes.

#### *Main findings*

**Table 2** summarizes findings for the OLS model on CRC screening intention; **Tables 3** and **4** summarize findings for

## Colorectal cancer screening behaviors among Black men

Doctor's visit in last 12 months		
Yes	256	86.49
No	39	13.18
CRC screening advice		
Yes	112	38.10
No	182	61.90
Religiosity		
Christian	230	78.50
Other (i.e., atheist, Muslim)	63	21.51
Smoking		
Daily	65	22.81
Less than daily	21	7.37
Not at all	199	69.82
Family history of cancer		
Yes	34	11.60
No	145	49.49
Unsure	114	38.91
Family history of CRC		
Yes	30	10.17
No	232	78.64
Unsure	33	38.91
Independent variables	Summary statistics	
	<i>M</i>	<i>SD</i>
Masculinity Barriers to Medical Care	3.52	0.35
Knowledge about CRC screening	5.06	1.23
Beliefs and values about CRC screening	3.76	0.99
Barriers to CRC screening	4.31	0.88
Social support for CRC screening	3.75	1.02
Dependent variables	Summary statistics	
	<i>M or N</i>	<i>SD or %</i>
Do you plan to obtain CRC screening in the future?		
Ranges from No (1) to within 6 months	4.49	1.54
Have you ever had a blood stool test using a home kit?		
Yes	93	32.98
No	189	67.02
Have you ever had a sigmoidoscopy or colonoscopy?		
Yes	167	59.22
No	115	40.78

PCP, primary care physician. Note: Because of missing data, some categories may not sum to 100%.

the logistic regression models on CRC screening uptake.

In summary, study participants with better social support and those who were not married had greater intent to be screened for CRC sooner than later ( $\beta=0.21$ ,  $P=0.04$  and ( $\beta=-0.48$ ,  $P=0.02$ , respectively). In adjusted models, a positive unit change in knowledge about

CRC screening ( $OR=1.30$ ,  $P=0.03$ ) and chronological age ( $OR=1.41$ ,  $P=0.03$ ) were associated with increased likelihood of taking a blood stool test at home. Lastly, in adjusted models, a positive unit change in average MBMC score was associated with more than three times the likelihood of taking a sigmoidoscopy or colonoscopy exam ( $OR=3.56$ ,  $P=0.01$ ), while a positive unit change in the average score for CRC screening barriers was associated with more than one-half the likelihood of taking a sigmoidoscopy and colonoscopy ( $OR=1.60$ ,  $P=0.02$ ). Chronological age was also a statistically significant covariate in this last adjusted model ( $OR=1.80$ ,  $P=0.01$ ).

### Discussion

The purpose of this study was to investigate whether the MBMC scale developed by the first author, together with other psychological factors, including knowledge, attitudes, beliefs, and social support, was associated with CRC screening intention and uptake in a sample of NH Black men living in Minnesota, Ohio, and Utah. Our results indicated that social support, and chronological age were positively associated with CRC screening intention, while marital status was inversely associated with screening intention. Increased knowledge about CRC

screening and chronological age was associated with a greater likelihood of completing a stool-based CRC screening test. Fewer masculinity and CRC screening barriers were associated with a greater likelihood of undergoing a sigmoidoscopy or colonoscopy. These findings support our hypothesis that greater masculinity barriers to care are negatively associated with CRC screening uptake.

## Colorectal cancer screening behaviors among Black men

**Table 2.** Associations between factors in Rogers' conceptual model and CRC screening intention (N=253)

Variables	Model 1 (R <sup>2</sup> =0.03)			Model 2 (R <sup>2</sup> =0.05)		
	B	95% CI	P> z	B	95% CI	P> z
Masculinity barriers to medical care	0.61	-0.01, 1.23	0.05	0.60	-0.00, 1.22	0.05
Knowledge about CRC screening	0.06	-0.09, 0.22	0.40	0.08	-0.07, 0.24	0.29
Beliefs and values about CRC screening	-0.00	-0.24, 0.22	0.94	0.01	-0.21, 0.25	0.88
Barriers to CRC screening	-0.06	-0.33, 0.21	0.66	-0.07	-0.36, 0.20	0.58
Social support for CRC screening	0.12	-0.07, 0.32	0.22	0.21*	0.00, 0.42	0.04
Age	--	--	--	-0.03	-0.23, 0.16	0.73
Marital status	--	--	--	-0.48*	-0.89, -0.07	0.02
Educational status	--	--	--	0.02	-0.11, 0.16	0.73
Constant	1.77	-0.29, 3.83	0.09	1.61	-0.47, 3.69	0.12

Note: B=Regression Coefficients, CI=Confidence Interval, \*P<0.05. Model 1 is unadjusted, and Model 2 is adjusted for covariates.

