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Socio-Psychological Factors in the Expanded Health Belief Model and Subsequent Colorectal Cancer Screening

Nancy L Sohler,

Community Health and Social Medicine, Sophie Davis School of Biomedical Education, City College of New York, New York, USA

Anthony Jerant, and

Department of Family and Community Medicine, University of California Davis School of Medicine, Sacramento, USA

Peter Franks

Department of Family and Community Medicine, University of California Davis School of Medicine, Sacramento, USA

Nancy L Sohler: nsohler@med.cuny.edu

Abstract

Objective—CRC screening interventions tailored to the Expanded Health Belief Model (EHBM) socio-psychological factors have been developed, but the contributions of individual factors to screening outcomes are unclear.

Methods—In observational analyses of data from a randomized intervention trial, we examined the independent associations of five EHBM factors - CRC screening knowledge, self-efficacy, stage of readiness, barriers, and discussion with a provider – with objectively measured CRC screening after one year.

Results—When all five factors were added simultaneously to a base model including other patient and visit characteristics, three of the factors were associated with CRC screening: self-efficacy (OR=1.32, p=0.001), readiness (OR=2.72, p<0.001), and discussion of screening with a provider (OR=1.59, p=0.009). Knowledge and barriers were not independently associated with screening. Adding the five socio-psychological factors to the base model improved prediction of CRC screening (area under the curve) by 7.7%.

Conclusion—Patient CRC screening self-efficacy, readiness, and discussion with a provider each independently predicted subsequent screening.

Corresponding author at: Anthony Jerant, Department of Family and Community Medicine, University of California Davis School of Medicine, 4860 Y Street, Suite 2300, Sacramento, California 95817 USA, afjerant@ucdavis.edu, (916) 734-7081 (telephone); (916) 734-5641 (fax).

Conflict of Interest

None of the authors have conflicts of interest to disclose

Practice implications—Self-efficacy and readiness measures might be helpful in parsimoniously predicting which patients are most likely to engage in CRC screening. The importance of screening discussion with a provider suggests the potential value of augmenting patient-focused EHBM-tailored interventions with provider-focused elements.

Keywords

Expanded health belief model; colorectal cancer; theoretical models; screening behavior; socio-psychological factors

1. Introduction

Screening for colorectal cancer (CRC) can reduce CRC mortality,[1] but use of CRC screening remains low relative to other evidence-based preventive services.[2] Theory-driven interventions to encourage CRC screening have been developed to favorably influence the socio-psychological factors described in the Expanded Health Belief Model (EHBM) (e.g. screening barriers and self-efficacy) and related factors (e.g. stage of readiness), with the distal aim of increasing patient adoption of targeted screening behaviors.[3,4] However, in randomized controlled trials (RCTs), theory-driven interventions have not consistently led to the desired changes in behaviors, including in CRC screening behaviors.[5–18] Further, even in the trials that found significant behavioral effects, the standardized behavioral effect sizes generally were small.[8,9] To improve intervention approaches for the future, it is important to understand why these approaches have not been more consistently successful.

Despite the fact that many interventions apply the EHBM, few studies have rigorously explored the relative contributions of the EHBM and related constructs to the behavior changes targeted in these interventions.[19] In intervention studies specifically related to CRC screening behaviors, few report on the status of such constructs post-intervention or their contribution to behavior change.[20–23] Furthermore, CRC screening outcomes were typically self-reported by patients and measured simultaneously with socio-psychological factors,[11,14,15] so the temporal nature of the relationships between the socio-psychological factors and the health behaviors was unclear. For these reasons the relative associations of factors commonly measured and addressed in EHBM-tailored interventions with subsequent objectively determined CRC screening behaviors remain unknown.

