Examining the relationship between household wealth and colorectal cancer screening behaviors among U.S. men aged 45–75

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ABSTRACT

Colorectal cancer (CRC) is the third leading cause of cancer-related death among men in the United States (U.S.), particularly among men aged 45 years and older. Early-detection screening remains a key method of decreasing CRC-related deaths, yet socioeconomic barriers exist to planning and completing CRC screening. While accumulating evidence shows income disparities in CRC screening prevalence, a dearth of research has investigated wealth disparities. This study aimed to determine whether household wealth was associated with CRC screening uptake and future screening intent. In February 2022, we sent an online survey to potential participants; U.S. men aged 45–75 years were eligible to participate. We examined four CRC screening behaviors as outcomes: ever completing a stool-based or exam-based screening test, current screening status, and future screening intent. Household net wealth, determined by self-reported household wealth and debt, was the primary predictor. We used logistic regression to estimate odds ratios (ORs) and their 95% confidence interval (CI). Of the study participants ($N = 499$), most self-identified as Non-Hispanic White, were aged 50–64 years, and had previously completed a CRC screening test. Results revealed that, among men aged 45–49 years, higher net wealth decreased the odds of ever completing a stool- or exam-based test (OR = 0.58, 95% CI: 0.33, 0.98; OR = 0.55, 95% CI: 0.31, 0.94, respectively). By contrast, among men aged 50–75 years, higher net wealth increased the odds of being current with CRC screening (OR = 1.40, 95% CI: 1.03, 1.92). Net wealth was unassociated with CRC screening intent. These findings suggest that household net wealth, rather than income, is an important socioeconomic factor to consider in relation to uptake of CRC early-detection screening. The financial and social cognitive mechanisms linking household wealth to CRC screening behaviors merit future research and intervention.

1. Introduction

Colorectal cancer (CRC) is estimated to contribute to 53,000 deaths in the United States (U.S.) in 2022, making it the third leading cancer-related cause of death among U.S. adults (American Cancer Society, 2022). Furthermore, costs associated with treating CRC account for 14 billion USD annually in healthcare expenditures (Mariotto et al., 2011; Yabroff et al., 2011). While a multitude of factors increase CRC risk, such as family history, smoking, alcohol consumption, and diet (American Cancer Society, 2020; Sawicki et al., 2021), CRC early-detection screening exams remain a key method of increasing survival (Lin et al., 2021; US Preventive Services Task Force, 2021). However, socioeconomic factors can serve as barriers to both planning for and completing CRC screening (Carethers & Doubeni, 2020; Hunleth et al., 2016), along with other barriers such as fear, transportation, antiquated perceptions of colonoscopies, masculinity norms, and racism (Muthukrishnan et al., 2019; Rogers et al., 2017). Removing socioeconomic barriers is one essential step towards increasing CRC screening rates, yet this area of inquiry remains understudied (Community Preventive Services Task Force, 2012).

Abbreviations: CRC, colorectal cancer.

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Research studies using national samples (e.g., the Behavioral Risk Factor Surveillance System) demonstrate the existence of income disparities in CRC screening prevalence, with adults from the lowest income brackets having the lowest screening rates compared with adults from the highest income brackets (Islami et al., 2021; Joseph et al., 2020; Klabunde et al., 2011). While income disparities in screening rates are seen in the uptake of colonoscopies compared with stool-based CRC screening tests (Siegel et al., 2020), income disparities in being current with CRC screening remain regardless of screening-test type (Islami et al., 2021; Klabunde et al., 2011). These disparities may be partly explained by the cost of CRC screening, as adults with health insurance are more likely than those without it to undergo screening (Joseph et al., 2020). Given the monetary cost to obtain health-related services such as CRC screening, an individual's financial resources are a fundamental contributor to their health outcomes that requires further investigation (Link & Phelan, 1995).

Despite the empirical and theoretical connection between income and CRC screening, few studies have examined the potential association between wealth and CRC screening behavior. Higher household wealth (e.g., real estate, savings) has been connected to receiving a greater number of preventive services, including CRC screening (Morales et al., 2004; Solmi et al., 2015). For example, adults aged 60–69 years in the lowest quintile for wealth were less likely to receive CRC screening (42%) relative to those in the highest quintile (66%), an effect of wealth that explained 39% of the variability in CRC screening inequality (Solmi et al., 2015). However, to our knowledge, no studies have assessed these associations among U.S. men, who have the highest CRC incidence rates and poorest survival after diagnosis when compared with U.S. women (Siegel et al., 2020).