**Table 3.** Associations between factors in Rogers' conceptual model and CRC screening uptake (via blood stool test using a home kit)

Variables	Model 1 (Pseudo R <sup>2</sup> =0.01)			Model 2 (Pseudo R <sup>2</sup> =0.04)		
	OR	95% CI	P> z	OR	95% CI	P> z
Masculinity barriers to medical care						
Yes (1) vs. No (0)	0.91	0.38, 2.16	0.83	0.83	0.34, 2.01	0.68
Knowledge about CRC screening						
Yes (1) vs. No (0)	1.29*	1.01, 1.65	0.03	1.30*	1.01, 1.66	0.03
Beliefs and values about CRC screening						
Yes (1) vs. No (0)	0.96	0.69, 1.32	0.81	1.04	0.74, 1.45	0.81
Barriers to CRC screening						
Yes (1) vs. No (0)	0.95	0.65, 1.39	0.80	0.89	0.59, 1.33	0.58
Social support for CRC screening						
Yes (1) vs. No (0)	0.81	0.62, 1.08	0.65	0.85	0.63, 1.15	0.31
Age						
Yes (1) vs. No (0)	--	--	--	1.41*	1.04, 1.89	0.02
Marital status						
Yes (1) vs. No (0)	--	--	--	0.76	0.42, 1.38	0.37
Educational status						
Yes (1) vs. No (0)	--	--	--	0.89	0.72, 1.09	0.26

OR, odds ratio; CI, confidence interval, \*P<0.05. Note: Model 1 is unadjusted. Model 2 is adjusted for covariates.

Social support and being unmarried were significantly associated with CRC screening intention in our adjusted models. This finding may be unique to NH Black men and may relate to COVID-19 stressors in play when the data were collected. It merits further investigation, as it contradicts prior studies demonstrating a strong association among partner concordance, marital status, and CRC screening participation favoring married individuals [49-54]. This association has been extensively demonstrated among White populations and has also been

shown among both insured and uninsured NH Black cohorts [55, 56]. Prior studies have also found that unmarried patients have a higher risk than married patients of a diagnosis of advanced-stage cancer, including CRC [57, 58]. Chen and colleagues (2021) found in their large Surveillance, Epidemiology, and End Results (SEER) Program-focused study that married patients had greater CRC survival than unmarried patients; they concluded that marriage may play a greater protective role in cancer-specific survival among men than among

## Colorectal cancer screening behaviors among Black men

**Table 4.** Associations between factors in Rogers' conceptual model and CRC screening uptake (via sigmoidoscopy or a colonoscopy)

Variables	Model 1 (Pseudo R <sup>2</sup> =0.10)			Model 2 (Pseudo R <sup>2</sup> =0.15)		
	OR	95% CI	P> z	OR	95% CI	P> z
Masculinity barriers to medical care						
Yes (1) vs. No (0)	3.83*	1.56, 9.43	0.01	3.56*	1.41, 8.99	0.01
Knowledge about CRC screening						
Yes (1) vs. No (0)	1.07	0.85, 1.34	0.52	1.02	0.81, 1.28	0.84
Beliefs and values about CRC screening						
Yes (1) vs. No (0)	0.71*	0.51, 1.00	0.05	0.74	0.51, 1.05	0.09
Barriers to CRC screening						
Yes (1) vs. No (0)	1.82*	1.23, 2.68	0.01	1.60*	1.06, 2.41	0.02
Social support for CRC screening						
Yes (1) vs. No (0)	1.26	0.95, 1.68	0.10	1.16	0.85, 1.58	0.34
Age						
Yes (1) vs. No (0)	--	--	--	1.80*	1.33, 2.43	0.01
Marital status						
Yes (1) vs. No (0)	--	--	--	1.51	0.82, 2.78	0.17
Educational status						
Yes (1) vs. No (0)	--	--	--	1.10	0.89, 1.36	0.35

OR, odds ratio; CI, confidence interval, \*P<0.05. Note: Model 1 is unadjusted. Model 2 is adjusted for covariates.

women, a finding similar to that of Hanske et al. (2016) [59, 60]. Future health promotion and interventional studies should continue to consider the complex interplay of social support and spousal influence on increasing both CRC screening intention and completion among NH Black men to stimulate earlier CRC diagnosis and better survival [41, 61].

Positive unit changes in both age and CRC screening knowledge corresponded to a greater likelihood of completing at-home CRC screening tests. Chronological age was a statistically significant covariate, with NH Black men more likely to have the intention to complete CRC screening as they got older. This finding is consistent with previous literature focused on CRC screening intent among men both older and younger than the previously recommended screening age of 50 [27, 62]. Additionally, several previous studies have found that NH Black men who are more knowledgeable about CRC screening are more likely to be screened [37, 63, 64]. While CRC screening rates for NH Black men are relatively low [2, 18], those with more exposure to CRC-relevant print materials, educational pamphlets, commercials, and billboards are more likely to complete colonoscopies and other early-detection CRC screening tests [41, 65].

Our findings complement those of studies by Greaney et al. (2014) and Seef et al. (2004), which found that increased education and awareness efforts by public health professionals and institutions, including primary care physicians, can increase the likelihood of at-home CRC screening among NH Black men [62, 66]. Our results also corroborate the findings of Joseph et al. (2012) that older NH Black men have higher completion rates than younger men for in-home blood-stool CRC screening tests, possibly due to primary care physician recommendations, positive attitudes toward CRC screening, and familial/social support [52, 62, 67-70].

Findings from numerous studies suggest that systemic and interpersonal racism may differentially influence CRC screening rates among NH Black men aged 45 years and older compared with their counterparts aged under 45 years [20, 23, 24, 52, 71]. Nevertheless, this phenomenon merits further exploration. As EO CRC incidence continues to increase at alarming rates [9, 11, 72], public health professionals and advocacy organizations have a responsibility to engage in efforts to decrease the disproportionate CRC morbidity and mortality affecting NH Black men by encouraging them to learn about CRC screening (including

## Colorectal cancer screening behaviors among Black men

at-home screening exams) at a younger age, as well as about key potential and proven CRC risk factors (e.g., high-fructose corn syrup consumption, sedentary behavior, smoking, stress, unhealthy cooking methods) [2, 73].