We examined this issue in the current study, conducting secondary observational analyses of data from an RCT of an experimental CRC screening intervention for patients that was individually tailored to EHBM socio-psychological factors. We evaluated the prospective associations of EHBM and related factors with objectively measured CRC screening. Measures of three EHBM factors (self-efficacy, barriers, and cues to action) and of two related factors (knowledge and stage of readiness) were collected after the participants had received their assigned study intervention and had seen their primary care provider for a scheduled visit. While knowledge and stage of readiness are not included in the description of the EHBM, both are important in evaluating how EHBM constructs contribute to CRC screening. Knowledge is often viewed as necessary to promote behavior change, and commonly cited as a modifying factor in the EHBM.[24] Similarly, behavioral experts call

attention to the interrelationship of the EHBM with stage of readiness to change behavior.[25] CRC screening was ascertained objectively by medical record review at one year follow-up. Based on the existing literature regarding the association of socio-psychological factors with CRC screening,[12.26] we hypothesized that, after adjusting for baseline patient and visit characteristics that may influence screening (e.g., patient age, education, health status, insurance, and prior screening), CRC screening knowledge, barriers, self-efficacy, and stage of readiness and discussion of screening with the visit provider each would be significantly associated with receipt of CRC screening both when examined individually, and when examined simultaneously in a single adjusted model.

2. Methods

2.1 Participants

The study was conducted from February 1, 2010 through November 30, 2012. Patients aged 50–75 years who were either English- or Spanish-speaking and were not up-to-date for CRC screening were recruited at the time of previously scheduled appointments in primary care clinics in five sites: Sacramento, California (ten clinics); Bronx, New York (one clinic); Rochester, New York (three clinics); San Antonio, Texas (four clinics); and Denver, Colorado (eight clinics in and around Denver). Patients were considered to be not up-to-date for CRC screening if none of the following was documented or reported: fecal occult blood test (FOBT) within one year; flexible sigmoidoscopy within five years; or colonoscopy within ten years. This study includes the 1,101 participants randomized in the parent study that had complete baseline and follow-up data (94.6% of the randomized sample).

2.2 Study Procedures

The aim of the parent RCT was to compare the effectiveness of an interactive multimedia computer program that was tailored to EHBM and related socio-psychological factors with a non-tailored informational control program. Both interventions were offered to patients in primary care clinics immediately before their scheduled provider visits. Details of the study design and procedures are available elsewhere.[27] Briefly, the tailored program messages addressed the status of several factors previously shown to be associated with CRC screening: knowledge, self-efficacy, and stage of readiness. The tailored program messages also were crafted to reduce common perceived barriers to screening (e.g., to address the fear that screening will be painful, intervention messages state that severe pain with colonoscopy is uncommon and nonexistent with FOBT), and to help overcome “actual” barriers (e.g., to address concerns that screening is not affordable, intervention messages state that, while some copayment may be required, most insurance plans cover the bulk of CRC screening costs, and that FOBT is generally a lower cost alternative). Beyond favorably influencing the status of these EHBM socio-psychological factors, a proximal aim of the tailoring was to motivate patients to discuss CRC screening with their primary care provider during an office visit immediately following the patient’s use of the intervention, which would be a trigger for engaging in screening behavior. The ultimate aim of the tailored intervention was to encourage patients to actually complete CRC screening by either FOBT or colonoscopy during a one year study follow-up period.

The interventions and interviews were self-administered using touchscreen notebook computers. Research assistants administered written informed consent and then showed participants how to use the computer program. The computer program randomly assigned participants to either the tailored or non-tailored intervention. Since one of the aims of the parent study was to compare efficacy of the tailored intervention for Spanish-speaking Hispanics with others, randomization was stratified by patient language and ethnicity. Randomization also was implemented in blocks of ten participants within each ethnicity/language stratum to ensure approximately equal numbers across groups over the course of the study. Participants completed a computer-based baseline questionnaire and their assigned intervention before the primary care provider visit. Immediately after the visit, participants completed a follow-up questionnaire on the computer and received an incentive worth $20. Approximately one year, data collection personnel conducted medical chart reviews. Institutional review board approval was obtained at all study performance sites.

2.3 Measures

EHBM and related socio-psychological factors were measured in both pre- and post-intervention questionnaires. The current analyses employed the post-intervention measures, including knowledge, barriers, self-efficacy, stage of readiness, and discussion of screening with provider.