Evidence pertaining to socioeconomic barriers to CRC screening may be advanced by including measures of wealth in research studies. At the state level, higher per capita gross domestic product (GDP), an indicator of wealth, is correlated with decreased age-adjusted CRC mortality and decreased CRC mortality relative to the number of CRC diagnoses (Chahoud et al., 2016). Yet it is unclear whether disparities in wealth at the *household level* are associated with CRC outcomes, as to our knowledge no research has examined this question. Household wealth—defined broadly as the accumulation of assets (e.g., home equity, savings, stocks, bonds) relative to debts—offers additional information beyond household income, as it can withstand economic shocks such as loss of employment or health pandemics (Krieger et al., 1997). Additionally, while those with the highest wealth status often also have high incomes, these financial indicators are not perfectly correlated (Wolff, 2004). Overall, wealth is a more comprehensive and stable indicator of an adult's socioeconomic position than income alone because of its connection to social capital, political power, and prestige (Diemer et al., 2013). An association between wealth and CRC screening would be consistent with fundamental cause theory (Link & Phelan, 1995; Phelan et al., 2004) and would provide further evidence to encourage policy makers to increase equitable access to CRC screening tests.

Bearing in mind prior research findings that greater wealth is associated with fewer chronic diseases and decreased mortality (Pollack et al., 2007), we aimed to determine whether, among men aged 45–75 years, self-reported total household net wealth was related to CRC screening uptake and future screening intent. We hypothesized that, compared with men with lower self-reported household net wealth, those with higher self-reported household net wealth would have a greater probability of having completed and of being current with CRC screening and a higher probability of having future CRC screening intent.

2. Methods

2.1. Study location and sampling procedures

This study was approved by the Institutional Review Board at the University of Utah (IRB #00149604). Potential participants were identified through an administrative and commercial survey sampling company (Qualtrics, LLC, Provo, UT). To be eligible to participate, respondents needed to identify as male,[1] be aged 45–75 years, and be able to read in English. We focused on men aged 45 to 75 because the U.S. Preventive Services Task Force (USPSTF) now recommends that average-risk adults initiate CRC screening at age 45 (US Preventive Services Task Force, 2021).

In February 2022, survey invitations were sent to verified consumer-panel members through various online sources (e.g., customer loyalty portals, targeted email lists, permission-based networks). Interested participants were directed to an anonymous online survey that first presented them with a description of the study and asked for their consent. Participants who consented first answered a set of eligibility questions, after which eligible participants were directed to complete the remainder of the survey. After submitting their completed survey, participants received their previously agreed-upon compensation (e.g., retail outlet points, gift cards, airline miles).

2.2. Sample size consideration

A target sample of 500 men was determined prior to administering the survey. We expected that approximately 45% of men aged 45–75 years would be current with CRC screening, whereas only 35% of men from lower socioeconomic backgrounds were expected to be current. These numbers were based on the percentage of all adults who are current with CRC screening across ages (21%–67%) and that for adults with lower household incomes and educational attainment, which is roughly 10–20% lower than for all adults (American Cancer Society, 2020). A power analysis for a logistic regression model, conducted using G*Power version 3.1.9.4 (Faul et al., 2007), revealed that enrolling approximately 400 participants would provide at least 80% power, considering a potentially strong correlation between wealth, income, and other covariates (e.g., educational attainment). A final sample of 500 men was targeted in case the effect was less strong.

2.3. Study sample

Survey invitations were sent to 5,147 potential participants, of whom 1,544 (30%) clicked on the survey link. Of the 1,149 participants who consented to participate in the study (75%), 946 (62%) were not eligible and 80 (5%) did not complete and submit their survey. In total, 505 men consented and completed the survey. After inspecting the data, six additional participants (1.2%) were excluded from the final analysis because they self-identified their race/ethnicity as Non-Hispanic (NH) other, thus precluding generalizability of their results. The final sample size was 499 men.

2.4. Research instruments

2.4.1. Dependent variables

To assess CRC screening uptake we used three binary variables, with response options of No or Yes. Participants were asked if they had ever completed an at-home blood-stool test (*stool-based test*) or ever had a sigmoidoscopy or colonoscopy (*exam-based test*). If participants indicated completion of either screening test, they were asked if they were current with CRC screening. We created a current CRC screening status (up-to-date) variable by grouping all participants who reported being current with screening and all those who reported never having had a screening test or not being current with screening. Last, we asked all

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[1] Potential participants responded to the eligibility question "Do you currently describe yourself as male, female, or transgender?" Participants also had the option to select "None of these" as a response option. Participants that selected "male" were included in this study.

participants whether they intended to obtain CRC screening in the future, providing six response options ("No, will not get screened"; "No, but have considered getting screened"; "Yes, at some time, but not within 2 years"; "Yes, in the next 1–2 years"; "Yes, in the next 7–12 months"; "Yes, in the next 6 months"). Responses were segmented into two groups: "No, will not get screened" (0) compared with "Yes," regardless of the timeline (1).

