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Masculinity Beliefs and Colorectal Cancer Screening in Male Veterans

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Abstract

As the third most common cause of cancer death among United States men, colorectal cancer (CRC) represents a significant threat to men's health. Although adherence to CRC screening has the potential to reduce CRC mortality by approximately half, men's current rates of adherence fall

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below national screening objectives. In qualitative studies, men have reported forgoing screenings involving the rectum (e.g., colonoscopy) due to concern about breaching masculinity norms. However, the extent to which masculinity beliefs predict men's CRC screening adherence has yet to be examined. The current study tested the hypothesis that greater endorsement of masculinity beliefs (i.e., self-reliance, risk-taking, heterosexual self-presentation, and primacy of work) would be associated with a lower likelihood of adherence to CRC screening with any test and with colonoscopy specifically. Participants were 327 men aged 51–75 at average risk for CRC who were accessing primary care services at a Midwestern Veterans Affairs Medical Center. Contrary to hypotheses, masculinity beliefs did not predict CRC screening outcomes in hierarchical regression analyses that controlled for demographic predictors of screening. Although results are largely inconsistent with masculinity theory and prior qualitative findings, further research is needed to determine the degree to which findings generalize to other populations and settings.

Keywords

Colorectal cancer (CRC) is the third most common cancer diagnosed and the third most common cause of cancer deaths among men in the United States (American Cancer Society, 2014a, 2014b). Adherence to CRC screening guidelines can reduce CRC mortality by approximately half through early detection and removal of precancerous polyps (American Cancer Society, 2014b; Brenner, Chang-Claude, Seiler, Rickert, & Hoffmeister, 2011; Cafferty, Sasieni, & Duffy, 2009; Edwards et al., 2010). Among people at average risk for CRC, screening begins at age 50 with six test options: (1) a single-strand DNA test every three years; (2) annual stool blood test (SBT) (e.g., FOBT [fecal occult blood test] or FIT [fecal immunochemical test]); (3) flexible sigmoidoscopy every five years; (4) double-contrast barium enema every five years; (5) virtual colonoscopy every five years; or (6) colonoscopy every ten years (Levin et al., 2008; Smith et al., 2015). CRC screening adherence has been associated with a number of demographic factors including increasing age, White race, being married, and higher socioeconomic status (Beydoun & Beydoun, 2008; Vernon, 1997). Although the National Colorectal Cancer Roundtable has set a national goal for 80% of age-appropriate adults to be screened by 2018, only 60% of American men aged 50 or older were adherent to screening recommendations in 2010 (American Cancer Society, 2014b; Smith et al., 2015).

Qualitative findings suggest that masculinity beliefs may deter some men from completing cancer screening examinations involving the rectum (e.g., colonoscopy for CRC screening and digital rectal exam for prostate cancer screening) (Bass et al., 2011; Beeker, Kraft, Southwell, & Jorgensen, 2000; Getrich et al., 2012; Goldman, Diaz, & Kim, 2009). For example, men suggested that cancer screening involving the rectum might parallel a sexual encounter and therefore, might affect or be indicative of one's sexual orientation (Getrich et al., 2012; Harvey & Alston, 2011; Holt et al., 2009; Winterich et al., 2009). In addition, men stated that receiving a rectal examination might make them feel vulnerable to the physician performing the examination (Winterich et al., 2009; Winterich et al., 2011). These

sentiments parallel two ideals from masculinity theory: heterosexual self-presentation and self-reliance (Courtenay, 2000a, 2000b, 2011; Parent & Moradi, 2009, 2011).

Other masculinity beliefs have been identified as potential barriers to a range of preventive health behaviors (e.g., cholesterol screening, attending annual physical examinations) (Hammond et al., 2010; Mahalik, Lagan, & Morrison, 2006) and may be relevant to CRC screening. Results from quantitative studies and masculinity theory suggest that men who hold risk-taking beliefs may not perceive themselves to be at risk for physical illnesses and therefore may be less willing to attend medical visits (Courtenay, 2000a, 2000b, 2011; Millar & Houska, 2007; Nicholas, 2000). Regarding CRC screening, men adhering to risk-taking ideals may not go to the doctor and thereby limit their opportunity to receive a recommendation for CRC screening. Furthermore, men with these ideals also may not undergo screening due to a perceived lack of vulnerability to CRC.

Primacy of work is another masculinity ideal that has been related to preventive health behaviors (Levant et al., 2011) and may be relevant to CRC screening. Specifically, men with this ideal may be motivated to care for their health in order to continue working and providing for their family and, thus, may be inclined to complete CRC screening. Alternatively, men with this ideal might be less likely to be absent from work to undergo colonoscopy, which is a two-day process including the bowel prep.

