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Affective Components of Perceived Risk Mediate the Relation between Cognitively-based Perceived Risk and Colonoscopy Screening

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Abstract

Perceived risk is a common component of health decision making theory. When affective components of risk are assessed as predictors of a behavior, they are usually examined separately from cognitive components. Less frequently examined are more complex interplays between affect and cognition. We hypothesized that cognitive and affective risk components would both have direct effects on colonoscopy behavior/intentions and that affective components would mediate the relationship of cognitively-based perceived risk to colonoscopy screening. In two secondary analyses, participants reported their cognitive and affective perceived risk for colorectal cancer, past colonoscopy behavior, and future screening intentions. In both studies, cognitive and affective risk components were associated with increased screening behavior/intentions and cognitive risk components were mediated through affective risk. Given the impact of early detection on

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colorectal cancer prevention, educational strategies highlighting both components of risk may be important to increase screening rates.

Keywords

Perceived risk; colonoscopy; decision making; cancer prevention; behavioral intentions

Introduction

Perceived risk is hypothesized to be a central influence on behavioral engagement in many health decision-making models (Ajzen, 1985; Ferrer, R. A. et al., 2016; Rogers, 1983; Rosenstock, 1974; Witte, 1992). Increasing perceived risk for a given disease is associated with a greater likelihood of adopting protective behaviors to prevent that disease (Brewer et al., 2004; Ferrer, R. & Klein, 2015; Smith et al., 2017). In these theories, perceived risk is typically conceptualized in purely cognitive terms. The health belief model defines perceived risk as a combination of perceived susceptibility (i.e. beliefs about the chances of getting a given disease) and perceived severity (i.e. how serious the consequences are of getting a given disease) (Rosenstock, 1974). Similarly, protection motivation theory posits that an individual determines perceived risk based on the perceived severity of a given disease and the perceived vulnerability (or risk of disease occurrence) (Rogers, 1983). Other decision-making theories, such as subjective expected utility theory rely on an individual to weigh the probability of disease occurrence (i.e. a person's perceived risk of getting a given disease) with the expected utility of performing a behavior to prevent that disease (Sutton & Hallett, 1989).

Affective and Cognitive Components of Perceived Risk

Although the "classic" health behavior models operationalize risk in cognitive terms, the overarching construct of risk perception also includes affective components. Affective components of risk involve threat-specific emotions associated with a given health problem. Emotions such as worry and fear are distinctly different from cognitive risk appraisals (Ferrer, R. & Klein, 2015; Lipkus et al., 2005). A woman can be told by a physician she is at increased risk of breast cancer due to family history, which could increase her perceived cognitive risk of getting cancer. Feelings of worry about getting cancer or fear of being chronically ill are the emotions potentially associated with this new information (Ferrer, R. & Klein, 2015). Such affectively-based perceived risk influences behavioral practice by serving as a signal to act on (or avoid) a particular health problem (Easterling & Leventhal, 1989).

Emotions such as fear and worry may encourage a person to engage in behaviors that are personally perceived as reducing risk (Leventhal, 1970). For example, a person making a decision to undergo a cancer screening test may be guided by affective cues, such as worry about getting cancer, which may motivate that person to learn more about their personal risk of getting cancer and get a screening test. Alternatively, a woman may be fearful of getting cancer after learning a genetic test result and may choose to get a prophylactic mastectomy to greatly reduce her chance of getting cancer. Affectively-based perceived risk (such as fear,

worry, and anxiety) and cognitively-based perceived risk (beliefs about the chance of getting a disease) are both predictive of health behavior uptake (Hay et al., 2006; Kiviniemi & Ellis, 2014; Zhao & Nan, 2016). Typically, affective and cognitive components of perceived risk have been examined in separate studies or as two independent main effects. Less is known about the interplay between these two elements of risk (Kiviniemi et al., 2017). In other models of decision making, such as the behavioral affective associations model, affective associations with an attitude object mediate the relationship between cognitions and behavioral engagement. Thus, the behavioral affective associations model (Kiviniemi, 2007) provides a plausible hypothesis for the relationship between affective and cognitive components of risk and protective behavioral practice.