2.4.2. Independent variables

The main independent variable was the self-reported household wealth-to-debt ratio. We asked participants if they or anyone in their household who contributed to the household budget had any assets (e.g., home ownership, retirement funds, savings account). Participants who responded *Yes* or *Maybe* were then asked to approximate the total amount of their assets; six interval response options were provided (less than $25,000; $25,000 to $49,000; $50,000 to $100,000; $100,000 to $149,000; $150,000 to $199,000; $200,000 or more). Participants were then asked if they or anyone in their household who contributed to the household budget had any debt (e.g., mortgage, credit cards, car loans). Participants who responded *Yes* or *Maybe* were then asked to approximate the total amount of their debts; the same six interval response options were provided (less than $25,000 to $200,000 or more). For assets and debts, we used the midpoint of each interval and the bottom and top-coded values. A wealth-to-debt ratio (hereafter referred to as household net wealth) was calculated by dividing assets by debts; negative values indicated that participants had more debt than assets.

2.4.3. Covariates

We included household income and educational attainment as covariates. For household income, we asked participants to report their income before taxes, as well as the income of everyone living in their household who contributed to the household budget; 12 interval response options were provided (less than $20,000 to $150,000 or more). We used the midpoint of each interval and the bottom and top-coded values. For educational attainment, we asked participants to report the highest level of school they had completed or the highest degree they had received. To maximize sample size, responses were categorized as: some schooling ("8th grade or less" to "12th grade, no diploma"); high school diploma or GED; some college (no degree), college degree (associate's or bachelor's), and advanced degree (e.g., MS, MPH, MD, JD, PhD). Age was also included as a covariate, which we coded categorically (i.e., 45 to 49, 50 to 64, and 65 to 75) to reflect the USPSTF's recommendation to change the age to initiate CRC screening from 50 to 45 years (US Preventive Services Task Force, 2021); 65 years and older was chosen as a third category given that adults are eligible to enroll in Medicare at this age. Other included covariates were: self-identified race/ethnicity; insurance status (has insurance vs uninsured); relationship status (married or in a relationship vs single, divorced, separated or widowed); family history of CRC (no or yes), having a primary care physician (PCP; yes or no), and having received advice from a PCP to be screened for CRC (yes or no). We could not include having received a past CRC diagnosis (yes or no) as a covariate because the small cell size (n = 12) resulted in a very wide confidence interval (CI). For this reason, a sensitivity analysis was conducted by excluding men with a prior CRC diagnosis.

2.5. Data analysis

Analyses were conducted in RStudio version 2021.9.1 (R version 4.1.2). We used means, standard deviations, and frequencies to summarize participant characteristics and study variables. Unadjusted and adjusted logistic regression was used to predict the odds of CRC screening uptake. Continuous variables, (i.e., household net wealth, household income) were standardized to make the interpretation of a unit change more meaningful. A unit change reflects an increase or decrease of one standard deviation (SD) relative to the mean.

We examined each dependent variable in separate models. First, each dependent variable was regressed on household net wealth and household income; then, all covariates were included in a second model. For CRC screening intent, we included prior completion of a CRC screening test as a covariate in a third model. As an exploratory test, we included an effect modification by age category; a multiplicative product term was computed for each age category with household net wealth and household income. We further examined the influence of age in estimating the association between wealth and CRC screening behavior by excluding men aged 45–49 years, given that screening of this age group was only recently recommended (US Preventive Services Task Force, 2021). A supplemental analysis was conducted to estimate the association between household net wealth and CRC screening behaviors for NH Black, Hispanic, and NH White men; this analysis and respective results are provided in Supplemental Material (see Appendix A). Co-efficients and their 95% CI were exponentiated to into odds ratios (ORs) for ease of interpretation. Multicollinearity between model variables was tested via the variance inflation factor (VIF) in the car version 3.0.12 R package (Fox & Weisberg, 2019). We used a threshold of 2.5 as an indication of potential bias due to multicollinearity (Midi et al., 2010).

2.6. Missing data

We used the naniar R package version 0.6.1 (Tierney et al., 2021) to examine patterns of missing data. A very small percentage of participants (1.4%) were missing data on at least one variable. Three participants (0.6%) were missing data for household net wealth, one was missing data on CRC screening intent (0.2%), and one (0.2%) was missing data on all three CRC screening uptake variables. Given the small percentage of missing data, we used a listwise deletion approach to exclude these participants.

3. Results

3.1. Summary statistics

Table 1 displays the summary statistics across men included in the analysis (N = 499). Most men in this sample were NH White (58.3%), were aged 50–64 years (49.9%), were medically insured (92.8%), were married or in a relationship (61.5%), had no family history of CRC or were unsure (87.6%), had a PCP (87.6%), had never received advice to be screened for CRC (60.1%), and had never been diagnosed with CRC (97.6%). More than half of the participants (53.7%) reported having received an exam-based screening test in the past, whereas fewer (37.5%) reported ever having completed a stool-based test; 44.7% indicated they were current with CRC screening. Most men (82.4%) reported having intent to obtain CRC screening in the future. Household net wealth ranged from $200,000 or more in total debt to $200,000 or more in net wealth (mean net wealth = $46,111, 95% CI: $38,831–$53,391; median net wealth = $12,001, IQR: $0–$99,501). Household income ranged from less than $20,000 per year to more than $150,000 per year (mean income = $69,414, 95% CI: $65,786–$73,043; median income = $62,000, IQR: $32,000–$87,500).

