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The Influence of Sociocultural Factors on Colonoscopy and FOBT Screening Adherence among Low-income Hispanics

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Abstract

Few studies have examined barriers and facilitators to colorectal cancer (CRC) screening among Hispanics, particularly sociocultural factors that may be relevant. This paper examines the influence of sociocultural factors on adherence to fecal occult blood testing (FOBT) and colonoscopy. A survey was conducted among a sample of 400 low-income Hispanics in East Harlem, New York. Fatalism and health literacy were both significantly associated with colonoscopy screening adherence in bivariate models, though fatalism became non-significant and health literacy became less significant in multivariable models. With respect to adherence to colonoscopy or FOBT, both fatalism and health literacy were associated in bivariate models, though only fatalism remained significant in multivariable models (p=.03; OR: .94; 95% CI: . 881–.992). These findings suggest fatalism and health literacy may play a role in shaping CRC screening adherence among low-income Hispanics. Researchers should continue investigating how sociocultural factors influence screening adherence among Hispanics, using larger and more geographically diverse samples.

Keywords

Hispanics/Latinos; colorectal cancer screening; fatalism; health literacy; cancer screening

Colorectal cancer (CRC) is the third leading cause of cancer-related deaths among men and women in the U.S. Approximately 51,000 deaths from CRC were expected in 2010.[1] Colorectal cancer is one of the most preventable cancers, as screening and the removal of polyps can reduce the incidence of the disease by up to 90%.[2,3] Early detection of CRC through screening is critical because survival depends in part on stage of cancer at the time of diagnosis. The five-year survival rate is 90% among people with localized disease, compared with 11% among those with metastatic/distant disease.[4] Colorectal cancer

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screening and polyp removal has been found to reduce CRC mortality significantly by allowing physicians to detect cancer at earlier, more treatable stages.

The opportunity to reduce CRC incidence and mortality through screening is not maximized equitably, with rates of CRC screening being particularly low among Hispanic/Latino populations (referred to here as Hispanic(s)). Nationally, Hispanics have lower rates of CRC screening adherence than non-Hispanic Whites, at 31.9% *vs.* 49.5% respectively.[4] Data from the 2002 Behavioral Risk Factor Surveillance Survey found that Hispanic respondents were less likely than non-Hispanic respondents to report current CRC screening adherence (FOBT OR: .66, 95% CI: .56–.81; colonoscopy or sigmoidoscopy OR: .87, 95% CI: .77–.99), even after adjusting for education, income, insurance, and usual source of health care.[5] Lower utilization of CRC screening among Hispanics likely contributes to the finding that Hispanics are more likely than Whites to be diagnosed at later stages of CRC, and to have poorer prognoses.[4,6] As the largest and fastest growing immigrant group in the U.S., Hispanics are in critical need of increased utilization of CRC screening.

With seven CRC screening options available,[2] CRC screening recommendations are complex. Colonoscopy carried out at 10-year intervals is often considered the preferred CRC screening test for average-risk adults ages 50 and over for certain guideline-issuing organizations,[7,8] in part because of its potential for being highly effective in both preventing and detecting CRC. To facilitate access to screening among low-income populations, Medicare and Medicaid changed their reimbursement policies to cover colonoscopy screening. Fecal occult blood testing (FOBT) is another viable and more affordable alternative to colonoscopy that also has evidence of mortality reduction. [2]

Across races/ethnicities, a number of barriers to CRC screening have been identified, including low awareness,[9,10] lack of provider recommendation or information,[11,12] anticipation of pain,[13] cost,[10,14] fear,[14] embarrassment,[10,14] and not having any symptoms.[15,16] There have been fewer studies examining barriers and facilitators to CRC screening among Hispanics in particular. The literature, in combination with qualitative research among Hispanics,[17] suggests that there are several sociocultural factors that may be particularly relevant to this population and should be considered in relation to CRC screening.

Fatalism has been defined as the belief that a person's behavior does not exert control over events that happen ,[18,19] while *cancer fatalism* in particular is the belief that death is inevitable when cancer is present.[20] Fatalism has arisen as a barrier to CRC screening among Hispanic populations[11,21,22] and in relation to other cancer screening behaviors and cancer-related beliefs,[23–27] suggesting that fatalistic beliefs may contribute to lower rates of CRC screening among Hispanics.