Despite theory and qualitative evidence suggesting a link between masculinity beliefs and CRC screening (Boman & Walker, 2010; Brannon, 1976; Courtenay, 2000a, 2000b, 2011; Harvey & Alston, 2011; Holt et al., 2009; Pleck, Sonenstein, & Ku, 1993), no quantitative studies have examined this relationship (Christy, Mosher & Rawl, 2014). The present study addresses this gap in the literature by testing the hypothesis that greater endorsement of masculinity beliefs (i.e., self-reliance, risk-taking, heterosexual self-presentation, and primacy of work) would be associated with a lower likelihood of CRC screening adherence with any test and with colonoscopy specifically among men accessing VA primary care services.

Methods

Participants

The sample was comprised of 327 male veterans who were receiving VA primary care services in the Midwestern U.S. Of note, screening rates in the VA system are higher than national averages, with 80% of eligible veterans adherent to CRC screening recommendations (Long et al., 2012). In addition, VA patients may have access to primary care services and CRC screening at reduced or no cost (Morgan, Teal, Reddy, Ford, & Ashton, 2005), thereby allowing the examination of psychological barriers to screening. For this study, eligible veterans were aged 51–75, at average risk for CRC, and able to read and write in English. This age group was selected because CRC screening is recommended for those at average risk for CRC starting at age 50. Beginning the age range at age 51 allowed all participants to have had the opportunity to complete screening at age 50 and to therefore be either adherent or non-adherent. After age 75, the U.S. Preventive Services Task Force recommends that providers discuss CRC screening with patients to make an individual

decision about screening because the risk-benefit ratio increases with advanced age (U.S. Preventive Services Task Force, 2014). Veterans were ineligible for this study if they had any of the following conditions that increased their CRC risk: a personal history of CRC, ulcerative colitis, familial adenomatous polyposis, Lynch syndrome, or Crohn's disease, or had two or more first-degree relatives with a history of CRC or a first-degree relative with a diagnosis of CRC before age 60.

Demographic characteristics are listed in Table 1. Briefly, the mean age of participants was 62. The majority of participants were White (72%) or African-American (20%), reported an annual household income of $30,999 or less (56%), and had completed some college or were college graduates (63%). The majority of participants (65%, $n = 213$) were adherent to CRC screening recommendations (i.e., had completed SBT [FOBT or FIT] in the past year, sigmoidoscopy in the past 5 years, and/or colonoscopy in the past 10 years), and 114 were non-adherent to these recommendations. Of those adherent to screening recommendations, 196 were adherent with either colonoscopy alone or SBT and colonoscopy, whereas 17 were adherent with SBT alone. No participants were adherent with sigmoidoscopy.

Measures

Masculinity beliefs—Masculinity beliefs were assessed with the Conformity to Masculine Norms Inventory-46 (CMNI-46) (Parent & Moradi, 2009, 2011). Four of the nine subscales of the CNMI-46 (i.e., heterosexual self-presentation, risk-taking, self-reliance, and primacy of work) were examined in the current study. Responses were rated on a four-point Likert-type scale ranging from 0 (*strongly disagree*) to 3 (*strongly agree*). Correlations between the original Conformity to Masculine Norms Inventory (Mahalik et al., 2003) and those of the 46-item version were high, ranging from 0.89 to 0.98 (Parent & Moradi, 2009; 2011). In prior research, Cronbach's alphas for the subscales of the CMNI-46 were adequate (i.e., heterosexual self-presentation [.89], risk taking [.82], self-reliance [.84], and primacy of work [.80]) (Parent & Moradi, 2011). In the current study, Cronbach's alphas were as follows: heterosexual self-presentation (.85), risk taking (.69), self-reliance (.74), and primacy of work (.60).

CRC screening status—CRC screening status (i.e., date of colonoscopy, sigmoidoscopy, FOBT, and/or FIT completion, if applicable) was collected from the medical record. These screening methods were selected as they are the most common screening methods for VA hospitals (Long et al., 2012). The VA medical record prompts providers to document CRC screening received outside of the VA; if CRC screening status could not be confirmed via medical record, self-reported status was used. Participants read descriptions of each CRC screening test and indicated whether they had undergone SBT (FOBT or FIT) in the past year, flexible sigmoidoscopy in the past 5 years, or a colonoscopy in the past 10 years at the VA or elsewhere (Christy et al., 2013; Rawl et al., 2015; Rawl et al., 2012). Veterans who were adherent to both SBT and colonoscopy were coded as adherent to colonoscopy.