3.2. Wealth and CRC screening uptake

Household net wealth was not significantly associated with ever having completed a stool-based test (Table 2) or an exam-based test (Table 3). However, we observed a significant interaction between household net wealth and age. Compared to men aged 50–64 years (OR = 1.26 95% CI: 0.92, 1.74), a SD increase in household net wealth was associated with a 42% decrease in the odds of ever having completed a stool-based test among men aged 45–49 years (OR = 0.58, 95% CI: 0.33, 0.98). Similarly, compared to men aged 50–64 years (OR = 1.32, 95% CI: 0.96, 1.82), a SD increase in household net wealth was associated

Table 1
Summary statistics of participant characteristics and study variables ($N = 499$ men).

Variable	Mean (SD) or Frequency (%)
Completed Stool-Based Test	
Yes	187 (37.47)
No	311 (62.32)
Completed Exam-Based Test	
Yes	268 (53.71)
No	230 (46.09)
Up-to-Date with CRC Screening	
Yes	223 (44.69)
No	275 (55.11)
CRC Screening Intention	
Yes	411 (82.36)
No	87 (17.43)
Household Net Wealth[a]	46.11 (82.52)
Household Income[a]	69.41 (41.25)
Educational Attainment	
Some High School	56 (11.22)
High School Diploma or GED	76 (15.23)
Some College	127 (25.45)
College Degree	172 (34.47)
Advanced Degree	68 (13.63)
Age	
45 to 49	101 (20.24)
50 to 64	249 (49.90)
65 to 75	149 (29.86)
Race/Ethnicity	
Hispanic/Latinx	102 (20.44)
NH Asian American	31 (6.21)
NH American Indian/Alaska Native	8 (1.60)
NH Black/African American	55 (11.02)
NH Multiracial	12 (2.40)
NH White	291 (58.32)
Insurance Status	
Yes	463 (92.79)
No	35 (7.01)
Relationship Status	
Single, Divorced, Separated, or Widowed	191 (38.28)
Married or In a Relationship	307 (61.52)
Family History of CRC	
Yes	62 (12.42)
No or Unsure	437 (87.58)
Primary Care Physician (PCP)	
Yes	437 (87.58)
No	62 (12.42)
Screening Advice in Past 12 Months	
Yes	199 (39.88)
No	300 (60.12)
Diagnosed with CRC in Past	
Yes	12 (2.40)
No	487 (97.60)

Note. [a] Reported in thousands (USD). SD = standard deviation.

Table 2
Model results for the association between wealth and ever completing a stool-based screening test for colorectal cancer (CRC) among U.S. Men.

Coefficients	Adjusted		Adjusted with Interactions	
	OR	95 % CI	OR	95% CI
Constant	0.88	0.45, 1.74	0.86	0.43, 1.72
Household Net Wealth	0.92	0.75, 1.14	1.26	0.92, 1.74
Household Income	0.90	0.70, 1.15	0.70	0.49, 0.99
Educational Attainment				
Some High School	0.36	0.14, 0.86	0.36	0.14, 0.87
High School Diploma or GED	0.48	0.22, 1.03	0.50	0.23, 1.09
Some College	0.44	0.23, 0.87	0.45	0.22, 0.88
College Degree	0.45	0.24, 0.82	0.45	0.24, 0.84
Age				
45–49 years	0.86	0.49, 1.51	0.66	0.33, 1.26
65–75 years	1.93	1.23, 3.04	2.09	1.31, 3.34
Race and Ethnicity				
Hispanic/Latinx	1.21	0.71, 2.04	1.24	0.73, 2.12
NH Asian American	0.93	0.38, 2.19	0.94	0.37, 2.27
NH American Indian/Alaska Native	1.72	0.33, 7.87	1.71	0.32, 7.87
NH Black/African American	1.23	0.65, 2.34	1.22	0.63, 2.35
NH Multiracial	1.49	0.39, 5.33	1.49	0.39, 5.37
No Insurance	1.04	0.39, 2.62	0.94	0.34, 2.39
Single, Divorced, Separated, or Widowed	0.75	0.48, 1.16	0.73	0.47, 1.15
Has Family History of CRC	0.87	0.48, 1.55	0.82	0.45, 1.47
No primary care physician (PCP)	0.31	0.13, 0.69	0.33	0.13, 0.72
Advised to get CRC screening	2.04	1.36, 3.08	2.09	1.38, 3.16
Household Net Wealth X 45 to 49			0.46	0.24, 0.84
Household Net Wealth X 65 to 75			0.61	0.38, 0.98
Household Income X 45 to 49			1.64	0.94, 2.92
Household Income X 65 to 75			1.55	0.94, 2.56

Note. OR = Odds ratio. 95% CI = 95% confidence interval.

