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Cancer Recurrence Worry, Risk Perception, and Informational-Coping Styles among Appalachian Cancer Survivors

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Abstract

Despite a growing literature on the psychosocial impact of the threat of cancer recurrence, underserved populations, such as those from the Appalachian region, have been understudied. To examine worry and perceived risk in cancer survivors, cancer patients at an ambulatory oncology clinic in a university hospital were surveyed. Appalachians had significantly higher worry than non-Appalachians. Cancer type and lower need for cognition were associated with greater worry. Those with missing perceived risk data were generally older, less educated, and lower in monitoring, blunting, and health literacy. Additional resources are needed to assist Appalachians and those with cancers with poor prognoses to cope with worry associated with cancer recurrence. More attention to prevention of cancer is critical to improve quality of life in underserved populations where risk of cancer is greater.

Keywords

Appalachian region; cancer; health disparities; oncology; perceived risk; psychosocial factors

It is expected that 2009 will have produced nearly 1.5 million new cases of cancer in the United States, and increasing survival rates are producing a growing population of individuals living with cancer or with a history of cancer (American Cancer Society, 2009). Having cancer poses many challenges and choices, including decision-making about

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treatment (Stalmeier et al., 2007; Steyerberg, Neville, Weeks, & Earle, 2007). Along with medical management of cancer, cancer patients have many psychosocial concerns and threats to their psychosocial well-being. Cancer survivors have been noted to have a significant amount of worry about cancer (Dunn & Steginga, 2000; Golden-Kreutz & Andersen, 2004) and worry about cancer recurrence (e.g., Andersen, Shapiro, Farrar, Crespin, & Wells-Digregorio, 2005; Ashing-Giwa et al., 2004; Benyamini, McClain, Leventhal, & Leventhal, 2003; Lee-Jones, Humphris, Dixon, & Hatcher, 1997; Mullens, McCaul, Erickson, & Sandgren, 2004; Stanton, Danoff-Burg, & Huggins, 2002; Vickberg, 2001; Wang et al., 2006). This worry is understandable in light of their greater likelihood of having cancer in the future, as compared to the general population (Ries et al., 2007). Research on the predictors of cancer worry is important because cancer worry has been shown to be a potent predictor of health behavior (Hay, McCaul, & Magnan, 2006) and is an important facet of overall well-being (Ashing-Giwa et al., 2004; Shelby, Lamdan, Siegel, Hrywna, & Taylor, 2006). Yet, most research in the area of worry about recurrence has focused on breast cancer, while the risk of a second cancer appears greatest for those with colon or esophageal cancer (Ueno et al., 2003).

Impact of Perceived Risk

Type of cancer not withstanding, most research dealing with recurrence has focused on cancer worry. Perceived risk of developing cancer again (i.e., perceived likelihood of cancer recurrence or the development of a second primary cancer) and its relationship with worry about recurrence has received less attention. A few studies have found perceived risk in cancer patients was not grossly overestimated (Mullens et al., 2004); in fact, perceived risk of cancer was lower than objectively merited (Kelly et al., 2004; Schnoll et al., 2004). This underestimation of risk of cancer recurrence may reflect limited health literacy and is similar to the underestimation of risk of cancer (e.g., ‘unrealistic optimism’) in individuals without a prior cancer (Lipkus et al., 2000; Weinstein, 1982), but counter to the overestimates of risk seen in individuals with a family history of cancer (Kelly et al., 2004; Lerman, Seay, Balshem, & Audrain, 1995). Perceived risk of cancer is important due to its theoretical (e.g., see Health Belief Model: Rosenstock, 1966; Protection Motivation Theory: Rogers, 1975; Health Action Process Approach: Schwarzer, 1992) and empirical (e.g., decision making: Fang et al., 2003; Mullens et al., 2004) association with behavior.