Our results indicate that each positive unit change in average MBMC score was associated with more than three times the likelihood of undergoing a sigmoidoscopy or colonoscopy. Aligning with our central hypothesis, lesser masculinity barriers to medical care were associated increased with CRC screening uptake. From a sociocultural perspective, traditional hegemonic masculinity has been found to strongly influence men's health-seeking behaviors and completion of physical examinations [74-76]. A decreased willingness to engage in CRC screenings has been associated with strong endorsement of masculine role norms, including "being strong," self-reliance, and preserving heterosexual authority [36, 77-79].

Conversely, masculine identity has been negatively correlated with adoption of healthcare-seeking and positive health behaviors among NH Black men [52, 80-82]. Innately invasive and potentially affecting an individual's view of his sexuality, sigmoidoscopy and colonoscopy examinations can create feelings of vulnerability that conflict with deeply rooted ideals of what it means to be a man [76, 78]. Reinforcing this idea, Heslin et al. (2008) showed that, in a sample of 19,410 racially diverse men aged 45 years and older, men who identified as gay or bisexual were 67% more likely to engage in CRC screenings [83]. This potentially presents a considerable barrier for heterosexual men to overcome in order to seek these crucial preventive health screenings. Further research is required to learn how best to overcome this barrier and increase colonoscopy uptake among NH Black men, who are often likely to refuse this procedure despite its necessity to examine polyps that develop deeper in the colon [6, 84, 85].

In our adjusted models, fewer CRC screening barriers-demonstrated by a positive unit change in the average score for CRC screening barriers-were associated with more than one-half of the likelihood of completing a sigmoidoscopy or colonoscopy. Prior literature extensively describes the multilevel barriers to CRC screening completion among NH Black men [85-89],

including patient-level barriers such as fear, cost, lack of knowledge, and lack of time [74, 85, 86, 90]. The most predominant barriers often reported among NH Black men include fear of invasion or pain during a colonoscopy, lack of knowledge about their elevated risk for CRC and the benefits of screening, and fear of a CRC diagnosis [74, 85, 86, 91].

Our results also confirmed the importance of CRC awareness, as increased knowledge was associated with a higher likelihood of completing an at-home stool-based CRC screening test. Although the strongest predictor of CRC screening is physician recommendation [85, 89], physicians are one-third less likely to recommend CRC screening to NH Blacks than to NH Whites [85]. More health professionals recommending CRC stool tests to NH Black patients could increase the proportion of cases caught when the disease is "treatable and beatable". Lower income also corresponds to a lower likelihood of being recommended for screening among NH Blacks [85]. Given the low rates of CRC screening among NH Black men [2, 15-19], our results reiterate the importance of addressing the systemic and multilevel barriers to CRC screening with approaches tailored towards NH Black men.

EOCRC incidence has doubled over the past two decades and is predicted to increase by 28% to 46% by 2030 among those aged 35 to 49 years, including NH Black men [8]. Because it is estimated that by 2030 CRC will be the number one cause of cancer death in the 20 to 49 age group [92], and because NH Blacks experience nearly double the rate of EOCRC as NH Whites [93], the recent endorsement by the U.S. Preventive Services Task Force (USPSTF) of CRC screening utilization beginning at age 45 is a vital effort [94]. This decision emerges as even more critical considering the finding by Sehgal et al. (2021) that colonoscopy uptake between the ages of 45 to 49 and 50 to 54 years resulted in significant decreases in CRC incidence compared with no colonoscopy [95].

It has been suggested that unless screening capacity is also expanded, implementation of the revised USPSTF recommendations may only intensify existing screening and outcome inequities among underserved groups, including but not limited to NH Black men [96]. For this reason, although colonoscopy is the "gold



## Colorectal cancer screening behaviors among Black men

standard” for CRC screening, efforts to increase screening rates among NH Black men-in addition to encompassing culturally targeted campaigns and provider education to increase recommendations for CRC screening to NH Black men-should include interventions focused on increasing the uptake of stool-based CRC testing.

Our findings are valuable for informing interventions, CRC activist organizations, and health promotion studies focused on increasing rates of early-detection CRC screening among NH Black men. However, the study’s limitations should be considered. First, our findings may not be generalizable to a larger population of NH Black men because we used a convenience-sampling plan and study participation was limited to men living in Minnesota, Ohio, and Utah. Moreover, the COVID-19 pandemic did not permit our planned in-person data collection efforts via barbershops for this hypothesis-generating study, so a larger confirmatory study is warranted as recommended by Hackshaw (2008) [97]. Notwithstanding the historical exclusion of NH Black men from health and medical research and their continuing underrepresentation in such research, we implemented a suitable strategy to engage and recruit participants in our sample, despite extensive COVID-19-related challenges. Secondly, several outcome measures were used as composite variables and scales were drawn from sources that have yet to test their validity. Nevertheless, creating composite scores was the most effective strategy for dealing with highly correlated individual data sets, as these were conceptually developed to denote theoretically relevant concepts in this area of inquiry.