Table 3
Model results for the association between wealth and ever having received an exam-based screening test for colorectal cancer (CRC) among U.S. Men.

Coefficients	Adjusted Model		Adjusted with Interactions	
	OR	95 % CI	OR	95% CI
Constant	1.71	0.84, 3.52	1.71	0.84, 3.55
Household Net Wealth	1.01	0.81, 1.26	1.32	0.96, 1.82
Household Income	1.24	0.96, 1.60	0.97	0.70, 1.35
Educational Attainment				
Some High School	0.80	0.32, 1.98	0.78	0.31, 1.98
High School Diploma or GED	0.46	0.21, 1.02	0.48	0.21, 1.07
Some College	0.68	0.33, 1.39	0.68	0.33, 1.40
College Degree	0.59	0.30, 1.13	0.60	0.30, 1.15
Age				
45–49 years	0.39	0.22, 0.69	0.27	0.13, 0.52
65–75 years	1.81	1.13, 2.93	1.93	1.18, 3.25
Race and Ethnicity				
Hispanic/Latinx	0.66	0.39, 1.13	0.66	0.38, 1.15
NH Asian American	0.34	0.14, 0.82	0.33	0.13, 0.82
NH American Indian/Alaska Native	0.75	0.16, 3.69	0.67	0.14, 3.40
NH Black/African American	1.33	0.68, 2.63	1.31	0.67, 2.63
NH Multiracial	0.74	0.20, 2.57	0.70	0.19, 2.44
No Insurance	0.32	0.11, 0.82	0.26	0.09, 0.70
Single, Divorced, Separated, or Widowed	1.42	0.91, 2.23	1.46	0.93, 2.32
Has Family History of CRC	2.60	1.37, 5.15	2.42	1.27, 4.77
No primary care physician (PCP)	0.25	0.11, 0.53	0.26	0.11, 0.54
Advised to get CRC screening	1.49	0.98, 2.27	1.53	1.00, 2.34
Household Net Wealth X 45 to 49			0.42	0.22, 0.77
Household Net Wealth X 65 to 75			0.69	0.41, 1.13
Household Income X 45 to 49			1.72	0.99, 3.06
Household Income X 65 to 75			1.64	0.96, 2.90

Note. OR = Odds ratio. 95% CI = 95% confidence interval.

with a 45% decrease in the odds of ever having received an exam-based test among men aged 45–49 years (OR = 0.55, 95% CI: 0.31, 0.94). Household net wealth remained unassociated with ever completing a stool-based or exam-based test when men aged 45–49 years were excluded from the analysis, and we saw no evidence of effect modification by age group. In the sensitivity analysis, excluding men with a prior CRC diagnosis did not substantially affect these associations, with one exception: the association between household net wealth and ever having completed a stool-based test was not significantly different between men aged 50–64 years and those aged 65–75 years.

After adjustment for household income only, household net wealth was significantly associated with being current with CRC screening (OR = 1.36, 95% CI: 1.13, 1.65), but this association did not remain significant when covariates were included (Table 4). However, a SD increase in household net wealth was associated with a 41% increase in the odds of being current with CRC screening among men aged 50–64 years (OR = 1.41, 95% CI: 1.03, 1.94). Household net wealth was associated with being current with CRC screening when men aged 45–49 years were

excluded from the analysis, and we saw no evidence of effect modification by age group. Thus, household net wealth was associated with increased odds of being current with CRC screening for men aged 50–75

Table 4
Model results for the association between wealth and being up-to-date with colorectal cancer (CRC) screening among U.S. Men.

Coefficients	Adjusted		Adjusted with Interactions	
	OR	95 % CI	OR	95% CI
Constant	0.98	0.49, 1.97	0.98	0.48, 1.99
Household Net Wealth	1.13	0.91, 1.41	1.41	1.03, 1.94
Household Income	1.27	0.99, 1.64	1.23	0.88, 1.72
Educational Attainment				
Some High School	0.63	0.25, 1.55	0.59	0.23, 1.46
High School Diploma or GED	0.44	0.20, 0.98	0.45	0.20, 0.99
Some College	0.85	0.42, 1.70	0.83	0.41, 1.67
College Degree	0.71	0.38, 1.33	0.69	0.36, 1.31
Age				
45–49 years	0.35	0.19, 0.64	0.31	0.15, 0.61
65–75 years	2.14	1.36, 3.41	2.24	1.40, 3.63
Race and Ethnicity				
Hispanic/Latinx	0.83	0.48, 1.43	0.85	0.49, 1.48
NH Asian American	0.54	0.21, 1.30	0.49	0.19, 1.21
NH American Indian/Alaska Native	0.75	0.14, 3.65	0.81	0.15, 3.94
NH Black/African American	0.95	0.49, 1.83	0.95	0.49, 1.85
NH Multiracial	1.40	0.37, 5.17	1.38	0.36, 5.06
No Insurance	0.63	0.21, 1.66	0.61	0.20, 1.63
Single, Divorced, Separated, or Widowed	1.31	0.84, 2.04	1.34	0.85, 2.12
Has Family History of CRC	1.31	0.71, 2.41	1.30	0.71, 2.39
No primary care physician (PCP)	0.21	0.08, 0.50	0.21	0.08, 0.50
Advised to get CRC screening	1.59	1.06, 2.41	1.65	1.09, 2.52
Household Net Wealth X 45 to 49			0.50	0.26, 0.94
Household Net Wealth X 65 to 75			0.71	0.44, 1.15
Household Income X 45 to 49			0.97	0.55, 1.75
Household Income X 65 to 75			1.15	0.69, 1.94