When medical records and self-reported CRC screening status were compared there were 56 instances of incongruence (i.e., 46 participants reported up-to-date CRC screening status which was not supported by the medical record, and 10 participants reported non-adherence

which was not supported by the medical record). Using evidence from both self-reported information and medical records, 21 participants were coded as adherent with screening (17 who reported being adherent via self-report and 4 who self-reported non-adherence, but were found to be adherent through evidence in the medical record), and the remaining 35 were coded as non-adherent (based on self-report and/or insufficient information in the medical record to confirm CRC screening adherence).

Procedure

Study procedures were approved by the university's institutional review board and recruitment took place from July 2013 through April 2014. First, patient gender, age, and absence of a personal history of CRC were determined via medical record to identify veterans who might be eligible for the study. Potentially eligible veterans were approached in a VA primary care clinic waiting room before or after their visit with a primary care provider (PCP) or nurse. Following a brief description of the study, a trained research assistant (RA) assessed patients' willingness to complete an eligibility questionnaire regarding their CRC screening status and medical risk factors for CRC. These paper questionnaires were hand-delivered to the RA to protect confidentiality. After determining eligibility, the RA described the study and answered questions for those who were interested. Written informed consent and HIPAA authorization were obtained prior to study participation.

A total of 561 male veterans were approached to determine eligibility for the study. Of those, 151 refused to complete the eligibility questionnaire and 55 were found to be ineligible for the study. Of the 355 veterans who were deemed eligible, five declined to participate and 350 were enrolled in the study. After this process, the project coordinator collected the following limited information from the medical record: 1) date of first visit to the PCP, 2) the date of last colonoscopy, sigmoidoscopy, FOBT, and/or FIT (if applicable), 3) medical diagnoses indicative of increased CRC risk (to confirm eligibility following consent), 4) zip code, and 5) PCP name.

Enrolled participants were asked to complete paper-based study questionnaires. Participants could complete study questionnaires during a clinic visit or at home. Participants who completed the questionnaires at home were given an addressed, stamped envelope for returning them to the study team. Reminder calls were made if the questionnaires were not returned. Participants received a $10 gift card after returning a completed survey.

Statistical Analyses

Statistical analyses were conducted using SPSS (Version 23, Copyright © 2015 IBM SPSS Statistics, Armonk, NY, USA). First, descriptive statistics were examined. Data from 23 participants were removed from analyses due to extensive missing values. Missing data for the remaining 327 participants were addressed using mean imputation, as the data were not missing completely at random. However, most items had little missing data with income having the highest percentage of missingness (6.7%). Skewness and kurtosis of the masculinity subscales were examined. The risk-taking scale was the only scale found to be slightly kurtotic following mean imputation (kurtosis=1.05, SE=.27). Evidence of skewness

was not found for any of the masculinity subscales. Thus, the data were not transformed. Second, Pearson correlational analyses were conducted. Next, separate hierarchical logistic regression analyses were conducted to examine the relationship between each masculinity belief and study outcomes (i.e., CRC screening adherence with any test and with colonoscopy) while controlling for demographic variables associated with CRC screening in prior literature (i.e., age, race, marital status, employment status, education, insurance status, and income) (Beydoun & Beydoun, 2008; Vernon, 1997).

Results

Correlates of Colorectal Cancer Screening Status

Intercorrelations between study variables and CRC screening adherence with any test and with colonoscopy specifically are found in Tables 2 and 3, respectively. CRC screening adherence with any test and with colonoscopy was associated with older age, being married, higher educational attainment, higher income, and having health insurance. Masculinity beliefs were not associated with screening adherence with any test or with colonoscopy.

Factors Associated with Colorectal Cancer Screening Status

Contrary to hypotheses, none of the masculinity variables predicted CRC screening adherence with any test (see Table 4). However, across logistic regression analyses, increasing age and education consistently predicted CRC screening adherence with any test. Similarly, none of the masculinity variables predicted adherence with colonoscopy, whereas increasing age, education, and income consistently predicted this outcome in the logistic regression analyses (see Table 5).[1]

Discussion

This study provides an initial examination of associations between masculinity beliefs and men's CRC screening adherence. Based on masculinity theory (Brannon, 1976; Courtenay, 2000a, 2000b, 2011) and prior qualitative research (Jilcott Pitts et al., 2013; Jones, Devers, Kuzel, & Woolf, 2010; Rivera-Ramos & Buki, 2011), we hypothesized that the masculinity beliefs of self-reliance, risk-taking, heterosexual self-presentation, and primacy of work would be negatively associated with CRC screening adherence (Christy, Mosher & Rawl, 2014). Contrary to hypotheses, masculinity beliefs were unrelated to CRC screening adherence with any test or with colonoscopy in male veterans when controlling for established demographic predictors of screening. Findings are largely inconsistent with masculinity theory (Courtenay, 2000a, 2000b, 2011; Pleck et al., 1993) and qualitative findings suggesting that masculinity beliefs deter some men from completing CRC screening (Thompson, Reeder, & Abel, 2011; Wackerbarth, Peters, & Haist, 2005; Winterich et al., 2009).