Knowledge was measured using 12-item scale that included knowledge about CRC screening recommendations, risk of not obtaining CRC screening, risks associated with CRC screening tests, and common inconveniences associated with CRC screening tests. One point was given to each correct answer, resulting in an overall score that ranges from 0 to 12 (higher score = greater knowledge, Cronbach's alpha = 0.81). *Barriers* to CRC screening were measured using a 9-item Likert-like scale for FOBT-related barriers (Cronbach's alpha = 0.86) and a 10-item Likert-like scale for colonoscopy-related barriers (Cronbach's alpha = 0.87). Respondents were asked the degree to which they endorsed each item using a range of 1 to 5 (higher scores = fewer barriers). The average item rating for each barriers scale is report.[28] CRC screening *self-efficacy* was measured using two items. Patients were asked to rate the degree to which they agreed with statements about their ability to obtain FOBT and colonoscopy screening (range 1–5, higher score= higher self-efficacy). Each item is reported separately. *Stage of readiness to change behavior* was measured as stage of readiness for either FOBT or colonoscopy (e.g., pre-contemplation, contemplation, or planning). We used a modified version of a previously single validated item.[29] An indicator variable for planning versus contemplation or pre-contemplation was used in the current analysis. Each knowledge, barrier, and efficacy measure was used as a continuous measure in the current analysis; stage of readiness was used as an indicator variable. Discussion of screening with provider, a measure for *cues to action*, was obtained by asking patients to report whether or not CRC screening was discussed with the provider during the study visit (yes or no).

The dependent measure for this analysis was CRC screening (FOBT, flexible sigmoidoscopy, or colonoscopy versus none) during one year follow-up, which was

ascertained by medical record review. Medical record review data collection personnel were blinded to participants' study group.

Other patient and visit characteristics that were included were socio-demographic characteristics, prior CRC screening behavior, and health status. *Sociodemographic* measures included age (measured continuously), gender (female versus male), race/ethnicity (Hispanic, black and other versus white), language/ethnicity (English speaking Hispanic and Spanish speaking Hispanic versus English speaking non-Hispanic), education (high school graduate, some college, college graduate and graduate school versus some high school), and health insurance status (no insurance or no information recorded versus any insurance). *Prior CRC screening* behavior was assessed with single items related to FOBT, sigmoidoscopy, and colonoscopy (received versus not received or unsure). *Health status* was measured using a single general health item from the SF-12 (rate your health, in general, range 1–5, higher scores = better health). All of these measures, except health insurance were obtained in the pre-intervention questionnaire. Health insurance data were obtained from medical record reviews.

2.4 Data Analysis

Data analyses were conducted using Stata 13.1 (Stata Corp, College Station, TX). The relationships between one year screening status and all other variables were examined using Chi-squared tests or t-tests as appropriate. The adjusted relationships between screening and predictor variables were examined using a series of logistic regression analyses. All analyses included adjustment for intervention group and study site. The first (base) analysis included all patient and visit variables other than the EHBM and related socio-psychological factors. Then a series of analyses examined, in turn, the individual additional contribution of each of the five socio-psychological factors: knowledge, barriers, self-efficacy, readiness to change, and cues to action. A final model included all five socio-psychological factors together. Odds ratios and 95% confidence intervals for each variable included in each model are reported. To better facilitate interpretation of our results, we additionally report the adjusted average marginal effects of those socio-psychological factors (that is, the percent of people predicted to receive CRC screening for each level of the factor adjusted for other variables in the model). To simplify the presentation of the marginal effects, only socio-psychological factors that were statistically significant in the full model are reported.

3. Results

A total of 250 participants (22.7%) received CRC screening within the one year follow-up period; colonoscopy was performed in 190 (17.3%), FOBT in 75 (6.8%), and sigmoidoscopy in 2 (0.2%). Some people received more than one type of screening test during the follow-up period.