Note. OR = Odds ratio. 95% CI = 95% confidence interval.

years (OR = 1.40, 95% CI: 1.03, 1.92). In the sensitivity analysis, excluding men with a prior CRC diagnosis did not substantially affect these associations.

3.3. Wealth and CRC screening intent

Household net wealth was not significantly associated with future CRC screening intent, nor did we see evidence of effect modification by age (Table 5). Household net wealth remained unassociated with CRC screening intent when men aged 45–49 years were excluded from the analysis, and we saw no evidence of effect mediation by age group. In the sensitivity analysis, excluding men with a prior CRC diagnosis did not substantially affect these associations.

4. Discussion

This study is one of the first to examine the relationship between self-reported household net wealth and CRC screening behaviors among a sample of U.S. men aged 45–75 years. We hypothesized that, compared with men with lower household net wealth, men with higher household net wealth would be more likely to have completed a CRC screening test, be current with CRC screening, and have future CRC screening intent. The study results partially supported our hypothesis, as wealth was associated with ever having completed a stool-based or exam-based test and with being current with CRC screening, but only for specific age groups. Overall, the intersection of wealth and age has implications for understanding CRC early-detection screening behavior.

As expected, higher household net wealth was associated with increased odds of being current with CRC screening, specifically for men aged 50–75 years. Men with higher wealth may have greater access to medical care, are more likely to have a college degree and to be insured, and face fewer financial barriers to receive cancer screening tests, all of which are associated with greater adherence to CRC screening (Carethers & Doubeni, 2020; Islami et al., 2021; Joseph et al., 2020).

Table 5
Model results for the association between wealth and intention to obtain screening for colorectal cancer (CRC) in the future among U.S. Men.

Coefficients	Adjusted		Adjusted for Prior CRC Screening		Adjusted with Interactions	
	OR	95 % CI	OR	95 % CI	OR	95 % CI
Constant	11.08	3.98, 35.46	3.99	1.32, 13.58	4.41	1.41, 15.56
Household Net Wealth	0.95	0.69, 1.30	0.92	0.65, 1.31	0.73	0.40, 1.36
Household Income	1.18	0.82, 1.71	1.05	0.71, 1.55	1.36	0.78, 2.50
Educational Attainment						
Some High School	0.28	0.08, 0.91	0.30	0.08, 1.03	0.26	0.07, 0.93
High School Diploma or GED	0.40	0.12, 1.21	0.55	0.16, 1.72	0.52	0.15, 1.65
Some College	0.79	0.25, 2.27	0.99	0.30, 2.96	0.91	0.27, 2.80
College Degree	0.59	0.20, 1.54	0.83	0.27, 2.28	0.8	0.25, 2.23
Age						
45–49 years	0.59	0.29, 1.17	0.81	0.40, 1.65	0.88	0.42, 1.85
65–75 years	0.62	0.32, 1.22	0.44	0.21, 0.91	0.43	0.20, 0.97
Race and Ethnicity						
Hispanic/Latinx	0.55	0.28, 1.10	0.65	0.32, 1.33	0.64	0.31, 1.33
NH Asian American	1.06	0.31, 4.47	1.29	0.38, 5.40	1.12	0.32, 4.74
NH American Indian/Alaska Native	0.27	0.05, 1.56	0.27	0.04, 1.84	0.32	0.05, 2.16
NH Black/African American	0.99	0.40, 2.68	0.95	0.37, 2.64	0.88	0.34, 2.47
NH Multiracial	0.64	0.14, 3.77	0.72	0.14, 4.75	0.74	0.14, 4.98
No Insurance	0.50	0.20, 1.29	0.59	0.23, 1.56	0.62	0.24, 1.64
Single, Divorced, Separated, or Widowed	1.46	0.80, 2.72	1.40	0.74, 2.70	1.39	0.73, 2.71
Has Family History of CRC	1.82	0.71, 5.48	1.36	0.49, 4.42	1.48	0.52, 4.93
No primary care physician (PCP)	0.21	0.10, 0.41	0.29	0.14, 0.59	0.26	0.13, 0.54
Advised to get CRC screening	3.94	2.00, 8.40	3.24	1.60, 7.06	3.3	1.62, 7.24
Completed Stool-Based Test			1.12	0.57, 2.23	1.17	0.60, 2.34
Completed Exam-Based Test			2.81	1.29, 6.43	3.06	1.38, 7.10
Up-to-Date with CRC Screening			3.17	1.25, 8.41	2.99	1.17, 7.98
Household Net Wealth X 45 to 49					1.51	0.66, 3.50
Household Net Wealth X 65 to 75					1.15	0.49, 2.68
Household Income X 45 to 49					0.51	0.23, 1.10
Household Income X 65 to 75					0.88	0.36, 2.23

Note. OR = Odds ratio. 95% CI = 95% confidence interval.