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[1]Analyses were also conducted using listwise deletion. In univariate analyses, greater self-reliance was associated with a lower likelihood of CRC screening adherence with any test ($r = -.13$, $p = .04$) and with colonoscopy ($r = -.15$, $p = .02$), whereas other masculinity beliefs were unrelated to this outcome. In regression analyses controlling for demographic predictors of CRC screening in prior literature, masculinity beliefs did not predict adherence with any test or colonoscopy (data not shown).

There are several potential explanations for the current results. Range restriction on the masculinity subscales, with few men endorsing either the lowest or highest possible levels of masculinity beliefs, may have contributed to null findings. Relatedly, our study participants were veterans receiving primary care services within a VA hospital; thus, certain masculinity beliefs (e.g., self-reliance) may be less prevalent among men who seek healthcare and might be related to CRC screening among men not seeking care. In addition, patient education in the integrated delivery system of the VA may potentially de-stigmatize CRC screening, as evidenced by the high rates of CRC screening among age-appropriate VA patients (Long et al., 2012). It is also possible that general masculinity beliefs assessed in the current study may be less predictive of CRC screening than healthcare-specific masculinity beliefs (e.g., "a man should not allow a physician to place a tube in his rectum as part of a medical exam"). Further research and measurement development is needed to test this explanation.

The present findings replicate prior population-based research (Beydoun & Beydoun, 2008; Vernon, 1997) where increasing age and education consistently predicted screening adherence with any CRC screening test and with colonoscopy. Consistent with prior research (Beydoun & Beydoun, 2008; Vernon, 1997), increasing income consistently predicted adherence with colonoscopy; however, because cost is not necessarily a barrier in the VA system, income may be a proxy for another characteristic. Other demographics associated with CRC screening in prior research with representative samples of older adults, such as marital status, health insurance, and race, were not associated with screening in the current study (Beydoun & Beydoun, 2008; Vernon, 1997). The lower marriage rate relative to the general population and access to VA healthcare in this sample may account for these differential findings.

Limitations of this study should be noted. The current study was cross-sectional and temporal relationships cannot be established. It is possible that past screening behaviors and healthcare experiences may have altered masculinity beliefs over time. Further, the study relied on self-report measures to assess masculinity variables. Additionally, medical comorbidities, which may affect physicians' CRC screening recommendations (Haggstrom, Klabunde, Smith, & Yuan, 2013), were not assessed. We also did not assess other factors which may be related to CRC screening adherence (e.g., documented physician recommendation, self-efficacy for completing CRC screening tests, perceived barriers to accessing healthcare, perceptions of CRC screening as a normative health behavior, and receipt of prior physician orders for CRC screening). In addition, participants may have differed from non-participants with respect to their CRC screening status and other factors; however, we did not collect clinical or demographic information on those who declined to participate. Finally, the sample was comprised of male veterans receiving PCP services at a Midwestern VA, the majority of whom were Caucasian. Thus, the findings may not generalize to non-veterans, those not seeking healthcare services, and ethnic minorities.

Several future research directions warrant consideration. First, many men reporting concerns about the maintenance of masculinity in the context of invasive cancer testing in qualitative studies were from minority groups (e.g., African American and Latino/Hispanic men) (e.g., Bass et al., 2011; Getrich et al., 2012; Winterich et al., 2009). In the current study, Caucasians reported lower levels of heterosexual self-presentation and primacy of work

relative to ethnic minorities who were predominantly African American. In addition, Caucasians endorsed higher levels of risk-taking relative to ethnic minorities. However, correlations between race and these masculinity beliefs were low, and their clinical relevance, if any, is unknown. Research is needed to examine associations between masculinity beliefs, related cultural beliefs, and CRC screening adherence in specific minority groups as well as potential differences in these associations across ethnocultural groups. Longitudinal studies also are needed to establish the predictive value of masculinity beliefs with respect to CRC screening adherence. Significant results from these future studies could inform gender-specific and culturally sensitive CRC screening interventions (Christy, Mosher & Rawl, 2014; Friedemann-Sanchez et al., 2007; O'Brien, Hunt, & Hart, 2005). In addition, research is needed to examine associations between masculinity beliefs and CRC screening among men not actively seeking healthcare, as their beliefs and experiences may be different from those in the current sample. Understanding the role of masculinity beliefs in men's decisions to seek CRC screening and other preventive healthcare and developing interventional approaches that address these beliefs may ultimately reduce mortality from preventable diseases.