Yet many of the associations of perceived risk to behavior appear contradictory, and few studies consider the importance of the interacting relationship of worry and perceived risk (Bowen, Alfano, McGregor, & Andersen, 2004; Hay, Coups, & Ford, 2006; Leventhal, Kelly, & Leventhal, 1999; Mullens et al., 2004; Zajac, Klein, & McCaul, 2006). Further, studies have posited that perceived risk framed in terms of timeline (i.e., projected age of cancer onset and years of survival time with cancer) may be more closely associated with behavior (Kelly et al., 2004; Leventhal et al., 1999) and may overcome problems with understanding probability (Schwartz, Woloshin, Black, & Welch, 1997). Although theoretically-supported (Leventhal et al., 1999), it is unclear empirically the extent to which perceived risk framed in terms of timeline may be related to cancer worry. Presumably, earlier projected age of cancer onset and shorter perceived survival time with cancer would be associated with greater worry.

Impact of Informational Coping Styles

Cancer survivors have been noted to have varied informational coping styles and needs (e.g., Oh, Meyerowitz, Perez, & Thornton, 2007; Petersen, Heesakcer, Schwartz, & Marsh, 2000; Petersson et al., 2002; Steptoe, Sutcliffe, Allen, & Coombes, 1991), with many studies focusing on informational coping in breast cancer survivors (e.g., Rees & Bath, 2001;

Wolinsky, Stump, Callahan, & Johnson, 1996). One study found that a monitoring informational coping style was positively related to higher perceived risk and greater worry in first degree relatives of ovarian cancer patients (Schwartz, Lerman, Miller, Daly, & Masny, 1995), suggesting that monitoring also may be associated with higher worries about and perceived risk of cancer recurrence. Indeed, such relationships of perceived risk and worry may be noted with other informational coping styles including the need for cognition (i.e., the degree to which one likes to engage in effortful cognitive tasks; Cacioppo, Petty, Feinstein, & Jarvis, 1996) and the health information scale (i.e., the degree to which one seeks information from health care providers: Krantz, Baum, & Wideman, 1980).

Impact of Cancer in Appalachia

Along with perceived risk and informational coping style, an additional factor may play a role in worry about cancer recurrence: belonging to an underserved population which has less access to care, poorer understanding of health (e.g., health literacy: King & Wheeler, 2006), and greater objective risk of cancer. One such underserved population is the Appalachian population, which is found in a federally-designated region associated with the Appalachian Mountains along the Eastern coast of the United States (Appalachian Regional Commission, 2009). Although it is unclear if the risk of a second cancer is increased, it is clear that Appalachians have higher risks of cancer than the general population and are more likely to present with later stages of disease, especially colorectal cancer (Huang, Wyatt, Tucker, & Bottorff, 2002; Kentucky Cancer Registry, 2009; Lengerich et al., 2005). Unfortunately, less is currently known about the psychosocial impact of a cancer diagnosis for Appalachians. Appalachia is marked by higher poverty rates, lower levels of education, and greater health shortages, particularly the Appalachian region in the state of Kentucky (Appalachian Regional Commission, 2009; Behringer & Friedell, 2006; Couto, 1994). These factors, common among a number of underserved populations, pose challenges to the diagnosis and treatment of cancer. Further, studies of individuals with no prior cancer history have found that Appalachians have greater worry about cancer and different informational needs than those not from the Appalachian region (Kelly, Andrews, Case, Allard, & Johnson, 2007). Considering socio-economic differences and the greater likelihood of dying from cancer, it may be possible that Appalachians differ from non-Appalachians in response to a cancer diagnosis and the threat of cancer recurrence.

Thus, it is important to understand how the psychosocial needs of underserved individuals with cancer, such as Appalachians, might differ in order to provide appropriate clinical care and to prevent and control cancer recurrence. The primary aim of the current exploratory study was to compare those with high and low levels of cancer worry in terms of demographic (e.g., Appalachian status) and psychosocial variables (e.g., perceived risk, informational coping style).