Health literacy may be another factor that contributes to lower rates of CRC screening, particularly given the complexity of recommendations and vocabulary used for CRC screening. Health literacy has been defined as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions."[28] [p.11–20] Prior studies have found poor health literacy skills to be associated with poorer knowledge and attitudes towards breast and cervical cancer screening,[29,30] and to serve as a barrier to obtaining mammograms, Pap smears, and prostate cancer screening.[30–32] Few health literacy studies have been conducted in relation to CRC screening, and particularly few among Hispanics.

The influence of family and friends (social influence) may also play an important role in shaping CRC screening behavior. Familism, or strong attachment to kinship networks with the family serving as a source of support, identity, and purpose, is an important cultural

value among Hispanics.[33,34] Research in the context of CRC screening suggests that family and friends' experiences and opinions play an important role in influencing CRC decision-making,[35] potentially dissuading them from participating.[36] More research is needed to investigate this association among Hispanics.

Trust in medical providers or systems has been identified as an important cultural value among Hispanics;[37] thus, lack of trust may also play a role in influencing Hispanics' decision to obtain CRC screening. Ling and colleagues found that among a cohort of 2,670 participants from the Health Information National Trends Survey (HINTS), having trust in cancer information from the doctor or other health care professionals was most predictive of being up to date for CRC screening.[38] Born and colleagues found higher trust and low discrimination were associated with being current for FOBT among racial/ethnic minority patients, though age and income were stronger predictors.[39] Palmer and colleagues also found that distrust of the medical system only emerged as a theme among African Americans who had not completed CRC screening, compared with African Americans who had obtained CRC screening.[40] To our knowledge, no studies have been exclusively conducted that investigate this association among Hispanics.

Acculturation, the process by which individuals adopt the attitudes, values, customs, beliefs, and behaviors of another culture,[41,42] may be particularly relevant to consider among Hispanic immigrants. Research investigating a relationship between acculturation and CRC screening has been mixed. Several authors using data collected among a large sample of Hispanics from the 2000 National Health Interview Survey (NHIS) found that acculturation was not associated with FOBT or colonoscopy or sigmoidoscopy screening once adjusting for covariates (e.g. medical history and medical care variables) in multivariable models.[43,44] In contrast, Johnson-Kozlow (2010) conducted analyses using the 2005 California Health Interview Survey and found that higher acculturated Mexican-Americans were 3–4 times more likely to have had both FOBT and endoscopic CRC screening, while lower acculturated Mexican-Americans were twice as likely to not have any CRC screening.[45] Based on these mixed findings, more research is needed to better understand this association.

The aims of this manuscript are to examine the influence of sociocultural factors on screening adherence to colonoscopy and FOBT among a sample of 400 low-income Hispanics living in East Harlem (EH), New York. Based on prior research,[9,16,46,47] we know that provider recommendation is a strong determinant of CRC screening adherence. We were interested in examining the influence of sociocultural factors beyond provider recommendation. In particular, we hypothesized that the following factors would be associated with lack of adherence to recommended CRC screening guidelines: 1) higher levels of medical mistrust and fatalism; and 2) lower levels of social influence, health literacy, and acculturation. East Harlem is an ideal location in which to investigate these hypotheses because Hispanics constitute over half of the population (55%) in this area, have low rates of CRC screening, and come from multiple countries of origin.

Methods

Study recruitment occurred at three EH health clinics and several community-based sites. To be eligible, participants were required: 1) to self-identify as Hispanic or Latino; 2) to be at least 50 years of age; 3) to have no previous personal history of CRC or chronic gastrointestinal disease; 4) to have no immediate family members with CRC; and 5) to speak English or Spanish. Potential participants received information about the study through a flyer. Among participants who expressed interest, eligibility was confirmed and enrollment completed. In-person interviews were conducted between January 2008 and January 2009

by trained bilingual, Hispanic health educators. Interviews were structured, typically lasted 50 minutes, and were conducted in English or Spanish (according to participant's preference). All measures that required translation used forward and back translation procedures to ensure content equivalency. All participants received a study pen, a Centers for Disease Control and Prevention CRC brochure, and $20.00 as incentives. The response rate was 92.4% overall. In examining differences between respondents (n=400) and nonrespondents (n=33), respondents were older than nonrespondents (67.5 *vs.* 63.1 years). This study was approved by the Institutional Review Board and was conducted in accordance with the guidelines of the Declaration of Helsinki.