Table 1 shows the characteristics of the screened versus non-screened participants. Screened participants were younger, less likely English-speaking Hispanics, more likely insured, and more likely to report excellent or very good health. With regard to socio-psychological variables, screened participants had greater knowledge, fewer barriers to colonoscopy,

greater self-efficacy for colonoscopy, and were more likely to be planning for screening and to have discussed CRC screening with their provider during the visit.

Table 2 shows CRC screening was associated with four of the five tested socio-psychological variables after adjusting for patient and visit variables, with knowledge being the variable not associated with CRC screening. Table 2 also shows the discrimination (area under the curve [AUC]) of each model, which increased from 67.8% in the base model to 75.5% in the full model. When all EHBM socio-psychological variables were included together, self-efficacy for colonoscopy, planning for screening, and discussion with provider were all statistically significantly associated with subsequent CRC screening. The marginal effects of these three EHBM factors are presented in table 3.

4. Discussion and Conclusion

4.1 Discussion

To our knowledge, our study is the first to examine the prospective associations of various EHBM and related socio-psychological factors (knowledge, barriers, self-efficacy, stage of readiness for change, and cues to action) with objectively measured subsequent CRC screening outcomes at one-year follow-up. Our findings largely supported our first hypothesis, which was that all five of the socio-psychological factors would be individually associated with subsequent CRC screening when examined individually in separate models. Of the five socio-psychological factors tested, only the knowledge variable was not associated with subsequent CRC screening in adjusted analyses. Some previous studies also have shown that knowledge is less important than other socio-psychological components in predicting both CRC behavior [15] and other health behaviors.[30] We also note that FOBT-related perceived barriers and FOBT-related self-efficacy were not associated with future CRC screening, while colonoscopy-related perceived barriers and self-efficacy were. This probably reflects that most study participants who received CRC screening in our study received colonoscopy.

The study findings also partially supported our second hypothesis, which was that all of the study socio-psychological factors together would be significantly associated with subsequent CRC screening when examined simultaneously in a single model. In our analysis of the simultaneous model, only self-efficacy for colonoscopy screening, being in the planning stage of readiness for CRC screening, and discussion of screening with the provider (a measure for cues to action) were statistically significantly associated with CRC screening. Together the addition of all five factors to the base model (including only patient and visit characteristics) improved the prediction model of CRC screening over a base model including patient and visit characteristics by 7.7%.

One possible reason for the lack of significance of the associations of barriers with screening in the simultaneous model could be overlap in the underlying constructs being captured by our measures. Barriers and self-efficacy both relate to perceived behavioral control.[3,30] Barriers are factors that may make behavioral adoption difficult, while self-efficacy is, in essence, one’s perceived ability to adopt a behavior in light of any barriers. It may be that

both the barriers and self-efficacy measures captured the influence of perceived behavioral control on screening, but that self-efficacy did so more powerfully.

The statistically significant associations of self-efficacy, planning for CRC screening, and discussion with provider with subsequent CRC screening, after adjusting for other factors, supports previous research indicating the importance of emphasizing these factors in health behavior promotion interventions.[32] Not only statistically significant, the magnitude of our findings was clinically significant as well. The adjusted predicted percent of the cohort screened was 20% higher for those reporting the highest level of self-efficacy relative to those reporting the lowest. Similarly, the percent screened was 16.3% higher in those who reported having plans for CRC screening within the next month than in those not yet planning screening, and 6.8% higher in those who reported discussion with provider compared with those who did not report such discussion. Our data suggest that a single-item measure of self-efficacy or stage of readiness may be useful in predicting which patients are most likely to engage in screening. This finding may be useful in guiding the design of future EHBM-grounded primary care office-based tailored CRC screening interventions and related trial protocols, given the imperative for brevity in the tailoring and outcome assessment questionnaires employed in such tools.

Both our study and previous research suggest that interaction between patient and provider is a powerful determinant of CRC screening.[32–35] In our study, 77% of our study population, all not up-to-date for screening at baseline, *still* lacked screening one year after receiving a patient-level CRC screening intervention. Unfortunately, our study design does not permit determination of whether patients who did not discuss screening with their provider *chose* not to discuss screening, or were *unable* to discuss screening due to barriers such as competing demands during the visit or detrimental provider behaviors.