Interplay between Affective and Cognitive Perceived Risk

In multiple behavior domains, affective associations with behaviors have been shown to mediate the relationship between cognitive constructs and behaviors. Affective associations are feelings connected to a behavior and can be either specific (such as disgust associated with the colonoscopy preparation procedure (Reynolds et al., 2013)) or contentment associated with breastfeeding a baby (Lau et al., 2017), or generalized positive and negative affective states (Kiviniemi, M. T., 2017). The behavioral affective associations model (Kiviniemi, Marc T. et al., 2007) is based on three main principles: 1) affective associations influence behavior; 2) affective associations mediate the impact of cognitive beliefs on behavior; and 3) affective associations influence behavior both through the mediating effects of cognitive variables and also through an independent path (Kiviniemi, Marc T. & Bevins, 2008). Evidence for these tenets has been shown across multiple health behavior domains, including eating behaviors (Jun & Arendt, 2016; Kiviniemi, Marc T. & Duangdao, 2009; Walsh & Kiviniemi, 2014), smoking (Lawton et al., 2007), physical activity (Helfer et al., 2015; Kiviniemi, Marc T. & Bevins, 2008), donating biospecimens for research (Kiviniemi, Marc T. et al., 2013), and condom use (Ellis et al., 2015).

Studies utilizing the behavioral affective associations model (Kiviniemi, 2007) to understand the process of cancer screening decision making have found that while both cognitive beliefs and affective associations influence screening uptake, the cognitive constructs are fully mediated by affective associations (i.e., they have no direct effect on behavior after accounting for the meditational role of affect) (Brown-Kramer & Kiviniemi, 2015; Kiviniemi, Marc T. et al., 2014).

Given these findings for affective associations with behaviors, it is plausible that affective components of perceived risk would *mediate* the relationship between cognitive risk perceptions and cancer screening behavior. A few previous studies have explored worry as a *moderator* for the relationship between cognitively-based cancer risk perceptions and protective behavior with mixed results (Ferrer, Rebecca A. et al., 2013; Moser et al., 2007). Moser and colleagues conducted a secondary analysis to look at both the main effects of absolute risk and cancer worry on screening behavior and their interaction. Utilizing logistic models, both cognitively-based and affectively-based perceived risk predicted increased likelihood of mammography, sigmoidoscopy, and colonoscopy screening, although affectively-based perceived risk showed slightly stronger relationships to behavior in each

model. Moderation was not present in any of the models. Ferrer and Colleagues analyzed a national dataset to a) assess the separate direct effects of cognitive and affective cancer risk on both consumption of fruits and vegetables and engaging in daily exercise, and b) to examine the interaction between cognitive and affective cancer risk perceptions on the same two protective behaviors (Ferrer, R. A. et al., 2013). Findings by logistic regression indicated that absolute risk was not related to either behavior. Cancer worry was only predictive of exercise, whereby individuals with greater cancer worry were more likely to engage in exercise over the past month than those with lower cancer worry. Interaction effects were significant for both behaviors, although relationships were counterintuitive. For individuals reporting more cancer worry, greater perceived absolute risk was associated with lower fruit and vegetable consumption and less exercise. For those with low cancer worry, there was no association between absolute risk and either behavior. Mediation was not tested in either study. Research examining perceived risk for skin cancer and sunscreen use (Kiviniemi, M. T. & Ellis, E. M., 2014) and perceived risk of cervical cancer and screening uptake (Zhao, X. & Nan, X., 2016) found affectively-based perceived risk to be a mediator in the cognitively-based risk to behavior relationship.

Current Studies

Guided by the behavioral affective associations model (Kiviniemi, 2007), this study extends previous work on perceived risk and cancer screening by assessing the indirect effects of affectively-based perceived risk (cancer worry and cancer fear) on the relationships between cognitively-based perceived risk (absolute and comparative risk perceptions) and both colonoscopy and stool test screening for colorectal cancer as well as examining if affective components of risk influence screening behavior over and above cognitively-based risk perceptions. In two separate studies, participants ages 50 and older were asked to report their affective and cognitive perceived risk for colorectal cancer and whether or not they had ever had a colonoscopy (Study 1) or if they intended to have one in the coming year (Study 2). As Study 1 concerns past behavior, we are interested in whether risk perceptions accurately inform preventive screening behavior, while in Study 2 we test whether risk perceptions motivate behavior change. We hypothesized that affectively-based perceived risk would be associated with both colonoscopy and Fecal Occult Blood Testing (FOBT) screening behavior and intentions and that affectively-based perceived risk would mediate the relationship between cognitively-based perceived risk and screening behavior/intentions.