Measures

Sociodemographic characteristics and potential covariates—The survey assessed a number of sociodemographic factors, including income, education, gender, age, marital status, employment status, years in the U.S., interview language, having a regular health care provider, and insurance. We also assessed fear of colonoscopy using a six-item scale developed by Manne (personal communication) that primarily measured fear of parts of the colonoscopy procedures, with one question about fear of telling family results (a = .85) (e.g., How fearful are you of the procedure being painful?) with response options ranging from one (Not at all fearful) to five (Extremely fearful) (mean: 14.4, Standard deviation or SD: 6.60; median=14.0). More complete information about the range of patient, health care and cultural factors that were collected is provided in a previously published article.[46]

Knowledge and beliefs—We assessed knowledge and beliefs (i.e., perceived benefits and perceived barriers) about CRC and colonoscopy screening on the basis of work of Manne and colleagues.[35] We assessed nine benefits (e.g., Having a colonoscopy will make me feel in control over my health) (a = .80) and 19 barriers (e.g., I cannot afford to have a colonoscopy) (a = .90). Based on prior work,[17] we added four items to address the cultural attitude of *machismo* (Having a colonoscopy would make me feel like less of a man/woman), embarrassment (I am embarrassed about being undressed/naked in front of my doctor/provider), and two items to address salience-coherence regarding a colonoscopy (e.g., Having a colonoscopy makes sense to me). Response options for each item ranged from one (Strongly agree) to five (Strongly disagree). The mean and median of the pros scale both approximated 48 (SD:5.23) and the mean and median of the cons scale both approximated 53 (SD:16.3).

Fatalism—Fatalism was assessed using Powe's 15-item Fatalism Inventory[20] with 15 true/false questions (e.g., I believe if someone is meant to have colorectal cancer, they will have colorectal cancer), summed to create an overall score (Kuder-Richardson =.90) (mean= 7.12, SD: 4.46; median=7.00) The reliability of this measure is good (a= .89).

Health literacy—Health literacy was assessed using a 50-item measure, The Short Assessment of Health Literacy for Spanish-speaking Adults (SAHLSA) which has been validated among Spanish speaking populations (a = .92).[48] A total summary score was created, with higher scores reflecting higher health literacy scores (mean= 41.7, SD:6.07; median=43.0).

Social influence—Social influence was measured with a four item scale assessing the influence of friends and family on CRC screening.[16] An example is, "Members of my immediate family think I should go through colorectal screening." Participants rated each item from 1 (= strongly disagree) to 4 (= strongly agree) with strong reliability (a = .90). The mean for this measure was 11.0 (3.71) and median was 12.0.

Medical mistrust—We used the Group-Based Medical Mistrust Scale (GBMMS) to assess medical mistrust. This 12-item scale has been validated in prior research[49,50] and demonstrated good reliability in this study (a = .87). Participants rated each item (e.g., I have personally been treated poorly or unfairly by doctors or health care providers because I am Hispanic/Latino) from 1 (= strongly disagree) to 5 (= strongly agree). In these analyses, the mean score for the total GBMMS was 2.21 (SD: 2.22) and median was 2.25. In addition to the overall scale, we also examined the scale's three subscales that have been identified in prior research:[49,50] suspicion (a = .84); discrimination (a =.80); and lack of support (a = .56).

Acculturation—To assess the level to which individuals adopt attitudes, values, customs, beliefs and behaviors of another culture, we used a 12-item Acculturation Scale for Hispanics.[51] This measure specifically assesses language use, media preference, and ethnic social relations. Items were rated from 1 (= only Spanish) to 5 (= only English). We added one additional item: *What language(s) does your doctor/provider speak?* Items were summed to create a summary score (overall scale mean= 19.6, SD: 5.75; median= 17.0). The Cronbach's alpha for the overall scale was very good (a = .91), and the Cronbach's alpha for the sub-scales was good: language use and ethnic loyalty (a = .89); media (a = .90); and ethnic social relationships (a = .69).

Colorectal cancer screening adherence—Although there are seven methods of CRC screening available,[2] this study only focused on FOBT and colonoscopy, the two kinds of CRC tests that were commonly used and available in EH when the study was conducted. A brief two-sentence description of each of these screening tests was read to respondents. Then participants were asked separately if they had ever had a FOBT or colonoscopy, and if so, the month and year of their last test. We defined current CRC screening adherence based on the American Cancer Society's Guidelines for the Early Detection of Cancer for average-risk populations ages 50 and older.[4] Participants were considered adherent for colonoscopy screening if they had undergone a colonoscopy within the past 10 years. Participants were considered adherent for colonoscopy or FOBT if they had received either a colonoscopy or FOBT within the recommended timeframe: within 10 years for colonoscopy and within one year for FOBT.