The strong association between discussion of CRC screening with the provider and receipt of screening would appear to support the hypothesis that complex multilevel interventions, simultaneously targeting patient, provider, and healthcare delivery system factors, may be necessary to substantively increase screening in primary care.[27, 36] Given the strong representation of Hispanic individuals in our study sample, our findings also suggest a potential role for eliciting and addressing cultural factors beyond language (e.g., machismo perceptions) that could influence screening behavior.[37] Future studies of complex multilevel interventions would ideally incorporate serial collection of both qualitative and quantitative data during follow-up, to explore how patient and PCP decision-making around CRC screening evolve over time. Among other benefits, such research could help to guide the timing of repeated intervention exposures, such as patient “booster” sessions with tailored motivational tools.

Our study had some limitations. The sample was recruited as part of a multi-site randomized controlled trial; trial participants are likely to differ from the general target population in their attitudes and behaviors related to CRC screening; notably, patients up-to-date with CRC screening were excluded. We did not seek to test the EHBM as a complete entity, since model constructs that were only weakly associations with CRC screening in prior work (e.g. perceived severity, susceptibility, and benefits) were not measured in the parent study.

Nonetheless, future studies might usefully examine these constructs. Given the differences in measures of EHBM and related constructs across various studies, differences between our findings and those of other studies may partly reflect differing measures. We also were unable to include measures of provider or health care system factors in our analyses; the influence of such factors should ideally be considered in future studies. Finally, our analyses did not specify and test an ordered causal path through which the EHBM constructs influence CRC screening. Attempting to elaborate a causal pathway would have required extrapolating far beyond the current state of knowledge regarding the interrelationships among the multiple overlapping study constructs.[7,38] Also, all of the EHBM constructs in our study were measured simultaneously.

4.2 Conclusion

In conclusion, in an analysis of the contribution of five socio-psychological EHBM predictors of CRC screening (knowledge, barriers, self-efficacy, stage of readiness, and cues to action), after adjusting for socio-demographics, health status, and prior CRC screening, only self-efficacy, planning for CRC screening (stage of readiness) and discussion of screening with the provider (cues to action) were associated with subsequent objectively measured CRC screening. These data suggest that single item measures of self-efficacy or stage of readiness may be useful in parsimoniously predicting screening and may be the best targets of EHBM-tailored interventions to improve uptake of CRC screening. Nonetheless, there is need for further research to understand how patient-level factors and provider and healthcare delivery system factors operate together to influencing CRC screening behaviors.

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Table 1

Patient and Visit Characteristics by Screening Outcome (N = 1101)

	CRC screened (N=250)	Not CRC screened (N=851)	Total (N=1101)
Age mean (s.d.)	55.9 (5.7)	57.3 (6.2)	57.0 (6.1)
Female, N (%)	153 (61.2)	565 (66.4)	718 (65.2)
Race/Ethnicity, N (%)			
Hispanic	112 (44.8)	440 (51.7)	552 (50.1)
Black	67 (26.8)	199 (23.4)	255 (24.2)
Non-Hispanic white	60 (24.0)	171 (20.1)	231 (21.0)
Other	11 (4.4)	41 (4.8)	52 (4.7)
Language/ethnicity, N (%)			
English/Hispanic	51 (20.4)	252 (29.6)	303 (27.5)
Spanish/Hispanic	62 (24.8)	189 (22.2)	251 (22.8)
English/non-Hispanic	137 (54.8)	410 (48.2)	547 (49.7)
Education, N (%)			
Less than high school	38 (15.2)	153 (18.0)	191 (17.3)
High school graduate	40 (16.0)	176 (20.7)	216 (19.6)
Some college	62 (24.8)	210 (24.7)	272 (24.7)
College graduate	49 (19.6)	168 (19.7)	217 (19.7)
Any graduate school	61 (24.4)	144 (16.9)	205 (18.6)
No health insurance, N (%)	37 (10.8)	203 (23.9)	240 (20.9)
Health status, N (%)			
Excellent	21 (8.4)	44 (5.2)	65 (5.9)
Very good	73 (29.2)	169 (19.9)	242 (22.0)
Good	90 (36.0)	318 (37.4)	408 (37.1)
Fair	60 (24.0)	273 (32.1)	333 (30.3)
Poor	6 (2.4)	46 (5.4)	52 (4.7)
Prior CRC screening, N (%)	92 (36.8)	276 (32.4)	368 (33.4)
Knowledge, mean (s.d.)	7.0 (2.8)	6.6 (2.7)	6.7 (2.7)
Barriers, mean (s.d.)			
FOBT	3.8 (1.1)	3.8 (1.1)	3.8 (1.1)
Colonoscopy	3.6 (0.7)	3.5 (0.7)	3.5 (0.7)
Self-efficacy, mean (s.d.)			
FOBT	3.8 (1.1)	3.8 (1.1)	3.8 (1.1)
Colonoscopy	4.1 (0.9)	3.7 (1.1)	3.8 (1.1)
Plan screening within month, N (%)	147 (58.8)	260 (30.6)	407 (37.0)
CRC screening discussion, N (%)	179 (71.6)	425 (49.9)	604 (54.9)