Additional research is needed to understand if having higher wealth can offset other systemic barriers that marginalized communities encounter such as bias, discrimination, and systemic exclusion (Haviland et al., 2020; Rogers et al., 2017; White & Itzkowitz, 2020).

Men with higher wealth may also receive more personalized care from their PCP, which may encourage greater adherence to cancer screening recommendations (Coughlin & Thompson, 2005; McMorrow et al., 2014). Of the different CRC screening tests, PCPs most often recommend colonoscopies (Klabunde et al., 2009), which have higher

direct and indirect costs than at-home stool-based tests (Jonas et al., 2007; Tangka et al., 2013). More men in our sample had completed a colonoscopy or sigmoidoscopy in the past than had completed a stool-based test. It is plausible that these participants were aware of the financial and time costs associated with exam-based CRC screening, and having greater wealth allowed them to stay current with screening by offering the opportunity to plan better (e.g., to take time off work). Since the mechanism by which wealth increases CRC screening adherence remains unclear, future research should examine different health-care related pathways that may help to better explain the association between wealth and CRC screening. Future research should also examine if marital/relationship status moderates the association between wealth and CRC screening status because married men are more likely to get screened for CRC than men who have never been married (Hanske et al., 2016); more men in our sample were married or in a relationship compared to single, divorced, separated, or widowed.

The association between higher net wealth and being current with CRC screening among men aged 50–75 years was also not surprising, as men aged 50 years and older are at higher risk for developing CRC (Siegel et al., 2020). Until 2021, the USPSTF recommended CRC screening for all adults aged 50–75 years (US Preventive Services Task Force, 2021). Its recent decision to recommend the initiation of screening at age 45 years for those at average risk may moderately increase life expectancy and decrease CRC cases and deaths compared with beginning screening at age 50 years (Knudsen et al., 2021). Nevertheless, as this change is relatively recent, many clinicians may continue to follow the previous USPSTF recommendation and only offer screening to men 50 years and older. Once adherence to USPSTF's revised recommendations has become more widespread, our study should be replicated to elucidate whether our findings of effect modification by age are attributed to age-related factors or if men aged 45–49 years are not caught up yet with the changes in CRC screening recommendations.

Household net wealth was unassociated with men's future CRC screening intent. This finding suggests that men's socioeconomic position, and the social and financial resources associated with it, do not directly increase their CRC screening intent. However, given that household net wealth in our study was associated with CRC screening uptake, it is possible that wealth played a different role in the connection to screening intent, since stronger intent to perform a behavior increases the likelihood of actually performing that behavior (Ajzen, 1991). For example, wealth may be associated with perceived behavioral control, thus moderating the association between motivation and intention (Ajzen & Kruglanski, 2019). Moreover, as has been found in prior research on income and other health-related behaviors (for a review, see Hagger & Hamilton, 2021), wealth may be directly related to the cognitive factors that predict level of intent. Nonetheless, unless CRC screening is directly related to a goal, favorable cognitive perceptions of CRC screening will be insufficient for developing intention to get screened (Ajzen & Kruglanski, 2019). Given that men with more wealth generally report better self-rated health than less wealthy men (Hajat et al., 2011), having wealth may decrease forming goals surrounding the need to get screened for CRC. Longitudinal research is warranted to unpack the role of net wealth in the pathway from forming goals to motivation to intent to actual completion of early-detection screening for CRC.

Among men aged 45–49 years, higher household net wealth decreased the odds of ever having completed a CRC stool-based or exam-based test, while the opposite was the case among men aged 50–75 years. This finding contradicts evidence that having more financial resources increases the use of preventive services such as CRC screening (McMorrow et al., 2014; Morales et al., 2004; Solmi et al., 2015). It is essential to determine why having higher household net wealth would decrease the use of CRC screening test use among men aged 45–49 years given the concerning increase in early-onset CRC (i.e., CRC diagnosed among people under age 50; Patel et al., 2022). Given that CRC