### Conclusion

Although the overall annual rate of CRC diagnosis has been decreasing nationally since the mid-1980s, NH Black men continue to have the highest mortality rate from CRC of any ethnic group in the United States. At the same time, early-detection CRC screening has been demonstrated to reduce CRC mortality. Broader endorsement of early-detection screening, combined with consideration of the facilitators of CRC screening intent and uptake in NH Black men identified in our study, may reduce the disproportionate CRC mortality rate among NH Black men. Specifically, we observed that

increasing age, having social support, and being unmarried increased CRC screening intent among NH Black men aged 45 to 75 years, while screening knowledge and chronological age were associated with a greater likelihood of completing a stool-based screening test for CRC and fewer masculinity-related barriers were correlated with a greater probability of undergoing a sigmoidoscopy or colonoscopy. Considering the recent USPSTF recommendation that routine CRC screening begin at age 45 years, together with the fact that the 5-year survival rate for localized (i.e., stage I or II) CRC is 90%, interventional research is warranted that considers the critical role of our findings, lifestyle factors, and social determinants in enabling CRC screening uptake and reducing NH Black men’s risk of dying from this destructive yet preventable disease.

### Acknowledgements

The authors extend gratitude to the participants who made the study possible and to Eleanor Mayfield, ELS, for editorial assistance. The successful implementation of this study would also not have been possible without support from Ace of Fades Barbershop, A Cut Above the Rest Barbershop, Calvary Baptist Church, DAPD, D-Brand Designs, Everybody’s Hair Salon, E’Voluer Barber Studio, Fades of Gray Barbershop, Final Cut Sports Barbershop, Oohs & Ahs Barbershop, Second Baptist Church, Set It Off Barber Styling, and The Point Church, Urban Touch Barbers, and Wilson’s Image Barbershop. The authors acknowledge financial support from 5 For the Fight and the Huntsman Cancer Institute; the V Foundation for Cancer Research; the Research Foundation of the American Society of Colon and Rectal Surgeons; and the National Cancer Institute (Grant K01CA234319), an entity of the National Institutes of Health (NIH). The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH, 5 For the Fight, V Foundation for Cancer Research, Huntsman Cancer Institute, the Research Foundation of the American Society of Colon and Rectal Surgeons, or the University of Utah.

### Disclosure of conflict of interest

Although unrelated to this study, Dr. Charles R. Rogers offers scientific input to research studies through an investigator services agreement

## Colorectal cancer screening behaviors among Black men

between the University of Utah and Exact Sciences.

**Address correspondence to:** Dr. Charles R Rogers, University of Utah School of Medicine, Department of Family & Preventive Medicine, 375 Chipeta Way, Suite A, Salt Lake, UT 84108, USA. Tel: 801-581-5752; E-mail: Charles.Rogers@utah.edu

### References

- [1] Siegel RL, Miller KD, Fuchs HE and Jemal A. Cancer statistics, 2021. *CA Cancer J Clin* 2021; 71: 7-33.
- [2] American Cancer Society (ACS). Colorectal cancer facts & figures 2020-2022. Atlanta: American Cancer Society; 2020.
- [3] Murphy G, Devesa SS, Cross AJ, Inskip PD, McGlynn KA and Cook MB. Sex disparities in colorectal cancer incidence by anatomic subsite, race, and age. *Int J Cancer* 2011; 128: 1668-1675.
- [4] Siegal RL, Miller KD, Sauer AG, Fedewa SA, Butterly LF, Anderson JC and Jemal A. Colorectal cancer statistics, 2020. *CA Cancer J Clin* 2020; 70: 145-164.
- [5] DeSantis CE, Miller KD, Sauer AG, Jemal A and Siegel RL. Cancer statistics for African Americans, 2019. *CA Cancer J Clin* 2019; 69: 211-233.
- [6] Augustus GJ and Ellis NA. Colorectal cancer disparity in African Americans: risk factors and carcinogenic mechanisms. *Am J Pathol* 2018; 188: 291-303.
- [7] Sung H, Siegel RL, Rosenberg PS and Jemal A. Emerging cancer trends among young adults in the USA: analysis of a population-based cancer registry. *Lancet Public Health* 2019; 4: e137-e147.
- [8] Bailey CE, Hu CY, You YN, Bednarski BK, Rodriguez-Bigas MA, Skibber JM, Cantor SB and Chang GJ. Increasing disparities in the age-related incidences of colon and rectal cancers in the United States, 1975-2010. *JAMA Surg* 2015; 150: 17-22.
- [9] Kasi PM, Shahjehan F, Cochuyt JJ, Li Z, Colibaseanu DT and Merchea A. Rising proportion of young individuals with rectal and colon cancer. *Clin Colorectal Cancer* 2019; 18: e87-e95.
- [10] Murphy CC, Singal AG, Baron JA and Sandler RS. Decrease in incidence of young-onset colorectal cancer before recent increase. *Gastroenterology* 2018; 155: 1716-1719, e4.
- [11] Siegel RL, Fedewa SA, Anderson WF, Miller KD, Ma J, Rosenberg PS and Jemal A. Colorectal cancer incidence patterns in the United States, 1974-2013. *J Natl Cancer Inst* 2017; 109: djw322.
- [12] Siegel RL, Jemal A and Ward EM. Increase in incidence of colorectal cancer among young men and women in the United States. *Cancer Epidemiol Biomarkers Prev* 2009; 18: 1695-1698.
- [13] Rahman R, Schmaltz C, Jackson CS, Simoes EJ, Jackson-Thompson J and Ibdah JA. Increased risk for colorectal cancer under age 50 in racial and ethnic minorities living in the United States. *Cancer Med* 2015; 4: 1863-1870.
- [14] Holowatyj AN, Ruterbusch JJ, Rozek LS, Cote ML and Stoffel EM. Racial/ethnic disparities in survival among patients with young-onset colorectal cancer. *J Clin Oncol* 2016; 34: 2148-2156.
- [15] Lansdorp-Vogelaar I, Kuntz KM, Knudsen AB, van Ballegooijen M, Zauber AG and Jemal A. Contribution of screening and survival differences to racial disparities in colorectal cancer rates. *Cancer Epidemiol Biomarkers Prev* 2012; 21: 728-736.
- [16] Klabunde CN, Cronin KA, Breen N, Waldron WR, Ambs AH and Nadel MR. Trends in colorectal cancer test use among vulnerable populations in the United States. *Cancer Epidemiol Biomarkers Prev* 2011; 20: 1611-1621.
- [17] Nadel MR, Blackman DK, Shapiro JA and Seef LC. Are people being screened for colorectal cancer as recommended? Results from the National Health Interview Survey. *Prev Med* 2002; 35: 199-206.
- [18] National Cancer Institute. Cancer trends progress report. 2020.
- [19] Shapiro JA, Klabunde CN, Thompson TD, Nadel MR, Seeff LC and White A. Patterns of colorectal cancer test use, including CT colonography, in the 2010 National Health Interview Survey. *Cancer Epidemiol Biomarkers Prev* 2012; 21: 895-904.
- [20] Atakere D and Baker T. Early cancer detection behaviours among black males. *J Mens Health* 2018; 14: e3-e13.
- [21] Green PM and Kelly BA. Colorectal cancer knowledge, perceptions, and behaviors in African Americans. *Cancer Nurs* 2004; 27: 206-215.
- [22] Kwaan MR and Jones-Webb R. Colorectal cancer screening in Black men: recommendations for best practices. *Am J Prev Med* 2018; 55 Suppl 1: S95-S102.
- [23] Muthukrishnan M, Arnold LD and James AS. Patients' self-reported barriers to colon cancer screening in federally qualified health center settings. *Prev Med Rep* 2019; 15: 100896.
- [24] Powell W, Adams LB, Cole-Lewis Y, Agyemang A and Upton RD. Masculinity and race-related factors as barriers to health help-seeking