Study 1

To examine the interplay between cognitive and affective perceived risk as influences on screening behavior, we conducted a secondary data analysis of a nationally representative population survey that included questions about absolute and comparative perceived risk for colorectal cancer, colorectal cancer worry, and prior screening behavior. We hypothesized that both affective and cognitive components of perceived risk would relate to colonoscopy and FOBT screening behavior. Additionally, we hypothesized, consistent with the behavioral affective associations model (Kiviniemi, 2007), that affectively-based components of risk would mediate relationships between cognitively-based risk and engagement in screening.

Method

Survey overview.—This study analyzed data from the National Cancer Institute’s 2003 Health Information National Trends Survey (HINTS). Data were collected using random digit dialing with a complex survey sampling design, allowing for use of a weighted analysis to provide nationally representative estimates. Greater detail regarding the HINTS study design is published elsewhere (Westat, 2012). The sample for these analyses were restricted to participants ages 50 and older, given the recommended starting age for colorectal cancer screening. (Overall N= 6,369; Over age 50 n=2,734).

Measures—Absolute risk was assessed by asking respondents “How likely do you think it is that you will develop colorectal cancer in the future?” Participants responded using a 5-point scale with endpoints of 1=very low and 5=very high. Comparative risk was assessed with the following item: “Compared to the average person your age, would you say that you are more likely to get colorectal cancer, less likely, or about as likely?” with response options of 1=more likely to get colon cancer, 2=less likely, 3=about as likely (recoded for analysis to reflect low to high comparative). Affectively-based perceived risk was assessed with the item: “How often do you worry about getting colorectal cancer?” Response options were on a 4-point scale with endpoints of 1=rarely or never and 4=all of the time. To assess past colorectal cancer screening behavior, for each test (colonoscopy and FOBT), participants reported whether they ever had the test. These responses were used to code a dichotomous variable, categorizing “yes” responses as 1 and “no”, “don’t know” and “refused to answer” responses as 0. Demographic information was assessed including age, gender, race/ethnicity, educational achievement, insurance status, and having a primary care provider.

Analysis Plan—Analyses were conducted in Stata 14 (StataCorp, LLC, College Station, Texas) using survey weighted analysis techniques to account for the complex sampling design. Logistic regression analysis was used to model cognitive and affective components of risk (absolute risk, comparative risk, and cancer worry) as correlates of screening, controlling for demographic variables. Cancer worry was modeled as a potential mediator of the relationship between cognitive measures of perceived risk and past screening behavior using estimation of Monte Carlo confidence intervals for the indirect effects (Darlington, 2016). Independent pathway analysis was conducted to assess the relationship of cancer worry on screening behavior independent of the effect of cognitive beliefs regarding risk. Finally, we examined whether, in addition to its role as a mediator of cognitive risk components, cancer worry had an additional, independent effect on risk behavior. Following a procedure described previously (Kiviniemi, Marc T. et al., 2007), we estimated a regression model in which both absolute and comparative risk were modeled as correlates of cancer worry.

Results

Participant Characteristics: Demographic characteristics of participants are reported in Table 1. 47% of participants had used FOBT at least once and 36% had at least one colonoscopy; 24% had both a colonoscopy and FOBT. As only two thirds of the United

States population reports any type of colorectal cancer screening history, these screening rates are similar to national averages (ACS, 2017).

Relationship of Cognitive and Affective Risk Components to Screening

Behavior.—The relationship of each risk construct to screening behavior is reported in Table 2. Absolute risk, comparative risk, and cancer worry were all significant correlates of having had a colonoscopy. There were no significant relationships between any of the perceived risk measures and FOBT screening behavior.