Analytic approach

All analyses were conducted using SAS 9.2 statistical software.[52] Univariate statistics were conducted to describe the sample and to examine the distribution of key variables of interest. We then conducted separate bivariate age-adjusted logistic models to assess each association between sociodemographic characteristics, potential covariates, and sociocultural variables in relation to the two outcomes: adherence to colonoscopy and adherence to colonoscopy or FOBT. Separate models were built for each screening outcome. Covariates included in multivariable logistic models included those variables that were significant at the $p \leq .15$ level in separate bivariate age-adjusted analyses. Statistical significance for multivariable models was established at $p \leq .05$. We first built a separate multivariable model for each significant exposure variable to examine their independent influence. We then built a final multivariable model for each screening outcome consisting of the significant exposure variables (fatalism and health literacy), controlling for important covariates. For the purposes of model-building, education was dichotomized according to high school enrollment (0 to 8^{th} grade; 9^{th} grade and above), insurance status was dichotomized by public insurance (Medicare/Medicaid) *versus* all other options (private/other/don't know/ none), and years in the U.S. was dichotomized by a rounded median split (40.00). All bivariate and multivariable models controlled for age (measured continuously) given the significant association between age and adherence to colonoscopy only and adherence to

colonoscopy or FOBT and CRC screening adherence (p<.0001; OR: 1.06, 1.04–1.09 for each).

Results

Sample characteristics

The majority of the sample (88.7%) was born outside of the U.S. and had an annual income of $10,000 or less (66.8%). About 40% of the sample had an 8th grade or lower education, and 72% of the sample was female. The majority of participants (n=276; 69%) were Puerto Rican, while the others identified as Dominican (16%), and a combination of Central American, Mexican, Cuban, and Other. More detailed information about the sociodemographic characteristics of the sample is provided in Table 1.

Modeling colonoscopy adherence—In age-adjusted bivariate models, the following factors were associated with colonoscopy screening adherence: age (OR: 1.06, 95% CI: 1.04, 1.09; p<.0001); insurance (OR: 1.05; 95% CI: 1.02, 1.08; p=.03); having a regular health care provider (OR: .446; 95% CI: .214, .929; p=.03); fear (Or: 1.02; 95% CI: .984, 1.06; p=.0008); perceived benefits (OR: 1.07; 95% CI: 1.03, 1.12; p=.0005); perceived barriers (OR: .986; 95% CI: .974, .999; p=.037); fatalism (OR: .946; 95% CI: .903, .992; p=.02); and health literacy (OR: 1.06; 95% CI: 1.02, 1.10; p=.003). The other sociocultural factors we examined, including social influence (OR: 1.02; 95% CI: .967, 1.08; p=.45), medical mistrust (OR: .985; 95% CI: .747, 1.30; p=.92), and acculturation (OR: .993; 95% CI: .959, 1.03; p=.67), were not significantly associated with colonoscopy screening adherence (see Table 2).

In a multivariable model with only health literacy as the exposure variable, health literacy was significantly associated with colonoscopy screening adherence (p=.03), controlling for age, having a regular health care provider, fear, perceived benefits and barriers, and insurance status (data not shown). As health literacy scores increased, the odds of being adherent to colonoscopy screening increased (OR: 1.05, 95% CI: 1.01–1.10). However, fatalism was no longer highly statistically significantly associated with colonoscopy screening adherence (p=.08; OR: .96, 95% CI:.907–1.01), controlling for these covariates (data not shown). In the final multivariable model that included both variables, fatalism became non-significant (p=.22) and health literacy became less significant (p=.09) (see Table 2).

Modeling adherence to colonoscopy or FOBT—In age-adjusted bivariate models, the following factors were associated with screening adherence at the p=.05 level: age (OR: 1.06, 95% CI: 1.04, 1.09; p<.0001); fear (OR: .963; 95% CI: .933, .994; p=.019); perceived benefits (OR: 1.07; 95% CI: 1.03, 1.12; p=.001); fatalism (OR: .936; 95% CI: .892, .982; p=.007). Insurance status (OR: 1.52; 95% CI: .970, 2.39; p=.0675), having a regular health care provider (OR: .509; 95% CI: .253; 1.02; p=.059), health literacy (OR: 1.03; 95% CI: .997, 1.07; p=.075), education (OR: 1.37; 95% CI: .890, 2.12; p=.152) and marital status (OR: .657; 95% CI: .411, 1.05; p=.078) were significant at the p=.15 level. Social influence (OR: 1.03; 95% CI: .974, 1.09; p=.29), medical mistrust (OR: 1.03; 95% CI: .778, 1.37; p=.83), and acculturation (OR: .992; 95% CI: .958, 1.03; p=.65) were not significantly associated with adherence to FOBT or colonoscopy (see Table 3).