Methods

Participants

Individuals with a prior diagnosis of cancer at an outpatient ambulatory gastrointestinal oncology clinic at a university hospital were approached for participation during their clinic visit (n=143). An effort was made to approach all individuals in their outpatient clinic rooms. The following criteria were used to establish eligibility: being 18 years of age or older, being capable of reading and writing in English, having a history of cancer other than basal cell carcinoma, and being able to provide consent for participation. Of those approached, eight were ineligible. From the one hundred thirty-five eligible, thirty-four did not participate for a response rate of 75%. Reasons for refusal included ‘don’t have my reading glasses’ (n=3), ‘my wife does the paperwork’ (n=2), not feeling well (n=2), insufficient time (n=1), 'don't do studies' (n=1), and 'just here for a second opinion' (n=1); some of these may be indications of an inability to read (Literacy Partners of Manitoba, 2006). Most individuals (n=24) provided no reason for refusal. Of the 101 men and women that agreed to participate, 3 participants were dropped due to largely incomplete surveys, and 1 participant was dropped when it was determined that a spouse had completed the survey instead of the patient. An additional survey was dropped in a person who spoke English as a second language, upon observing that "1" was circled for all questions.

Measures

The questionnaire was developed utilizing previously-existing and newly-developed scales. Standard demographic data was collected, including age, race, gender, annual income, and years of education. Annual income ranged from 1, being less than $7,500, through 6, being $100,000 or greater. County of residence was used to determine if the individual resided in a federally designated Appalachian county (Appalachian Regional Commission, 2009). Participants also indicated their stage of cancer (stage 1, for localized cancer, through stage 4, for advanced metastatic cancer) and the type or types of cancer they had and at what age. The number of years since diagnosis was computed. Psychosocial scales were also included.

Monitoring/Blunting—The Miller Behavioral Style Scale, a valid and reliable scale, classified people as either having a monitoring or blunting coping style based on their self-reported preferences for information or distraction in a variety of naturalistic stress situations (Miller, 1987). A short form of the scale was used (Salsman, Pavlik, Boerner, & Andrykowski, 2004), including two scenarios and eight possible statements for each scenario. Eight monitoring statements endorsed (e.g., "I would watch all of the dentist's movements and listen for the sound of the drill,") and eight blunting statements endorsed (e.g., "I would try to sleep," eight items) were summed separately. Higher scores indicated higher monitoring or blunting.

Health Related Information Seeking—The Health Information Scale, a seven item subscale of the larger Health Opinion Scale, assessed information seeking regarding health (Krantz et al., 1980). The scale asked participants to either agree or disagree with statements regarding seeking information from the doctor or other medical professionals (e.g., "Instead of waiting for them to tell me, I usually ask the doctor or nurse immediately after an exam about my health."). A sum of the seven items was taken, with higher scores indicating higher information seeking.

Need for Cognition—The 18-item Need for Cognition Scale assessed desire to engage in effortful cognitive tasks (Cacioppo, Petty, & Kao, 1984). Participants rated how well they felt each statement (e.g., "I would prefer complex to simple problems.") described them using a 5-point scale, with 5 being extremely characteristic of the participant, 3 being uncertain, and 1 being extremely uncharacteristic of the participant. A mean score was computed, with higher scores indicating greater need for cognition.

Perceived Risk—Perceived risk of cancer was assessed with two age-related items: projected age of cancer onset (i.e., "As I look forward, I believe it will be ___ years before I get cancer again.") and survival time with cancer (i.e., "If I were to get cancer again, I would expect to survive for ___ years."). The maximum number of years for this question was 100. Participants indicated their estimated number of years for each response (Kelly et al., 2004; Kelly, Shedlosky-Shoemaker, et al., 2007)

Worry about Cancer—Worry about cancer was measured with the four-item Cancer Worry Scale adapted to assess general cancer worry of developing cancer again (Kelly, Shedlosky-Shoemaker, et al., 2007; Lerman, et al., 1991). For each item (e.g., "During the past month, how often have you thought about your own chances of developing cancer again?"), participants responded on a rating scale ranging from one, being not at all, to four, being a lot. A mean score was computed, with higher scores indicating greater worry.

Health Literacy—The Rapid Estimate of Adult Literacy in Medicine (REALM: Davis et al., 1991) was used to assess health literacy of participants. The REALM identifies people with limited reading skills. Participants were given a list of 66-words to read aloud, and their score was determined by the number of words pronounced correctly.