Acknowledgments

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Table 1

Descriptive Statistics

Variable	M (SD), Range
Age	61.9 (5.9), 51–75
Risk-taking	1.10 (.45), 0–3.0
Self-reliance	1.24 (.47), 0–2.4
Primacy of Work	1.18 (.49), 0–2.5
Heterosexual Self-presentation	1.79 (.65), 0–3.0
	N (%)
Race	
White	235 (72)
African-American/Black	66 (20)
Other/More than One Race	21 (6)
Missing	5 (2)
Marital Status	
Married/Partnered	176 (54)
Single/Divorced/Separated/Widowed	146 (45)
Missing	5 (2)
Employment	
Employed	101 (31)
Unemployed/Retired	225 (69)
Missing	1 (<1)
Education	
High School/GED or Less	119 (36)
Some College	150 (46)
College Graduate/Post-Graduate	57 (17)
Missing	1 (<1)
Health Insurance[a]	
Yes	134 (41)
No	190 (58)
Missing	3 (1)
Income	
$0–$10,999	54 (17)
$11,000–$20,999	68 (21)
$21,000–$30,999	60 (18)
$31,000–$50,999	63 (19)
$51,000 to $99,999	49 (15)
$100,000+	11 (3)
Missing	22 (7)
Adherent to CRC screening[b]	
Yes	213 (65)

Variable	*M* (*SD*), Range
No	114 (35)

Note. *N*s = 298–326. CRC = colorectal cancer.

[a]Health insurance indicates having insurance beyond access to VA services.

[b]Adherence coded based upon evidence from both self-report and medical record data.

Table 2

Correlations among CRC Screening Adherence with Any Test and Study Variables

		1	2	3	4	5	6	7	8	9	10	11	12
1. Adherent to CRC screening[a]	Corr.	—											
	p-value												
2. Age	Corr.	**.23**	—										
	p-value	**<.01**											
3. Race[b]	Corr.	.10	**.13**	—									
	p-value	.07	**.02**										
4. Marital status[c]	Corr.	**.19**	**.24**	**.20**	—								
	p-value	**<.01**	**<.01**	**<.01**									
5. Employment status[d]	Corr.	.03	**−.16**	.08	.10	—							
	p-value	.58	**<.01**	.14	.06								
6. Education	Corr.	**.19**	**.15**	.09	**.16**	.10	—						
	p-value	**<.01**	**.01**	.11	**<.01**	.06							
7. Insurance status[e]	Corr.	**.18**	**.20**	.09	**.23**	.07	**.15**	—					
	p-value	**<.01**	**<.01**	.09	**<.01**	.20	**.01**						
8. Income	Corr.	**.23**	**.19**	**.19**	**.47**	**.22**	**.25**	**.41**	—				
	p-value	**<.01**	**<.01**	**<.01**	**<.01**	**<.01**	**<.01**	**<.01**					
9. Risk-taking	Corr.	.01	−.01	**.14**	−.02	.01	**.15**	**−.11**	.04	—			
	p-value	.82	.93	**.01**	.69	.93	**.01**	**.048**	.44				
10. Self-reliance	Corr.	−.09	−.07	.09	−.04	−.04	**−.11**	−.04	−.05	**.13**	—		
	p-value	.12	.20	.12	.50	.44	**.04**	.52	.37	**.02**			
11. Primacy of work	Corr.	−.09	**−.12**	**−.15**	**−.17**	.02	**−.14**	**−.17**	**−.28**	**.16**	**.19**	—	
	p-value	.11	**.03**	**.01**	**<.01**	.69	**.01**	**<.01**	**<.01**	**<.01**	**<.01**		
12. Heterosexual self-presentation	Corr.	.00	−.03	**−.13**	.01	−.01	**−.19**	−.05	−.10	**−.14**	.09	.02	—
	p-value	.95	.65	**.02**	.82	.88	**<.01**	.33	.07	**.02**	.12	.69	

Note. N = 327. Significant correlations are displayed in bold. CRC = colorectal cancer; Corr = correlation.

[a] Adherent (i.e., stool blood test, sigmoidoscopy, or colonoscopy) coded as 0 = no and 1 = yes.

[b] Race coded as 0 = minority race and 1= White race.

[c] Marital status coded as 0 = single/separated/divorced/widowed and 1 = married/partnered.

[d] Employment status coded as 0 = unemployed/retired and 1 = employed.