## Colorectal cancer screening behaviors among Black men

- among African American men. *J Behav Med* 2016; 42: 150-163.
- [25] Rawl SM, Dickinson S, Lee JL, Roberts JL, Teal E, Baker LB, Kianersi S and Haggstrom DA. Racial and socioeconomic disparities in cancer-related knowledge, beliefs, and behaviors in Indiana. *Cancer Epidemiol Biomarkers Prev* 2019; 28: 462-470.
- [26] Rogers CR, Rogers TN, Matthews P, Le Duc N, Zickmund S, Powell W, Thorpe RJ Jr, McKoy A, Davis FA, Okuyemi K, Paskett ED and Griffith DM. Psychosocial determinants of colorectal cancer screening uptake among African-American men: understanding the role of masculine role norms, medical mistrust, and normative support. *Ethn Health* 2020; [Epub ahead of print].
- [27] Rogers CR, Goodson P, Dietz LR and Okuyemi KS. Predictors of intention to obtain colorectal cancer screening among African American men in a state fair setting. *Am J Mens Health* 2018; 12: 851-862.
- [28] Rogers CR and Goodson P. Male role norms, knowledge, attitudes, and perceptions of colorectal cancer screening among young adult African American men. *Front Public Health* 2014; 2: 252.
- [29] Edwards BK, Ward E, Kohler BA, Ehemana C, Zauber AG, Anderson RN, Jemal A, Schymura MJ, Lansdorp-Vogelaar I, Seeff LC, van Balle-gooyen M, Goede SL and Ries LA. Annual report to the nation on the status of cancer, 1975-2006, featuring colorectal cancer trends and impact of interventions (risk factors, screening, and treatment) to reduce future rates. *Cancer* 2010; 116: 544-573.
- [30] Naishadham D, Lansdorp-Vogelaar I, Siegel R, Cokkinides V and Jemal A. State disparities in colorectal cancer mortality patterns in the United States. *Cancer Epidemiol Biomarkers Prev* 2011; 20: 1296-1302.
- [31] Siegel RL, Sahar L, Robbins A and Jemal A. Where can colorectal cancer screening interventions have the most impact? *Cancer Epidemiol Biomarkers Prev* 2015; 24: 1151-1156.
- [32] Carethers JM. Screening for colorectal cancer in African Americans: determinants and rationale for an earlier age to commence screening. *Dig Dis Sci* 2015; 60: 711-721.
- [33] Mannucci A, Zuppardo RA, Rosati R, Leo MD, Perea J and Cavestro GM. Colorectal cancer screening from 45 years of age: thesis, antithesis, and synthesis. *World J Gastroenterol* 2019; 25: 2565-2580.
- [34] Abdelsattar ZM, Wong SL, Regenbogen SE, Jomaa DM, Hardiman KM and Hendren S. Colorectal cancer outcomes and treatment patterns in patients too young for average-risk screening. *Cancer* 2016; 122: 929-934.
- [35] National Colorectal Cancer Roundtable. Achieving 80% colorectal cancer screening rates in every community. 80% in every community. 2019.
- [36] Courtenay WH. Constructions of masculinity and their influence on men's well-being: a theory of gender and health. *Soc Sci Med* 2000; 50: 1385-401.
- [37] Daniel CL, Gilreath K and Keyes D. Colorectal cancer disparities beyond biology: screening, treatment, access. *Front Biosci (Landmark Ed)* 2017; 22: 465-478.
- [38] Hammond WP. Psychosocial correlates of medical mistrust among African American men. *Am J Community Psych* 2010; 45: 87-106.
- [39] Ajzen I and Fishbein M. Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice Hall Publishing; 1930.
- [40] Rogers CR, Okuyemi K, Paskett ED, Thorpe RJ Jr, Rogers TN, Hung M, Zickmund S, Riley C and Fetters MD. Study protocol for developing #CuttingCRC: a barbershop-based trial on masculinity barriers to care and colorectal cancer screening uptake among African-American men using an exploratory sequential mixed-methods design. *BMJ Open* 2019; 9: e030000.
- [41] Rogers CR, Matthews P, Xu L, Boucher K, Riley C, Huntington M, Le Duc N, Okuyemi KS and Foster MJ. Interventions for increasing colorectal cancer screening uptake among African-American men: a systematic review and meta-analysis. *PLoS One* 2020; 15: e0238354.
- [42] The Nielsen Company. Multifaceted connections: African-American media usage outpaces across platforms. 2015.
- [43] Rogers CR, Goodson P and Obidike OJ. Measuring factors associated with colorectal cancer screening among young adult African American men: a psychometric study. *J Immigr Minor Health* 2016; 20: 101-106.
- [44] Centers for Disease Control and Prevention (CDC). Behavioral risk factor surveillance system survey data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2018.
- [45] Earl V, Beasley D, Ye C, Halpin SN, Gauthreaux N, Escoffery C and Chawla S. Barriers and facilitators to colorectal cancer screening in African-American men. *Dig Dis Sci* 2021; [Epub ahead of print].
- [46] Gimeno García AZ. Factors influencing colorectal cancer screening participation. *Gastroenterol Res Pract* 2012; 2012: 483417.
- [47] Rogers CR, Goodson P and Foster MJ. Factors associated with colorectal cancer screening among younger African American men: a systematic review. *J Health Dispar Res Pract* 2015; 8: 133-156.