Family History—The Stemmermann Interview (Mussio, Weber, Brunetti, Stemmermann, & Torhorst, 1998) was used to collect the participants' family history of cancer. This questionnaire is a one-page, in-person interview used to determine the types of cancer in the first degree relatives of the individual and is highly accurate, sensitive, and specific (Mussio et al., 1998). Only age of the family member (age), type of cancer diagnosis (diagnosis), and age at the time of the cancer diagnosis (age at diagnosis) in first degree relatives were collected (Kelly, Shedlosky-Shoemaker, et al., 2007). Names, birth dates and date of cancer onset were not collected, as was done in the original Stemmermann Interview. Family history was categorized as no family members with cancer, one family member with cancer, or more than one family member with cancer.

Procedures

IRB approval was obtained prior to initiating the study. Participants were approached during a regular visit to their oncologist (e.g., receiving treatment, follow-up after treatment), and once they were determined to be eligible, were asked if they would consent to participate in the study. After consenting, participants proceeded with the psychosocial questionnaire completion. During the psychosocial questionnaire portion, the first author or research assistant remained available outside the door to answer any questions. The questionnaire collected information regarding standard demographics (i.e., age, race, gender, and zip code), informational coping styles, family history of cancer, and health literacy. The family history interviews were conducted by the first author or a research assistant trained by the first author, following the directions given on the Stemmerman Interview. An assessment of health literacy was also made at the end of the study after questionnaire completion. Time to complete the questionnaire and interview was approximately 30 minutes.

Statistical Analysis

There were 96 total participants. Appalachian status could not be determined for 1 participant, and 12 participants that did not answer the cancer worry items. A significance level of alpha = 0.05 was used for all statistical tests. Cancer types were categorized as colorectal, other gastrointestinal (i.e., stomach, esophageal, liver, pancreatic, and gall bladder), or other (e.g., lymphoma, leukemia). Responses for projected age of cancer onset and survival time with cancer were analyzed both as dichotomous variables (those answering "100" versus those not answering "100") and also as continuous variables for only the participants not answering "100."

Demographic and psychosocial factors were compared by Appalachian or non-Appalachian status. T-tests for continuous variables and chi-square tests for categorical variables were used to compare groups. A Wilcoxon rank sum test was used for health literacy, which was not normally distributed. Fisher's exact test was used for race due to small cell sizes.

Next the association of demographic and psychosocial variables with cancer worry was examined. Cancer worry was not normally distributed, so two categories were created using a median split: less than two or greater than or equal to two. Univariable logistic regression models were fit to the dichotomous cancer worry variable. Each variable that was significant in the univariable models was included in a multivariable logistic regression model. Backward selection based on significant p-values was used to determine variables in the final model.

Missing values for projected age of cancer onset and survival time with cancer were investigated. Participants were divided into those with missing data for one or both of these items and those with complete data for onset and survival. Demographic and psychosocial variables were compared between these two categories using t-tests for continuous variables and chisquare tests for categorical variables. A Wilcoxon rank sum test was used for health literacy. Fisher’s exact test was used for race due to small cell sizes.

Results

Table 1 contains summary statistics for demographic and psychosocial factors by Appalachian status. Appalachian participants had significantly fewer years of education [t(93) = 3.43, p < .001], lower income [$X^2(2) = 17.17$, p < .001], and higher cancer worry [t(81) = 2.06, p = .034] than non-Appalachian participants.

Results for univariable logistic regression models for cancer worry are given in Table 2. Although years since diagnosis was associated with worry in the univariate model, the final multivariable logistic regression model found that only Appalachian status (p = .014), cancer type (p = .011), and need for cognition (p = .015) were all significantly associated with cancer worry. Appalachians had greater odds of being in the higher category of cancer worry than non-Appalachians (OR = 3.92; 95% CI: 1.32, 11.62). For cancer type, those with other (non-colorectal) gastrointestinal cancer had significantly higher odds of having higher cancer worry than those in the “other cancer” category (OR = 9.91; CI: 2.10, 46.71; p = .004). Those with colorectal cancer had higher odds of higher cancer worry than those in the “other cancer” category (OR = 3.38; CI: 1.03, 11.07; p = .044). Further, in the case of need for cognition, for each increase of 1 point in the need for cognition scale (e.g., 1=extremely uncharacteristic to 2=uncharacteristic), participants had 2.66 (CI: 1.21, 5.84) times lower odds of being in the higher cancer worry category. The linearity of continuous variables was assessed using fractional polynomials. The final multivariable model had adequate fit (Hosmer-Lemeshow p = .904).