[e] Insurance status coded as 0 = no and 1 = yes.

Table 3

Correlations among CRC Adherence with Colonoscopy and Study Variables

		1	2	3	4	5	6	7	8	9	10	11	12
1. Adherent with colonoscopy[a]	Corr.	—											
	p-value												
2. Age	Corr.	**.24**	—										
	p-value	**<.01**											
3. Race[b]	Corr.	.10	**.13**	—									
	p-value	.09	**.03**										
4. Marital status[c]	Corr.	**.19**	**.25**	**.22**	—								
	p-value	**<.01**	**<.01**	**<.01**									
5. Employment status[d]	Corr.	.04	**−.16**	.10	.11	—							
	p-value	.44	**<.01**	.09	.06								
6. Education	Corr.	**.20**	**.14**	.09	**.16**	.10	—						
	p-value	**<.01**	**.02**	.10	**.01**	.09							
7. Insurance status[e]	Corr.	**.20**	**.21**	.10	**.25**	.06	**.14**	—					
	p-value	**<.01**	**<.01**	.08	**<.01**	.30	**.01**						
8. Income	Corr.	**.27**	**.20**	**.20**	**.48**	**.22**	**.24**	**.42**	—				
	p-value	**<.01**	**<.01**	**<.01**	**<.01**	**<.01**	**<.01**	**<.01**					
9. Risk-taking	Corr.	.00	−.02	**.14**	−.03	.02	**.14**	**−.12**	.05	—			
	p-value	.98	.69	**.01**	.56	.80	**.02**	**.04**	.39				
10. Self-reliance	Corr.	−.10	−.05	.09	−.04	−.03	−.10	−.03	−.05	**.15**	—		
	p-value	.09	.40	.13	.52	.63	.07	.62	.40	**.01**			
11. Primacy of work	Corr.	−.11	**−.12**	**−.16**	**−.19**	.03	**−.14**	**−.16**	**−.27**	**.17**	**.19**	—	
	p-value	.05	**.04**	**.01**	**<.01**	.58	**.02**	**.01**	**<.01**	**<.01**	**<.01**		
12. Heterosexual self-presentation	Corr.	.01	−.01	**−.15**	.02	.00	**−.19**	−.04	−.11	**−.13**	.06	.00	—
	p-value	.89	.91	**.01**	.75	.98	**<.01**	.54	.06	**.02**	.32	.95	

Note. N = 310. Significant correlations are displayed in bold. CRC = colorectal cancer; Corr = correlation.

[a] Adherent to colonoscopy coded as 0 = no and 1 = yes.

[b] Race coded as 0 = minority race and 1= White race.

[c] Marital status coded as 0 = single/separated/divorced/widowed and 1 = married/partnered.

[d] Employment status coded as 0 = unemployed/retired and 1 = employed.

[e] Insurance status coded as 0 = no and 1 = yes.

Table 4

Logistic Regression Analyses Predicting CRC Screening Adherence with Any Test

	Variable	Beta	SE	Wald chi-square (df=1)	OR	95% CI for odds ratio
	Risk-taking model					
Step 1	Age	.07**	.02	7.94	1.07	1.02–1.12
	Race[a]	.16	.28	.35	1.18	0.69–2.02
	Marital status[b]	.23	.28	.71	1.26	0.73–2.18
	Employment status[c]	.02	.28	.01	1.02	0.59–1.78
	Education	.39*	.19	4.37	1.48	1.02–2.13
	Insurance status[d]	.37	.28	1.73	1.44	0.84–2.49
	Income	.18	.11	2.71	1.20	0.97–1.48
Step 2	Age	.07**	.02	7.93	1.07	1.02–1.12
	Race[a]	.16	.28	.34	1.18	0.68–2.03
	Marital status[b]	.23	.28	.71	1.26	0.73–2.18
	Employment status[c]	.02	.28	.01	1.02	0.59–1.78
	Education	.39*	.19	4.30	1.48	1.02–2.14
	Insurance status[d]	.37	.28	1.68	1.44	0.83–2.51
	Income	.18	.11	2.69	1.20	0.97–1.49
	Risk-taking	.00	.29	.00	1.00	0.57–1.75
	Self-reliance model					
Step 1	Age	.07**	.02	7.94	1.07	1.02–1.12
	Race[a]	.16	.28	.35	1.18	0.69–2.02
	Marital status[b]	.23	.28	.71	1.26	0.73–2.18
	Employment status[c]	.02	.28	.01	1.02	0.59–1.78
	Education	.39*	.19	4.37	1.48	1.02–2.13
	Insurance status[d]	.37	.28	1.73	1.44	0.84–2.49
	Income	.18	.11	2.71	1.20	0.97–1.48
Step 2	Age	.06**	.02	7.62	1.07	1.02–1.12