## Colorectal cancer screening behaviors among Black men

- [48] Rogers CR, Brooks E, Petersen E, Campanelli P, Figueroa R, Kennedy C, Thorpe RJ Jr and Levant RF. Psychometric properties and analysis of the masculinity barriers to medical care scale among Black, Indigenous, and White Men in the U.S. *Am J Mens Health* 2021; 15: 15579883211049033.
- [49] El-Haddad B, Dong F, Kallail KJ, Hines RB and Ablah E. Association of marital status and colorectal cancer screening participation in the USA. *Colorectal Dis* 2015; 17: 0108-0114.
- [50] Gram MA, Therkildsen C, Clarke RB, Andersen KK, Mørch LS and Tybjerg AJ. The influence of marital status and partner concordance on participation in colorectal cancer screening. *Eur J Public Health* 2021; 3: 340-346.
- [51] Power E, Miles A, von Wagner C, Robb K and Wardle J. Uptake of colorectal cancer screening: system, provider and individual factors and strategies to improve participation. *Future Oncol* 2009; 5: 1371-1388.
- [52] Rogers CR, Mitchell JA, Franta GJ, Foster MJ and Shires D. Masculinity, racism, social support, and colorectal cancer screening uptake among African American men: a systematic review. *Am J Mens Health* 2017; 11: 1486-1500.
- [53] van Jaarsveld CH, Miles A, Edwards R and Wardle J. Marriage and cancer prevention: does marital status and inviting both spouses together influence colorectal cancer screening participation? *J Med Screen* 2006; 13: 172-176.
- [54] von Euler-Chelpin M, Brasso K and Lynge E. Determinants of participation in colorectal cancer screening with faecal occult blood testing. *J Public Health (Oxf)* 2010; 32: 395-405.
- [55] Nguyen NT, Savoy EJ, Reitzel LR, Nguyen MH, Wetter DW, Reese-Smith J and McNeill LH. Diet, Alcohol use, and colorectal cancer screening among Black church-goers. *Health Behav Policy Rev* 2017; 4: 118-128.
- [56] Patel K, Hargreaves M, Liu J, Kenerson D, Neal R, Takizala Z, Beard K, Pinkerton H, Burrell M and Blot B. Factors influencing colorectal cancer screening in low-income African Americans in Tennessee. *J Community Health* 2012; 37: 673-679.
- [57] Aizer AA, Chen MH, McCarthy EP, Mendu ML, Koo S, Wilhite TJ, Graham PL, Choueiri TK, Hoffman KE, Martin NE, Hu JC and Nguyen PL. Marital status and survival in patients with cancer. *J Clin Oncol* 2013; 31: 3869-3876.
- [58] Greenberg ER, Chute CG, Stukel T, Baron JA, Freeman DH, Yates J and Korson R. Social and economic factors in the choice of lung cancer treatment. a population-based study in two rural states. *N Engl J Med* 1988; 318: 612-617.
- [59] Chen ZH, Yang KB, Zhang YZ, Wu CF, Wen DW, Lv JW, Zhu GL, Du XJ, Chen L, Zhou GQ, Liu Q, Sun Y, Ma J, Xu C and Lin L. Assessment of modifiable factors for the association of marital status with cancer-specific survival. *JAMA Netw Open* 2021; 4: e2111813.
- [60] Hanske J, Meyer CP, Sammon JD, Choueiri TK, Menon M, Lipsitz SR, Noldus J, Nguyen PL, Sun M and Trinh QD. The influence of marital status on the use of breast, cervical, and colorectal cancer screening. *Prev Med* 2016; 89: 140-145.
- [61] Rogers CR, Matthews P, Brooks E, De Luc N, Washington C, McKoy A, Edmondson A, LaJune L and Fetters MD. Barriers to and facilitators of recruitment of adult African American men for colorectal cancer research: an instrumental exploratory case study. *JCO Oncol Pract* 2021; 17: e686-e694.
- [62] Greaney ML, Puleo E, Sprunck-Harrild K, Syngal S, Suarez EG and Emmons KM. Changes in colorectal cancer screening intention among people aged 18-49 in the United States. *BMC Public Health* 2014; 14: 901.
- [63] Emmons K, Puleo E, McNeill LH, Bennett G, Chan S and Syngal S. Colorectal cancer screening awareness and intentions among low income, sociodemographically diverse adults under age 50. *Cancer Causes Control* 2008; 19: 1031-1041.
- [64] Winterich JA, Quandt SA, Grzywacz JG, Clark P, Dignan M, Stewart JH and Arcury TA. Men's knowledge and beliefs about colorectal cancer and 3 screenings: education, race, and screening status. *Am J Health Behav* 2011; 35: 525-534.
- [65] May FP, Whitman CB, Varlyguina K, Bromley EG and Spiegel BM. Addressing low colorectal cancer screening in African Americans: using focus groups to inform the development of effective interventions. *J Cancer Educ* 2016; 31: 567-574.
- [66] Seeff LC, Nadel MR, Klabunde CN, Thompson T, Shapiro JA, Vernon SW and Coates RJ. Patterns and predictors of colorectal cancer test use in the adult U.S. population. *Cancer* 2004; 100: 2093-2103.
- [67] Joseph DA, King JB, Miller JW and Richardson LC; Centers for Disease Control and Prevention (CDC). Prevalence of colorectal cancer screening among adults—behavioral risk factor surveillance system, United States, 2010. *MMWR Suppl* 2012; 61: 51-56.
- [68] Brittain K, Loveland-Cherry C, Northouse L, Caldwell CH and Taylor JY. Sociocultural differences and colorectal cancer screening among African American men and women. *Oncol Nurs Forum* 2012; 39: 100-107.