Abbreviations: CRC: colorectal cancer; FOBT: fecal occult blood test;

Table 2

Adjusted Relationship between Patient and Visit Characteristics and CRC Screening (N = 1101)

	Base	**Health Belief Model Constructs Added**					
		Knowledge	**Barriers**	**Self-efficacy**	**Readiness**	**Talk to provider**	**Full Model**
	OR (95% C.I.)	OR (95% C.I.)	OR (95% C.I.)	OR (95% C.I.)	OR (95% C.I.)	OR (95% C.I.)	OR (95% C.I.)
Age	0.95 (0.93,0.98)	0.95 (0.93,0.98)	0.96 (0.93,0.98)	0.96 (0.94,0.99)	0.95 (0.93,0.98)	0.96 (0.93,0.98)	0.96 (0.93,0.99)
Female	0.85 (0.62,1.15)	0.84 (0.62,1.14)	0.87 (0.64,1.18)	0.84 (0.61,1.14)	0.83 (0.60,1.13)	0.87 (0.64,1.19)	0.82 (0.60,1.14)
Race/Ethnicity (reference group = non-Hispanic white)							
Hispanic	1.61 (0.96,2.69)	1.65 (0.99,2.78)	1.59 (0.94,2.67)	1.53 (0.91,2.59)	1.71 (1.00,2.93)	1.53 (0.91,2.58)	1.62 (0.93,2.81)
Black	0.82 (0.05,14.03)	0.97 (0.06,16.98)	0.71 (0.04,12.18)	0.29 (0.02,5.10)	0.45 (0.03,7.93)	0.72 (0.04,14.18)	0.26 (0.01,5.16)
Other	0.86 (0.40,1.84)	0.88 (0.41,1.89)	0.87 (0.40,1.86)	0.89 (0.41,1.91)	0.86 (0.39,1.88)	0.83 (0.38,1.78)	0.90 (0.41,1.98)
Language/Ethnicity (reference group = English/non-Hispanic)							
English/Hispanic	1.62 (0.09,27.87)	1.39 (0.08,24.33)	1.94 (0.11,33.56)	4.44 (0.25,79.16)	2.91 (0.16,51.59)	1.78 (0.09,35.08)	4.84 (0.24,96.10)
Spanish/Hispanic	2.33 (0.14,38.13)	1.94 (0.12,32.37)	2.84 (0.17,46.67)	6.34 (0.37,107.53)	3.92 (0.23,65.96)	2.50 (0.13,47.09)	6.54 (0.35,123.59)
Education level (reference group = some high school)							
High school	0.73 (0.43,1.24)	0.72 (0.42,1.23)	0.71 (0.41,1.22)	0.67 (0.39,1.15)	0.63 (0.37,1.10)	0.71 (0.42,1.23)	0.59 (0.34,1.04)
Some college	1.07 (0.64,1.77)	1.03 (0.62,1.71)	1.04 (0.62,1.73)	0.98 (0.58,1.64)	0.98 (0.58,1.64)	0.93 (0.56,1.57)	0.85 (0.50,1.44)
College	0.85 (0.48,1.49)	0.81 (0.46,1.44)	0.79 (0.45,1.41)	0.79 (0.44,1.40)	0.81 (0.46,1.45)	0.79 (0.45,1.41)	0.73 (0.40,1.33)
Graduate	1.12 (0.62,2.01)	1.02 (0.56,1.86)	1.03 (0.57,1.87)	1.06 (0.59,1.92)	0.97 (0.53,1.77)	1.05 (0.58,1.90)	0.86 (0.46,1.61)
No insurance	0.45 (0.28,0.74)	0.45 (0.28,0.73)	0.44 (0.27,0.72)	0.45 (0.28,0.74)	0.45 (0.27,0.73)	0.47 (0.29,0.76)	0.45 (0.27,0.74)
Health status	0.81 (0.70,0.95)	0.83 (0.71,0.97)	0.80 (0.69,0.94)	0.83 (0.71,0.98)	0.85 (0.72,0.99)	0.84 (0.72,0.99)	0.87 (0.74,1.03)
Prior screening	1.45 (1.05,2.00)	1.44 (1.04,1.98)	1.46 (1.06,2.02)	1.42 (1.02,1.97)	1.47 (1.05,2.04)	1.49 (1.08,2.06)	1.50 (1.06,2.11)
Knowledge		1.06 (0.99,1.13)					1.06 (0.99,1.14)
Barriers							
FOBT			0.80 (0.60,1.06)				0.91 (0.66,1.25)
Colonoscopy			1.55 (1.16,2.09)				1.12 (0.80,1.56)
Self-efficacy							
FOBT				0.93 (0.81,1.07)			0.92 (0.79,1.07)
Colonoscopy				1.46 (1.25,1.70)			1.32 (1.12,1.56)
Plan for screening					3.22 (2.36,4.41)		2.72 (1.94,3.80)