Mediated Effects.—Results for indirect effects of cancer worry on the relationship of cognitive risk to colonoscopy screening can be found in Table 3. As no significant direct effects were present for any of the perceived risk constructs on FOBT screening, FOBT was not included as an outcome in mediational analyses. For both absolute risk and comparative risk, the relationship to colonoscopy screening behavior was mediated by cancer worry, as indicated by the significant indirect effects. In the case of comparative risk, there was no significant direct effect after accounting for the indirect (mediating) relationship. For absolute risk, there remained a significant direct effect in addition to the indirect effect.

Independent Influences of Affective Components.—The residual score from this model was calculated – the residual score represents the portion of variance in cancer worry not related to cognitively-based perceived risk (i.e., not part of the mediational pathway described above). The residual slopes were significant, indicating an independent effect of affectively-based perceived risk on screening behavior.

Discussion

Absolute risk, comparative risk and cancer worry were all associated with greater likelihood of colonoscopy screening, but not screening with FOBT. Moreover, cancer worry mediated the relationship of both absolute and comparative risk to colonoscopy screening behavior. Finally, cancer worry independently related to behavior in addition to its role as a mediator of the cognitive components of perceived risk. These findings support both of the hypothesized relationships: affectively-based risk are both independently associated with colonoscopy behavior and mediated relationships between cognitive risk and colonoscopy. It should be noted that changes in behavior, such as getting a colonoscopy, can lead to changes in risk perception (Weinstein & Nicolich, 1993). In this study, screening behavior is reported retrospectively. Thus, previously screened participants are reporting on their affect and cognitions after being screened and can use their past experience with screening to inform risk perceptions. Thus, risk perceptions may be attenuated for those who are screening compliant, while those who are due for screening may be more motivated by fear and worry to get a colonoscopy and the desire to have more information about their own risk for colorectal cancer.

Study 2

In Study 1, cognitive and affective risk components were both associated with past screening behavior, and the affective risk component (worry) mediated the relationship between cognitive risk and behavior. Although consistent with the hypotheses derived from the

behavioral affective associations model (Kiviniemi, 2007), the retrospective nature of reporting past colonoscopy behavior makes the situation modeled in Study 1 different from the health decision making contexts described in health behavior models, which focus on making decision about future behavior. To address this shortcoming, in Study 2 we examined the role of affective risk constructs in *intentions* to undergo colonoscopy screening for individuals who were either never screened or not currently adherent to screening recommendations. African Americans, experience a disproportionate burden of morbidity and mortality, which may be due to low adherence to screening recommendations. As such, we used a racially concordant African American sample to better understand how risk perceptions might inform some of this screening disparity. In addition to cancer worry, fear of getting cancer was also assessed as a second type of affectively-based perceived risk. We hypothesized that all measures of perceived risk would be associated with colonoscopy screening intentions and that affectively-based perceived risk would mediate the cognitively-based risk to colonoscopy relationship.

Methods

Participants.—Participants in the analyses reported here included 646 African Americans, ages 50 and older who had either never been screened for colorectal cancer or whose last colonoscopy screening was at least seven years ago. To determine eligibility, participants were asked if they had ever had a colonoscopy. Participants reporting “no” or “don’t know” were included. Participants responding “yes” were asked when their most recent colonoscopy occurred. Those responding that they had a colonoscopy between seven and 10 years ago or more than 10 years ago were also included. These criteria were developed to allow examination of near-term intentions to screen in a screening-eligible population. The participants were a subset of those taking part in a larger randomized trial of colorectal cancer screening interventions (total sample size for RCT was N=2,655). Participants were recruited in partnership with faith-based and other community-based civic organizations in the New York City and Buffalo, NY metropolitan areas (Klasko-Foster, et al., 2018; Ellis, E. et al., 2018).

Procedure.—The larger RCT (Ellis E., et al. 2018) from which these analyses are drawn tested two educational interventions to increase colonoscopy screening. The data reported here are from baseline questionnaires collected prior to intervention delivery, such that the subsequent intervention test is not relevant to the analyses reported here. Participants completed surveys assessing affectively (cancer worry and fear) and cognitively-based (absolute and comparative) perceived risk of colorectal cancer, future screening intentions, and demographic characteristics.