## Colorectal cancer screening behaviors among Black men

- [69] Fish JA, Prichard I, Ettridge K, Grunfeld EA and Wilson C. Psychosocial factors that influence men's help-seeking for cancer symptoms: a systematic synthesis of mixed methods research. *Psychooncology* 2015; 24: 1222-1232.
- [70] Subramanian S, Klosterman M, Amonkar MM and Hunt TL. Adherence with colorectal cancer screening guidelines: a review. *Prev Med* 2004; 38: 536-550.
- [71] White PM and Itzkowitz SH. Barriers driving racial disparities in colorectal cancer screening in African Americans. *Curr Gastroenterol Rep* 2020; 22: 41.
- [72] Murphy CC, Wallace K, Sandler RS and Baron JA. Racial disparities in incidence of young-onset colorectal cancer and patient survival. *Gastroenterology* 2019; 156: 958-965.
- [73] Hofseth LJ, Hebert JR, Chanda A, Chen H, Love BL, Pena MM, Murphy EA, Sajish M, Sheth A, Buckhaults PJ and Berger FG. Early-onset colorectal cancer: initial clues and current views. *Nat Rev Gastroenterol Hepatol* 2020; 17: 352-364.
- [74] Beeker C, Kraft JM, Southwell BG and Jorgensen CM. Colorectal cancer screening in older men and women: qualitative research findings and implications for intervention. *J Community Health* 2000; 25: 263-278.
- [75] Nobis R and Sanden I. Young men's health: a balance between self-reliance and vulnerability in the light of hegemonic masculinity. *Contemp Nurse* 2008; 29: 205-217.
- [76] Winterich JA, Quandt SA, Grzywacz JG, Clark PE, Miller DP, Acuna J and Arcury TA. Masculinity and the body: how African American and White men experience cancer screening exams involving the rectum. *Am J Mens Health* 2009; 3: 300-309.
- [77] Bass SB, Gordon TF, Ruzek SB, Wolak C, Ward S, Paranjape A, Lin, K, Meyer B and Ruggieri DG. Perceptions of colorectal cancer screening in urban African American clinic patients: differences by gender and screening status. *J Cancer Educ* 2011; 26: 121-128.
- [78] Getrich CM, Sussman AL, Helitzer DL, Hoffman RM, Warner TD and Sanchez V. Expressions of machismo in colorectal cancer screening among New Mexico Hispanic subpopulations. *Qual Health Res* 2012; 22: 546-559.
- [79] Vandello JA and Bosson JK. Hard won and easily lost: a review and synthesis of theory and research on precarious manhood. *Psychol Men Masc* 2013; 14: 2, 101-113.
- [80] Hammond WP, Matthews D, Mohottige D, Agyemang A and Corbie-Smith G. Masculinity, medical mistrust, and preventative health services delays among community-dwelling African-American men. *J Gen Int Med* 2010; 25: 1300-1308.
- [81] Levant RF and Richmond K. A review of research on masculinity ideologies using the male role norms inventory. *J Mens Stud* 2007; 15: 130-146.
- [82] Rogers CR, Moore JX, Qeadan F, Gu LY, Huntington MS and Holowatyj AN. Examining factors underlying geographic disparities in early-onset colorectal cancer survival among men in the United States. *Am J Cancer Res* 2020; 10: 1592-1607.
- [83] Heslin KC, Gore JL, King WD and Fox SA. Sexual orientation and testing for prostate and colorectal cancers among men in California. *Med Care* 2008; 46: 1240-1248.
- [84] Dimou A, Syrigos KN and Saif MW. Disparities in colorectal cancer in African-Americans vs Whites: before and after diagnosis. *World J Gastroenterol* 2009; 15: 3734-3743.
- [85] Williams R, White P, Nieto J, Vieira D, Fancois F and Hamilton F. Colorectal cancer in African Americans: an update. *Clin Transl Gastroenterol* 2016; 7: e185.
- [86] Bromley EG, May FP, Federer L, Spiegel BM and van Oijen MG. Explaining persistent underuse of colonoscopic cancer screening in African Americans: a systematic review. *Prev Med* 2015; 71: 40-48.
- [87] Drolet CE and Lucas T. Justice beliefs buffer against perceived barriers to colorectal cancer screening among African Americans. *Psychol Health* 2021; 26: 1-16.
- [88] Sly JR, Edwards T, Shelton RC and Jandorf L. Identifying barriers to colonoscopy screening for nonadherent African American participants in a patient navigation intervention. *Health Educ Behav* 2013; 40: 449-57.
- [89] Wong CR, Bloomfield ER, Crookes DM and Jandorf L. Barriers and facilitators to adherence to screening colonoscopy among African-Americans: a mixed-methods analysis. *J Cancer Educ* 2013; 28: 722-8.
- [90] Wilkins T, Gillies RA, Harbuck S, Garren J, Looney SW and Schade RR. Racial disparities and barriers to colorectal cancer screening in rural areas. *J Am Board Fam Med* 2012; 25: 308-317.
- [91] Holt CL, Shipp M, Eloubeidi M, Clay KS, Smith-Janias MA, Janias MJ, Britt K, Norena M and Fouad MN. Use of focus group data to develop recommendations for demographically segmented colorectal cancer educational strategies. *Health Educ Res* 2009; 24: 876-889.
- [92] Rahib L, Wehner MR, Matrisian LM and Nead KT. Estimated projection of US cancer incidence and death to 2040. *JAMA Netw Open* 2021; 4: e214708.