A multivariable model was conducted for only health literacy. Here we found that health literacy was no longer significant, controlling for age, education, having a regular health care provider, marital status, fear, perceived benefits and barriers, and insurance (p= .469; OR: 1.02; 95% CI: .973–1.06) (data not shown). A separate multivariable model was built for fatalism. Controlling for age, education, having a regular health care provider, marital

status, fear, perceived benefits and barriers, and insurance status, fatalism remained highly significantly associated with adherence to FOBT or colonoscopy (p=.03) (data not shown). Specifically, as fatalism scores increased, the odds of being adherent to CRC screening (colonoscopy or FOBT) decreased (OR: .94, 95% CI: .889–.993). In the final multivariable model, both fatalism and health literacy were entered into the model, and only fatalism remained significant (p=.03): participants with higher fatalism scores were .94 (95% CI: .881–.992) times less likely to be adherent to screening for FOBT or colonoscopy compared with participants with lower fatalism scores, controlling for important covariates (see Table 3).

Discussion

As the second most commonly diagnosed cancer among Hispanic men and women,[53] CRC is a significant public health issue among this growing population. With rates of CRC screening lower among Hispanics than non-Hispanic Whites,[4] more research is needed to understand factors that contribute to this underutilization. We set out to investigate how sociocultural factors influence CRC screening adherence among Hispanics in East Harlem, New York.

We expected that a number of sociocultural variables would be associated with adherence to FOBT and colonoscopy among this sample, but interestingly, only found that fatalism and health literacy were important in influencing screening. Fatalism was strongly associated with colonoscopy screening adherence, though this association became non-significant when health literacy was included in the model. Health literacy was significantly associated with colonoscopy screening adherence, with higher literacy scores associated with higher odds of colonoscopy adherence, though this association became less significant when fatalism was included in the model. With respect to screening adherence to either colonoscopy or FOBT, fatalism was associated with adherence in both bivariate and multivariable models, and remained significant with health literacy in the model. Participants with higher fatalism were less likely to be adherent compared with participants with lower fatalism, controlling for age, education, regular health care provider, marital status, fear, perceived benefits and barriers, and insurance. In contrast, health literacy was non-significant in all multivariable models.

Though findings in the literature have not always been consistent,[54] our findings support previous studies that have found that fatalism influences cancer screening and cancer-related behaviors among Hispanics.[22–27] Though research has been more limited in relation to CRC screening, several studies have identified fatalistic beliefs as potential barriers to CRC screening. Among Hispanic women in Northern Manhattan, in the context of free screening, participants with less fatalistic attitudes toward CRC were more likely to be compliant with FOBT screening than those with more fatalistic attitudes.[11] Similarly, our research suggests that low-income Hispanics with a higher fatalism score were less likely to be adherent to FOBT or colonoscopy. Though some research suggests that fatalism may particularly influence screening among people with low incomes,[24,55] we found an association despite the fact that all participants had low incomes.

It is important to note, however, that fatalism is a complex, multidimensional concept. In focus groups among Hispanic men and women ages 50 and older living along the U.S.-Mexico border, Fernandez and colleagues found that while participants endorsed some dimensions of fatalistic beliefs (e.g., attributes of pessimism and inevitability of death), participants also noted that these beliefs did not reflect the predetermination dimension of fatalism (i.e., the idea that events were determined by fate) and believed there were things they could do about their future.[55] Some researchers have argued that this can lead to

Hispanics taking an active role to change one's fate.[21] In addition, Florez and colleagues have warned of some of the conceptual ambiguities concerning the meaning, definition, and measurement of fatalism, and have highlighted the need to move beyond simplistic treatments of the construct.[56] In their qualitative research with Latinas from the Dominican Republic, complex themes arose of both individual and external forces influencing breast cancer screening, with some women actively participating in screening because they believed that cancer could become a death sentence if diagnosed late or left untreated. Thus, future research should investigate further some of the ambiguities of this concept and its role in influencing screening among Hispanics.