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	Base	Health Belief Model Constructs Added					
		Knowledge	Barriers	Self-efficacy	Readiness	Talk to provider	Full Model
Discuss with MD						2.32 (1.67,3.20)	1.59 (1.12,2.25)
Model Fit: AUC	**67.8%**	**67.8%**	**68.3%**	**70.4%**	**73.0%**	**70.3%**	**75.5%**

Abbreviations: CRC=colorectal cancer, OR=odds ratio; FOBT=fecal occult blood test; AUC=area under curve

Table 3

Adjusted percentage of participants with subsequent colorectal cancer screening that is associated with levels of EHBM factors

	Key individual EHBM factors, also adjusted for base model[1]			**Full adjustment[2]**
	Self-efficacy (5=high to 1=low)	**Stage of Readiness (Plan screening vs. no plan)**	**Discuss with provider (discuss screening vs. no discussion)**	
Self-efficacy				
5	28.1 (22.8,33.5)			25.5 (20.5,30.5)
4	25.4 (21.1,29.7)			25.1 (21.0, 29.3)
3	15.2 (9.7,20.7)			18.0 (11.9,24.2)
2	16.0 (9.6,22.3)			17.6 (10.8,24.3)
1	4.6 (−1.5,10.6)			5.5 (−1.6,12.5)
Plan screening		34.9 (30.4,39.4)		32.5 (28.0,37.1)
Not planning		15.3 (12.6,17.9)		16.2 (13.4,19.0)
Discuss screening			28.4 (24.9,31.9)	25.4 (22.2,28.6)
No discussion			15.3 (12.1,18.5)	18.6 (14.9,22.3)

[1] Base Model includes: age, gender, race/ethnicity, language, education level, insurance status, health status, and prior CRC screening

[2] Base Model and all 5 EHBM factors (knowledge, barriers, self-efficacy, stage of readiness, and discussion of CRC screening with provider) included

Abbreviation: CRC: colorectal cancer; EHBM: Expanded Health Belief Model