	Variable	Beta	SE	Wald chi-square (df=1)	OR	95% CI for odds ratio
	Race[a]	.20	.28	.54	1.23	0.71–2.11
	Marital status[b]	.23	.28	.70	1.26	0.73–2.18
	Employment status[c]	.01	.28	.00	1.01	0.58–1.76
	Education	.38*	.19	3.99	1.46	1.01–2.10
	Insurance status[d]	.37	.28	1.71	1.44	0.83–2.49
	Income	.18	.11	2.66	1.20	0.96–1.48
	Self-reliance	−.30	.26	1.28	.74	0.44–1.25
	Primacy of work model					
Step 1	Age	**.07****	.02	7.94	1.07	1.02–1.12
	Race[a]	.16	.28	.35	1.18	0.69–2.02
	Marital status[b]	.23	.28	.71	1.26	0.73–2.18
	Employment status[c]	.02	.28	.01	1.02	0.59–1.78
	Education	**.39***	.19	4.37	1.48	1.02–2.13
	Insurance status[d]	.37	.28	1.73	1.44	0.84–2.49
	Income	.18	.11	2.71	1.20	0.97–1.48
Step 2	Age	**.07****	.02	7.94	1.07	1.02–1.12
	Race[a]	.16	.28	.35	1.18	0.69–2.02
	Marital status[b]	.24	.28	.72	1.27	0.73–2.18
	Employment status[c]	.02	.28	.01	1.02	0.59–1.78
	Education	**.39***	.19	4.37	1.48	1.03–2.13
	Insurance status[d]	.37	.28	1.74	1.45	0.84–2.50
	Income	.18	.11	2.67	1.20	0.96–1.49
	Primacy of work	.02	.27	.01	1.02	0.60–1.72
	Heterosexual self-presentation model					
Step 1	Age	**.07****	.02	7.94	1.07	1.02–1.12
	Race[a]	.16	.28	.35	1.18	0.69–2.02
	Marital status[b]	.23	.28	.71	1.26	0.73–2.18
	Employment status[c]	.02	.28	.01	1.02	0.59–1.78

Variable	Beta	SE	Wald chi-square (df=1)	OR	95% CI for odds ratio
Education	**.39**[*]	.19	4.37	1.48	1.02–2.13
Insurance status[d]	.37	.28	1.73	1.44	0.84–2.49
Income	.18	.11	2.71	1.20	0.97–1.48
Step 2 Age	**.07**[**]	.02	7.86	1.07	1.02–1.12
Race[a]	.19	.28	.48	1.21	0.70–2.09
Marital status[b]	.21	.28	.57	1.23	0.71–2.14
Employment status[c]	.02	.28	.01	1.02	0.59–1.78
Education	**.42**[*]	.19	4.87	1.52	1.05–2.21
Insurance status[d]	.37	.28	1.75	1.45	0.84–2.50
Income	.19	.11	2.87	1.21	0.97–1.49
Heterosexual self-presentation	.18	.20	.77	1.19	0.81–1.76

Note. N = 327. CRC = colorectal cancer; SE = standard error; OR = odds ratio; CI = confidence interval. Significant results are displayed in bold. The outcome variable, CRC screening adherence, was coded 0 = no and 1 = yes.

[a] Race coded as 0 = minority race and 1 = White race.

[b] Marital status coded as 0 = single/separated/divorced/widowed and 1 = married/partnered.

[c] Employment status coded as 0 = unemployed/retired and 1 = employed.

[d] Insurance status coded as 0 = no and 1 = yes.

[*] $p < .05$.

[**] $p < .01$.