Measures.—Absolute risk was assessed with the item “What do you think are the chances that you will have colorectal cancer at some point in your life?” (Moser et al., 2007). Participants responded using a 5-point scale with endpoints of 1=very low and 5=very high. Comparative risk was assessed with the following item: “Compared to other people of your age and gender, how likely are you to have colorectal cancer at some point in your life?” with response options of 1=less likely than average, 2=equally likely, 3=more likely than average (Moser et al., 2007). Cancer worry was assessed by asking participants to respond to

the question “How worried are you about getting colorectal cancer?” (Moser et al., 2007). Response options were on a 5-point scale with endpoints of 1=not at all and 5=extremely. Fear of getting cancer was assessed with the item “How afraid are you about getting colorectal cancer?” Response options were on a 5-point scale with endpoints of 1=not at all and 5=extremely. To measure screening intentions, participants were asked how likely they were to have a colonoscopy in the next 12 months. Intentions were assessed on a 5-point scale with endpoints: 1=not at all and 5=extremely. Demographic information was assessed including age, gender, educational achievement, insurance status, and having a primary care provider.

Analysis Plan.—All analyses were conducted in SPSS 24. Regression analysis was used to model both components of risk as correlates of screening intentions, controlling for demographic variables (age, gender, educational achievement, annual household income, insurance status). Bootstrap estimates modeling the indirect effects of cancer worry and fear as independent mediators of the relationship between cognitively-based perceived risk and screening intentions were assessed using the PROCESS macro (Hayes, 2012) .

All analyses reported here based on the eligibility criteria described above (over age 50 and never screened or last screened seven or more years ago). In addition, we also conducted analyses using a more conservative inclusion criteria which included only those participants who had never been screened (n=407). Patterns of results based on this more conservative criteria were consistent with those reported here.

Results

Participant characteristics.—Participant characteristics are reported in Table 4. Participants were mostly female, low income, and a little more than half had a college degree. Most participants had some form of health insurance and a regular primary care provider. Approximately 50 percent of participants in this sample had a lifetime history of any colorectal cancer screening (colonoscopy or FOBT), which is slightly lower than national averages (ACS, 2017). The relationship between demographic characteristics and colonoscopy screening was assessed and only younger age ($b=-0.18$, $p<0.001$) was associated with of future screening intentions. Because of the design of the larger trial, all participants self-identified as African American or black.

Relationship of Cognitive and Affective Risk Components to Screening Intentions.—Absolute risk, cancer worry, and cancer fear were all positively associated with colonoscopy intentions. While comparative risk showed a positive association with colonoscopy intentions, results were not significant. Table 5 shows the relationship of each risk component to colonoscopy intentions.

Mediated Effects.—Results of mediation analyses are shown in Table 6. Absolute risk was partially mediated by cancer fear, but not cancer worry. Comparative risk was fully mediated by both cancer fear and cancer worry.

Independent Influences of Affective Components.—Independent pathway analyses were conducted for each affective component that had a significant indirect effect. When

colonoscopy intentions were regressed on residual scores for the cancer worry to comparative risk relationship and the cancer fear to both absolute risk and comparative risk relationships, the slopes were significant, indicating an effect of affectively-based perceived risk independent of effects from the cognitive components on screening behavior.

Discussion

In Study 2, both cognitive and affective risk components were related to behavioral intentions and both cancer fear and cancer worry mediated relationships between the cognitively-based perceived risk measures and behavioral intentions. Both cancer fear and cancer worry showed significant independent relationships to colonoscopy intentions over and above the aforementioned mediated relationships. Consistent with Study 1, there was evidence supporting each of the hypotheses.