incidence and mortality are generally lower for adults who are financially well off compared with those who are financially worst off (Singh & Jemal, 2017), it could be that wealthier men aged 45–49 years are less likely to be advised by their PCP to be screened for CRC because these men may be perceived to be at lower risk for CRC. Wealthier men are also more likely to have access to health-relevant resources, thus reducing the risk of late diagnosis (Reynolds, 2021). Additionally, physicians are more likely to recommend screening for patients aged 50–59 years (Guerra et al., 2007), and as abovementioned, the USPSTF recently adopted its recommendation that CRC screening begin at age 45 in May 2021 (US Preventive Services Task Force, 2021). However, in our sample, net wealth was not associated with having received advice to be screened for CRC, and even after adjustment for having a PCP, higher net wealth remained associated with decreased odd of having completed a CRC screening test among men aged 45–49 years. Perhaps men with more prestigious careers—which often accompany higher wages and a greater likelihood of accumulating wealth—have responsibilities and career-related stress that limit them from engaging in health-promoting behaviors (see Luthar et al., 2013). All considered, other factors specifically related to wealth may be in play that require further investigation.

Among men aged 50–75 years, higher self-reported household net wealth was not significantly associated with increased odds of ever having completed a CRC stool-based or exam-based screening test. These results contrast with the finding from prior research that higher household wealth increases utilization of preventive services such as CRC screening (Morales et al., 2004; Solmi et al., 2015). However, our findings do align with published studies suggesting that money is not a key determinant of having completed a CRC screening exam (Issaka & Dominitz, 2021; Levin, 2017). For example, offering a financial incentive to adults who are eligible for CRC screening has not been consistently found to increase screening uptake (Facciorusso et al., 2021), although larger incentives (e.g., $100) that offset some of the costs associated with screening may help to some degree compared with smaller incentives (e.g., $5, $10; Mehta et al., 2017). Additionally, increasing insurance coverage for adults with lower incomes was estimated to increase CRC screening by 4%, yet their completion rates remained 10% lower than those of adults with higher incomes, suggesting that educational attainment, age, and current health status also drive income disparities in screening rates (McMorrow et al., 2014). Therefore, a myriad of factors contribute to CRC screening test completion and increasing uptake requires addressing more than one component such as reducing out-of-pockets costs, reminding patients to get screened, providing transportation, and increasing provider delivery (Carethers & Doubeni, 2020; Guide to Community Preventive Services, 2016). It may be that greater wealth facilitates the completion a CRC screening test for those who are *already* considering undergoing CRC screening (Issaka & Dominitz, 2021).

4.1. Limitations

This novel study is not without limitations. First, we measured household net wealth using men's self-reports of their household's estimated total assets and debts rather than specific types of assets (e.g., home ownership) and debts (e.g., mortgage). The type of assets and/or debts have been found to have different associations for particular health-related behaviors and outcomes (Krieger et al., 1997). However, our survey questions regarding household assets and debts may have increased participants' willingness to answer the question, thus avoiding nonresponse bias (Diemer et al., 2013). Second, men self-reported their CRC screening behaviors, which could misrepresent their actual completion and current screening status (Smyth et al., 2020). Nonetheless, these self-report data have allowed us to provide one of the first pieces of evidence on the association between individual-level net wealth and CRC screening behavior among a national sample of 499 U.S. men. Third, more men in our sample identify as NH White compared to

other racial/ethnic subsamples, which limited our ability to test the association between wealth and CRC screening behaviors stratified by race/ethnicity. However, in our supplemental analysis, the association between wealth and CRC screening uptake did not appear to be different for NH Black, Hispanic, and NH White men. Finally, our sample included fewer men aged 45–49 years relative to men aged 50–64 years. Given the USPSTF's 2021 recommendation that adults should initiate CRC screening at age 45 instead of age 50 (US Preventive Services Task Force, 2021), our findings will need to be re-examined in the future in a larger sample of men aged 45 to 49. Nonetheless, we were able to demonstrate differences in the association between household net wealth and CRC screening behaviors between men aged 45 to 49 and those aged 50–64 years.

5. Conclusion

The current study advances research on the potential negative impact of socioeconomic position on CRC early-detection screening completion. We have demonstrated that household net wealth, which has been largely understudied in CRC screening-related research, plays a key role in men's completion of a CRC screening exam and in being current with their screening. Higher household net wealth was associated with decreased odds of ever having completed a CRC stool-based or exam-based test among men aged 45–49 years and with increased odds of being current with CRC screening among men aged 50–75 years. Additional research is needed to better grasp the mechanisms that help explain these associations. For now, greater efforts are warranted to reduce socioeconomic disparities in CRC screening rates among U.S. men.

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CRediT authorship contribution statement

Kevin M. Korous: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing, Funding acquisition, Project administration. **Adolfo G. Cuevas:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing. **Jad Chahoud:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing. **Uchenna C. Ogbonnaya:** Methodology, Writing – original draft, Writing – review & editing. **Ellen Brooks:** Conceptualization, Writing – original draft, Writing – review & editing, Project administration. **Charles R. Rogers:** Conceptualization, Methodology, Supervision, Writing – original draft, Writing – review & editing, Funding acquisition.

Declaration of competing interest

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssmph.2022.101222.

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