Prior research also suggests that health literacy may have an important role in influencing CRC screening behavior. According to a study conducted predominately among White and Black veterans from a Veterans Association (VA) Hospital in Chicago[57] and a focus group study of patients and providers,[15] people with low literacy or health literacy skills have poor knowledge of and attitudes toward CRC, and did not understand the concept of screening, benefits of early detection, or the names of CRC screening tests.[15,57] However, Guerra and colleagues found that while health literacy was associated with having less knowledge about and lower rates of CRC, the association was not independent of the sociodemographic characteristics ethnicity and education.[58] Despite these mixed findings, the effects of low health literacy may be particularly important to consider among Hispanics,[59,60] as some research suggests that Hispanics have lower health literacy rates than Whites,[31,61] and those who primarily speak Spanish and have limited fluency in English tend to have low literacy even when literacy is tested in Spanish.[31,61] Though we found health literacy to be associated with CRC screening adherence, this association weakened when other variables (including fatalism) were controlled in the model. It is important to note that in *post-hoc* analyses, we found that health literacy and fatalism were correlated with one another. This suggests that these two factors may have some shared explanatory influence with respect to CRC screening which may in part explain why they became less significant when they were both in the model, and their independent influence may be difficult to disentangle. Qualitative research and longitudinal quantitative studies may be useful in further understanding the shared and unique influence of these factors.

It is interesting to note that we did not find associations for medical mistrust, social influence, or acculturation. However, given that the majority of our sample preferred speaking in Spanish and was born outside the U.S., it is possible that we did not have sufficient variability to assess the association in a valid way, or it may be that our measure was not sensitive enough for this population. Some researchers have speculated that acculturation may not be specifically associated with CRC screening, but rather with lower access to medical care which in turn results in low rates of CRC screening.[44] It is interesting to note that we also did not find significant associations with CRC screening for country of origin, years in the U.S., or language preference. Though prior research suggests that medical mistrust may influence CRC screening, it is possible that this construct should be further developed among this population. Finally, it is surprising that social influence was not associated with CRC screening, given the prior literature in this area, though it may also be a case of low variability since scores for social influence were high among this sample.

With respect to sociodemographic factors, we found that having a health care provider and age were significant correlates of colonoscopy screening adherence, while age, marital status, and having a regular health care provider were significant correlates of adherence to FOBT or colonoscopy in adjusted analyses. Increasing age has consistently been found to be associated with CRC screening in previous research.[62,63] Our findings stand in contrast to those of James and colleagues who conducted analyses among a multi-ethnic sample from the 2000 NHIS and found that being married or living with a partner predicted greater CRC

adherence. Having a regular health care provider or physician has also been found to be associated with CRC screening in our research,[46] as well as by others.[64] Insurance was bivariately associated with adherence (with participants having Medicare or Medicaid more likely to be adherent than those with private, other, or no insurance) but this association became less significant in multivariable models. Interestingly, education, income, and language of interview were not associated with screening adherence, although this stands in contrast to results of previous research.[35,47,64–66] It is possible that low variability with respect to these factors contributed to this null association. Future research should investigate these associations among samples with variability with respect to education, income, and language. We also found fear and perceived barriers/benefits to be significantly associated with CRC screening. Individuals with higher levels of fear and higher levels of perceived barriers were less likely to be adherent, while those with higher levels of perceived benefits were more likely to be adherent. Though few studies have specifically investigated perceived benefits and barriers in relation to CRC screening, a number of barriers to CRC screening have been identified in the literature.[11,21,36,55] In addition, our findings are consistent with the prior literature on fear as a key barrier to CRC screening.[40,67,68]

There are several study limitations that should be noted. This study had a cross-sectional study design, precluding the establishment of causality. Future research should examine these associations using a longitudinal research design. In addition, CRC screening was collected by self-report, which introduces the possibility of bias. However, the literature suggests that self-report is a valid way of assessing CRC screening adherence, particularly with respect to colonoscopy screening.[69,70] We did not distinguish between diagnostic and screening colonoscopies, nor did we assess all potential forms of CRC screening; thus, our findings may not be applicable to all forms of CRC screening. However, the two methods of CRC screening included here are the two methods predominately used in EH health care settings. In addition, due to limited sample size, we were not able to model adherence to FOBT on its own, and some measures were specific to colonoscopy (i.e. pros and cons). This study was only conducted in EH predominately among Spanish speakers. In order to increase generalizability, future studies should investigate the underutilization of CRC screening among Hispanics using samples that are geographically diverse. Although provider recommendation is an important predictor of CRC screening adherence, we purposely did not include this factor in our analyses since the focus of this paper was on understandings factors that influence screening beyond physician referral. Finally, several key constructs of interest *(including health literacy) had low variability in this sample, which may have inhibited our ability to see associations. A more robust measure of health literacy may increase variability of this measure in future studies.