General Discussion

Both studies demonstrated the complex, mediational relationships between cognitive and affectively-based perceived risk and both colonoscopy screening behavior and intentions. In both studies, both cognitive and affective risk components were related to behavior, but the influence of cognitive components was primarily indirect and mediated by affective perceived risk. These findings suggest that as individuals cognitively appraise their risk of colorectal cancer to be greater, their fear and worry increases and they are more likely to get (or intend to get) a colonoscopy. Our work lends additional empirical support for the extension of the behavioral affective associations model (Kiviniemi, 2007) to perceived risk and indicates that affectively-based perceived risk is a proximal influence on both behavior and behavioral intentions to get screened for cancer. Notably, this consistent pattern was found across two different participant populations -- Study 1 utilized a nationally representative sample of US Adults over age 50 whereas Study 2 included only participants self-identifying as black/African American from two metropolitan areas in a single, northeastern state.

One should note that the findings in Study 1 were specific to colonoscopy – there were no relationships between perceived risk and FOBT screening. This may be due to different characteristics of decision making for the two procedures – FOBT involves less sustained activity on the part of the individual patient (versus colonoscopy, where the individual must schedule, complete preparation, travel to the test, and arrange for travel home after the test while under sedation) and is sometimes presented as a part of an annual exam. Moreover, FOBT is often treated as a first line test given to patients with lower risk. As such, those who have opted for FOBT over colonoscopy may be truly at lower objective risk. It may also be the case that the much smaller portion of the population screened with FOBT makes it more difficult to detect effects, given the relationships between proportions of dichotomous variables and statistical power. As we did not see significant effects for the relationship between perceived risk and FOBT behavior in Study 1, we did not assess the relationship between perceived risk and FOBT intentions in Study 2.

Implications

This study has implications for understanding the relationships between risk and behavior. This work shows that risk perception is not an all-encompassing construct, but rather a complex decision-making factor with both emotional and logical components that work together to influence behavioral practice or avoidance. As such, including both affective and cognitive components of risk in theoretical work may more accurately describe decisions about engaging in behaviors.

The results of this study also have implications for cancer screening educational interventions as these interventions often focus solely on cognitively-based screening factors, including perceived risk. Given the potential impact of colonoscopy in detecting disease early and preventing colorectal cancer, educational strategies highlighting the effectiveness of screening and addressing both cognitive and affective components of risk may be important to increase screening rates. While results indicate that it is affect or affect in combination with cognitions that influences behavioral uptake or intentions to perform a screening behavior, careful consideration should be exercised in intervention planning. While this work shows the magnitude of effects on average, it does not provide information on how much worry or fear is behavior motivating. For example, making patients too afraid of getting colorectal cancer may become a barrier to screening (de Hoog et al., 2005; Witte, 1992). Thus, interventions should balance increasing awareness of personal vulnerability with emphasizing controllability through regular screening and monitoring.

Recent research has found evidence for a tripartite model of risk perception, whereby perceived risk has cognitive, affective, and experiential components (Ferrer, R. A. et al., 2016). Often conflated with affectively-based perceived risk, experiential components are heuristic-based judgments resulting from learned associations or stereotypes. Individuals often think they are less likely to be affected by a health hazard, such as cancer, than their peers. When deciding to engage in a protective behavior, they may compare themselves to a riskier portion of the population or rely on an available stereotype of a person that would have a given disease (Tversky & Kahneman, 1973). Future work on the interplay between cognitive and affective risk types, with the addition of experiential risk, will be important to continued theory development.

Limitations

Some limitations should be considered regarding this work. First, it should be noted that the secondary analyses in Study 2, examining behavioral intentions for non-screening compliant participants, was an intentions measure rather than a behavior measure as should be interpreted as such. Second, these results are cross-sectional and thus limit our ability to make causal statements about relationships. However, as past behavior and future behavioral intentions show consistent patterns, future intentions are likely predictive of behavior and these findings shed light on a potential mechanism for considering risk processing. Future work longitudinal work using these mediation models is necessary to make more concrete statements about the role of worry and fear and causal mechanisms for behavioral activation. Third, both studies used self-report measures of screening behavior which introduces the possibility of self-report bias. However, evidence in the colorectal cancer screening literature

suggests that self-report measures are indicative of actual behavior (Partin et al., 2008). Finally, because Study 1 involved secondary analysis of an existing dataset, we were limited to variables included in the original survey. For screening behavior, the measure only assessed whether a participant had ever been screened, not whether they were currently compliant and the results should be interpreted in that light. One should note that in Study 2, we examined both ever screening and current compliance and obtained the same pattern of results.