Table 5

Logistic Regression Analyses Predicting CRC Screening Adherence with Colonoscopy

Variable	Beta	SE	Wald chi-square (df=1)	OR	95% CI for odds ratio
Risk-taking model					
Step 1					
Age	**.07**[**]	.02	8.17	1.07	1.02–1.12
Race[a]	.09	.28	.11	1.10	0.63–1.91
Marital status[b]	.16	.29	.31	1.17	0.67–2.06
Employment status[c]	.08	.29	.07	1.08	0.61–1.91
Education	**.42**[*]	.19	4.93	1.52	1.05–2.20
Insurance status[d]	.35	.29	1.48	1.42	0.81–2.47
Income	**.24**[*]	.11	4.44	1.27	1.02–1.58
Step 2					
Age	**.07**[**]	.02	8.13	1.07	1.02–1.12
Race[a]	.10	.29	.12	1.11	0.63–1.93
Marital status[b]	.16	.29	.29	1.17	0.66–2.05
Employment status[c]	.08	.29	.07	1.08	0.61–1.90
Education	**.42**[*]	.19	4.96	1.53	1.05–2.22
Insurance status[d]	.34	.29	1.36	1.40	0.80–2.47
Income	**.24**[*]	.11	4.47	1.27	1.02–1.59
Risk-taking	–.05	.29	.03	.95	0.54–1.67
Self-reliance model					
Step 1					
Age	**.07**[**]	.02	8.17	1.07	1.02–1.12
Race[a]	.09	.28	.11	1.10	0.63–1.91
Marital status[b]	.16	.29	.31	1.17	0.67–2.06
Employment status[c]	.08	.29	.07	1.08	0.61–1.91
Education	**.42**[*]	.19	4.93	1.52	1.05–2.20
Insurance status[d]	.35	.29	1.48	1.42	0.81–2.47
Income	**.24**[*]	.11	4.44	1.27	1.02–1.58
Step 2					
Age	**.07**[**]	.02	8.02	1.07	1.02–1.12

Step	Variable	Beta	SE	Wald chi-square (df=1)	OR	95% CI for odds ratio
	Race[a]	.14	.29	.24	1.15	0.66–2.01
	Marital status[b]	.15	.29	.28	1.17	0.66–2.05
	Employment status[c]	.07	.29	.06	1.07	0.61–1.90
	Education	.40*	.19	4.49	1.50	1.03–2.17
	Insurance status[d]	.35	.29	1.47	1.42	0.81–2.48
	Income	.24*	.11	4.32	1.27	1.01–1.58
	Self-reliance	−.37	.27	1.79	.69	0.41–1.19
Primacy of work model						
Step 1	Age	.07**	.02	8.17	1.07	1.02–1.12
	Race[a]	.09	.28	.11	1.10	0.63–1.91
	Marital status[b]	.16	.29	.31	1.17	0.67–2.06
	Employment status[c]	.08	.29	.07	1.08	0.61–1.91
	Education	.42*	.19	4.93	1.52	1.05–2.20
	Insurance status[d]	.35	.29	1.48	1.42	0.81–2.47
	Income	.24*	.11	4.44	1.27	1.02–1.58
Step 2	Age	.07**	.02	8.15	1.07	1.02–1.12
	Race[a]	.08	.28	.09	1.09	0.62–1.90
	Marital status[b]	.16	.29	.29	1.17	0.67–2.05
	Employment status[c]	.08	.29	.09	1.09	0.62–1.92
	Education	.42*	.19	4.84	1.52	1.05–2.20
	Insurance status[d]	.34	.29	1.44	1.41	0.81–2.47
	Income	.23*	.11	4.16	1.26	1.01–1.58
	Primacy of work	−.08	.28	.08	.93	0.54–1.59
Heterosexual self-presentation model						
Step 1	Age	.07**	.02	8.17	1.07	1.02–1.12
	Race[a]	.09	.28	.11	1.10	0.63–1.91
	Marital status[b]	.16	.29	.31	1.17	0.67–2.06
	Employment status[c]	.08	.29	.07	1.08	0.61–1.91

Variable	Beta	SE	Wald chi-square (df=1)	OR	95% CI for odds ratio
Education	**.42***	.19	4.93	1.52	1.05–2.20
Insurance status[d]	.35	.29	1.48	1.42	0.81–2.47
Income	**.24***	.11	4.44	1.27	1.02–1.58
Step 2 Age	**.07****	.02	8.00	1.07	1.02–1.12
Race[a]	.13	.29	.21	1.14	0.65–2.00
Marital status[b]	.13	.29	.20	1.14	0.65–2.01
Employment status[c]	.07	.29	.05	1.07	0.61–1.89
Education	**.45***	.19	5.47	1.57	1.08–2.28
Insurance status[d]	.35	.29	1.45	1.41	0.81–2.47
Income	**.25***	.11	4.71	1.28	1.02–1.60
Heterosexual self-presentation	.19	.20	.86	1.21	0.81–1.80

Note. N = 310. CRC = colorectal cancer; SE = standard error; OR = odds ratio; CI = confidence interval. Significant results are displayed in bold. The outcome variable, CRC screening adherence with colonoscopy, was coded 0 = no and 1 = yes.

[a]Race coded as 0 = minority race and 1= White race.

[b]Marital status coded as 0 = single/separated/divorced/widowed and 1 = married/partnered. [c]Employment status coded as 0 = unemployed/retired and 1 = employed.

[d]Insurance status coded as 0 = no and 1 = yes.

*
 $p < .05$.

**
 $p < .01$.