Despite these study limitations, the results contribute to our understanding of CRC screening adherence among Hispanics and suggest important intervention targets beyond physician recommendation. First, it has been suggested that intervention efforts should increase self-efficacy and sense of control in order to counter some of the potentially negative influence of fatalistic beliefs.[71] Prior research has suggested that fatalistic beliefs about cancer prevention may keep individuals from engaging in preventive behaviors by increasing external locus of control and reducing both self-efficacy and motivation to perform these behaviors.[72] If self-efficacy is related to fatalism in the context of CRC among Hispanics, this may provide an important insight for strategies to increase self-efficacy and reduce fatalism leading to increased CRC screening. This research also suggests that issues related to health literacy may limit the effectiveness of some existing public health messages and interventions regarding CRC, particularly those that use complex health terminology. Materials and information should be presented bilingually, should be written simply (at low literacy levels), and should use simple text to explain CRC screening guidelines and why

CRC screening is important. As has been suggested in prior research, educational and intervention strategies would be aided by illustrations, animation, and multimedia technology.[73] Audio-narration may be particularly appropriate for low-literacy populations. Strategies that utilize testimonials or role models in person or through varied media may be particularly effective.

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Table 1

Sociodemographic Characteristics of the Sample (n=400)

	Sample size (n)	%
Age		
50–64	234	58.5%
65+	166	41.5%
Educational Level		
0–8th Grade	161	40.3%
9th Grade+	239	59.8%
Employment Status		
Yes	64	16.0%
No	336	84.0%
Gender		
Male	111	27.8%
Female	289	72.3%
Annual Income		
<$10,000	259	66.8%
$10,000+	129	33.3%
Country of Origin		
US born	45	11.3%
Foreign born	355	88.7%
Preferred Language		
Spanish	333	83.3%
English	67	16.8%
Marital Status		
Lives Alone	296	74.0%
Lives with partner or Married	104	26.0%
Years lived in the U.S.		
0–40 Years	201	50.4%
40+ Years	198	49.6%
Healthcare Provider		
Yes	362	90.5%
No	38	9.5%
Insurance Status		
Medicaid Only	187	46.8%
Medicare Only	30	7.5%
Both Medicare/Medicaid	138	34.5%
Out-of-pocket or No Insurance	27	6.7%
Employer provided/Other/Don't know	18	4.5%
CRC Screening		
Colonoscopy only	161	40.3%

	Sample size (n)	%
Colonoscopy & FOBT	40	10.0%
FOBT only	33	8.3%
None	166	41.5%

Note: This data has previously been reported in a manuscript by Jandorf and colleagues (2009)

J Health Care Poor Underserved. Author manuscript; available in PMC 2013 April 25.

Table 2

Bivariate and Multivariable Models with Correlates of Colonoscopy Adherence

	Bivariate Models[a] (OR, 95% CI)	**Multivariable Model[a] (OR, 95% CI)**
Employment	p=.20	
Yes	REF	
No	.685 (.383, 1.23)	
Gender	p=.31	
Male	REF	
Female	1.27 (.804, 1.99)	
Education	p=.36	
0–8th Grade	REF	
9th Grade+	1.22 (.796, 1.86)	
Insurance	p=.03**	p=.0628*
Private/other/don't know/none	REF	REF
Medicaid/Medicare	1.05 (1.02, 1.08)	1.58 (.976, 2.55)
Income	p=.91	
$<10,000	REF	
$10,000+	1.03 (.658, 1.60)	
Country of Origin	p=.89	
US Born	REF	
Foreign Born	1.05 (.54, 2.04)	
Years in the US	p=.71	
0–40 Years	REF	
>40 Years	1.08 (.701, 1.66)	
Marital status	p=.36	
Lives alone	REF	
Lives w/partner or married	.803 (.503, 1.28)	