Conclusions

This research examined the relationship between affective and cognitive components of risk on cancer screening behavior and found that affective components mediated the relationship between cognitive risk perceptions and colonoscopy uptake. While it is important to consider the main effects of each component of perceived risk on screening behavior, such analyses do not tell the full story about how individuals use risk judgments to inform decision-making. More complex, mediational relationships should be considered in intervention development to increase colonoscopy coverage and adherence in the United States.

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Table 1:

Participant Characteristics, Study 1.

Participants ages 50+		Weighted Proportions or M (SE)
Gender	Male	0.46
	Female	0.54
Age		63.75 (0.23)
Highest education level	Less than high school	0.22
	High school or GED	0.33
	Some college	0.22
	College degree	0.23
Race/Ethnicity ^b	Hispanic	0.07
	White	0.78
	Black	0.10
	Asian	0.01
	Other	0.04
Health status		
Have regular medical provider ^c	Yes	0.79
	No	0.21
Insurance status ^a	Yes	0.93
	No	0.07

^a3.3% of responses are missing^b5.1% of responses are missing^c<1% of responses are missing

Table 2:

Relation of cognitive and affective perceived risk constructs to screening behavior: participants ages 50+, controlling for age, education, race/ethnicity, gender, and health insurance status, Study 1 (n=2,734).

Predictor	Colonoscopy OR (95% CI)	FOBT OR (95% CI)
Absolute risk	1.28 (1.14, 1.43)	1.09 (0.99, 1.21)
Comparative risk	1.22 (1.04, 1.42)	0.96 (0.83, 1.11)
Cancer worry	1.46 (1.21, 1.77)	1.00 (0.83, 1.20)

Table 3:

Cancer worry as a mediator of the relation between cognitive perceived risk and colonoscopy: participants ages 50+, controlling for age, education, race/ethnicity, gender, and health insurance status, Study 1 (n=2,734).

Cognitive risk	Total Effect	Direct Effect	Indirect Effect
Absolute Risk	1.28 (1.14, 1.42)	1.21 (1.07, 1.36)	0.26 (0.20, 0.34)
Comparative Risk	1.22 (1.04, 1.42)	1.12 (0.95, 1.32)	0.35 (0.25, 0.45)

Table 4:

Participant Characteristics, Study 2.

		Study eligible (n=646)	
		N	M (SD) or %
Gender	Male	156	26.1
	Female	490	75.9
Age		646	65.2 (10.5)
Highest education level	Less than high school	91	17.6
	High school or GED	164	31.8
	Some college	168	32.6
	College degree	93	18.0
Income	< \$25,000	484	74.9
	\$25,000 - \$50,000	117	18.1
	> \$50,000	45	7.0
Health status			
Have regular medical provider	Yes	576	89.2
	No	70	10.8
Insurance status ^a	Yes	612	94.7
	No	27	4.2

^a 1.1% missing

Table 5:

Relation of cognitive and affective perceived risk constructs to pre-intervention screening intentions: participants eligible for screening in the next three years, Study 2 (n=646).

Predictor	β (95% CI)	<i>p</i> Value
Absolute risk	0.14 (0.04, 0.25)	<0.001
Comparative risk	0.06 (−0.10, 0.21)	0.18
Cancer worry	0.11 (0.005, 0.21)	<0.01
Cancer fear	0.13 (0.04, 0.22)	<0.01

Table 6:

Affective components of risk as mediators of the relation between cognitive perceived risk and screening intentions: study eligible participants, Study 2 (n=646).

	Affective Risk			
Cognitive risk	Cancer Worry		Cancer Fear	
	Direct (95% CI)	Indirect (95% CI)	Direct (95% CI)	Indirect (95% CI)
Absolute Risk	0.13* (0.02,0.25)	0.03 (−0.01,0.07)	0.12* (0.01,0.24)	0.04* (0.01,0.09)
Comparative Risk	0.05 (−0.12,0.22)	0.07* (0.01,0.13)	0.05 (−0.12,0.21)	0.07* (0.02,0.13)