## Colorectal cancer screening behaviors among Black men

- [93] Theuer CP, Wagner JL, Taylor TH, Brewster WR, Tran D, McLaren CE and Anton-Culver H. Racial and ethnic colorectal cancer patterns affect the cost-effectiveness of colorectal cancer screening in the United States. *Gastroenterology* 2001; 120: 848-856.
- [94] US Preventive Services Task Force; Davidson KW, Barry MJ, Mangione CM, Cabana M, Caughey AB, Davis EM, Donahue KE, Doubeni CA, Krist AH, Kubik M, Li L, Ogedegbe G, Owens DK, Pbert L, Silverstein M, Stevermer J, Tseng CW and Wong JB. Screening for colorectal cancer: US Preventive Services Task Force recommendation statement. *JAMA* 2021; 325: 1965-1977.
- [95] Sehgal M, Ladabaum U, Mithal A, Singh H, Desai M and Singh G. Colorectal cancer incidence after colonoscopy at ages 45-49 or 50-54 years. *Gastroenterology* 2021; 160: 2018-2028, e13.
- [96] Mehta SJ, Morris AM and Kupfer SS. Colorectal cancer screening starting at age 45 years-ensuring benefits are realized by all. *JAMA Netw Open* 2021; 4: e2112593.
- [97] Hackshaw A. Small studies: strengths and limitations. *Eur Respir J* 2008; 32: 1141-1143.

## Colorectal cancer screening behaviors among Black men

**Supplementary Table 1.** Samples of items used in the survey of African American men, to assess their masculinity barriers to medical care, knowledge, attitudes, perceptions, and social support associated with Colorectal Cancer (CRC) screening intention and uptake

Survey Item Number	Question	Construct					
		Demographic Characteristics	Masculinity Barriers to Medical Care	CRC & Screening Knowledge	Attitudes toward CRC Screening	Beliefs (Perceived Barriers)	Social Support
4	What is your age?	X					
26	As a provider, I assure the needs of my family are met.		X [Provider Role]				
30	When it comes to my health, I figure problems out on my own.		X [Health-related Self-Reliance]				
41	Physical pain in my body would never lead me to show any emotions.		X [Restrictive Emotionality]				
42	Medical exams below the waist disrespect my sexuality.		X [Fear of being Perceived as Gay]				
49	Men of my race rarely receive quality medical care.		X [Medical Mistrust]				
50	Colorectal cancer is third most common cancer in African Americans.			X			
56	If I had colorectal cancer, my career/ life would be over.				X		
61	I don't know how to go about scheduling colorectal cancer screening.					X	
68	It is important to comply with what my "significant other" believes in.						X
69	Do you plan to obtain colorectal cancer screening in the future?						Intention
70	A blood stool test is a test that may use a special kit at home to determine whether the stool contains blood. Have you ever had this test using a home kit?						Uptake
71	Sigmoidoscopy and colonoscopy are exams in which a tube is inserted in the rectum to view the colon for signs of cancer or other health problems. Have you ever had either of these exams?						Uptake