	Bivariate Models[a] (OR, 95% CI)	Multivariable Model[a] (OR, 95% CI)
Language Preference	p=.38	
Spanish	REF	
English	.778 (.444, 1.36)	
Healthcare Provider	p=.03**	p=.0212*
Yes	REF	REF
No	.446 (.214, .929)	.405 (.188, .874)
Fear	p=.0008** 1.02 (.984, 1.06)	p=.0066* .950 (.916, .986)
Perceived Benefits	p=.0005** 1.07 (1.03, 1.12)	p=.0184** 1.06 (1.01, 1.12)
Perceived Barriers	p=.037** .986 (.974, .999)	p=.0733* 1.02 (.998, 1.04)
Sociocultural Exposure Variables		
Medical Mistrust	p=.917 .985 (.747, 1.30)	
Discrimination	p=.869 .983 (.801, 1.21)	
No Support	p=.635 .942 (.736, 1.21)	
Suspicion	p=.902 1.02 (.794, 1.30)	
Social Influence	p=.45 1.02 (.967, 1.08)	
	p=.02**	p=.221

	Bivariate Models[a] (OR, 95% CI)	Multivariable Model[a] (OR, 95% CI)
Fatalism	.946 (.903, .992)	.965 (.911, 1.02)
	p=.003**	p=.0971*
Health Literacy	1.06 (1.02, 1.10)	1.04 (.993–1.09)
Acculturation		
Overall	p=.668 .993 (.959, 1.03)	
Language use and ethnic loyalty	p=.460 .978 (.921, 1.04)	
Media	p=.901 .994 (.905, 1.09)	
Ethnic social relationship	p=.866 1.01 (.880, 1.16)	

[a] Adjusting for age, measured continuously;

* Statistically significant at p≤.10;

** Statistically significant at p≤.05.

J Health Care Poor Underserved. Author manuscript; available in PMC 2013 April 25.

Table 3

Bivariate and Multivariable Models with Correlates of Screening Adherence to FOBT or colonoscopy

	Bivariate Models[a] (OR, 95% CI)	**Multivariable Model[a] (OR, 95% CI)**
Employment	p=.218	
Yes	REF	
No	.693 (.387, 1.24)	
Gender	p=.702	
Male	REF	
Female	1.09 (.691, 1.73)	
Education	p=.152	p=.669
0–8th Grade	REF	REF
9th Grade+	1.37 (.890, 2.12)	1.12 (.675, 1.84)
Insurance	p=.0675 *	p=.134
Private/other/don't know/none	REF	REF
Medicaid/Medicare	1.52 (.970, 2.39)	1.46 (.890, 2.39)
Income	p=.699	
$<10,000	REF	
$10,000+	1.09 (.696, 1.72)	
Country of Origin	p=.503	
US Born	REF	
Foreign Born	.799 (.414, 1.54)	
Years in the US	p=.356	
0–40 Years	REF	
>40 Years	1.23 (.796, 1.89)	
Marital status	p=.078 *	p=.025 **
Lives alone	REF	REF
Lives w/partner or married	.657 (.411, 1.05)	.561 (.338, .929)

	Bivariate Models[a] (OR, 95% CI)	Multivariable Model[a] (OR, 95% CI)
Language Preference	p=.482	
Spanish	REF	
English	.820 (.471, 1.43)	
Healthcare Provider	p=.059 *	p=.0589 *
Yes	REF	REF
No	.509 (.253, 1.02)	.486 (.230, 1.03)
Fear	p=.019 ** .963 (.933, .994)	p=.0392 ** .962 (.926, .998)
Perceived Benefits	p=.001 ** 1.07 (1.03, 1.12)	p=.0029 ** 1.08 (1.03, 1.14)
Perceived Barriers	p=.138 .990 (.977, 1.00)	p=.0376 ** 1.02 (1.00, 1.04)
Sociocultural Exposure Variables		
Medical Mistrust [b]	p=.829 1.03 (.778, 1.37)	
Discrimination	p=.886 .985 (.800, 1.21)	
No Support	p=.999 1.00 (.779, 1.29)	
Suspicion	p=.664 1.06 (.822, 1.36)	
Social Influence	p=.289 1.03 (.974, 1.09)	
Fatalism	p=.007 ** .936 (.892, .982)	p=.027 ** .935 (.881, .992)

	Bivariate Models[a] (OR, 95% CI)	Multivariable Model[a] (OR, 95% CI)
Health Literacy	p=.075 * 1.03 (.997, 1.07)	p=.958 .999 (.953, 1.05)
Acculturation		
Overall	p=.652 .992 (.958, 1.03)	
Language use and ethnic loyalty	p=.535 .981 (.924, 1.04)	
Media	p=.981 .999 (.908, 1.09)	
Ethnic social relationship	p=.726 .975 (.846, 1.12)	

[a]Adjusting for age, measured continuously;

*Statistically significant at p≤.10;

**Statistically significant at p≤.05.