Sixty-two of the 96 participants (64.6%) had missing values for only projected age of cancer onset (n=10), only length of survival with cancer (n=1), or both survival and onset (n=51). Table 3 contains summary statistics for those with and without missing values for the perceived risk variables. Those with missing values tended to be older [t(94) = 3.25, p = .002] and have less education [t(94) = 2.24, p = .027] and lower scores for monitoring [t(89) = 2.36, p = .021], blunting [t(89) = 2.29, p = .024], and health literacy [Wilcoxon z = 2.94, p = .003].

Discussion

The current study examined cancer worry and perceived risk in individuals with a prior cancer diagnosis from Appalachian and non-Appalachian regions of Kentucky. Consistent with their lower socio-economic status, individuals from Appalachia had lower levels of education and income than non-Appalachians. In fact, nearly 70% of Appalachians had incomes below $15,000, and the average education was high school. Yet, health literacy did not appear to differ as a function of Appalachian status. Appalachians had higher levels of cancer worry than non-Appalachians, which was understandable in light of their higher mortality from cancer. Yet, there were no differences in Appalachians in terms of perceived risk (project onset of cancer and survival with cancer). Other psychosocial factors did not appear to differ as a function of Appalachian status, indicating that the impact of cancer was seen largely in-terms of situational factors (e.g., financial resources, objective threat of cancer), rather than dispositional characteristics (e.g., informational coping style).

Considering the importance of cancer worry in the lives of those with a prior cancer diagnosis, those with high and low levels of cancer worry were compared. Those with non-colorectal gastrointestinal cancer had greater cancer worry than those with other types of cancer. Indeed, individuals with pancreatic and liver cancers have low survival rates compared to other types of cancer, and their worry is understandable in light of their greater likelihood of death from cancer (American Cancer Society, 2007). In addition, higher need for cognition, the desire for effortful cognitive tasks, was associated with lower worry. Thus, engaging in effortful cognitive tasks may serve as a protective factor against worry in those with a prior history of cancer.

Although one goal of this study was to gain a better understanding of perceived risk and how it influences cancer worry, the amount of missing perceived risk data significantly lowered our power for such an investigation. The amount of missing data was certainly unexpected in light of a previous study of individuals with a prior history of and in current treatment for breast cancer, where little missing data was noted (Kelly et al., 2004). Further, prognostication and risk assessment has been a critical task of health care providers particularly in palliative care, suggesting that it would also be important to patients (Angeles-Llerenas et al., 2003; Lau, Downing, Lesperance, Shaw, & Kuziemsky, 2006; Siminoff, Fetting, & Abeloff, 1989). However, it seems participants were uncomfortable or unwilling to report when they would get cancer or how long they would survive with cancer. Those who were older, had less education, and had lower health literacy were more likely to have missing perceived risk data. A number of possible explanations exist for these findings. First, individuals with less education and lower health literacy may also have lower levels of numeracy, the ability to understand and manipulate numbers. Thinking of risk in terms of numbers may have been too complex a task for these individuals.

Second, those who were older, had less education, and had lower health literacy may not have known how to form a prediction about when their cancer would occur or how long it would last. They might assume that cancer equals death; as others around them may have been diagnosed at a later stage and may not have survived an initial cancer diagnosis. Further, it could be that these patients had not discussed a prognosis with their physician. This latter explanation is *consistent* with the finding that less monitoring was associated with more missing perceived risk data but *inconsistent* with the association of less blunting with more missing perceived risk data and the lack of findings for the health information scale, which assesses the extent to which individuals seek information from physicians.

Third, it is possible that those with missing perceived risk data were resistant to make predictions about the time of cancer development or length of survival with cancer. Anecdotally, some participants expressed extreme apprehension at answering this question and felt that committing to a time of cancer occurrence or death might somehow ‘bring it on’ or ‘tempt fate’. Thus, the lack of projected onset of or length of survival with cancer may reflect magical thinking, that speaking or writing about an event (i.e., cancer, death) will make it occur. Although magical thinking has long been hypothesized to be important for making events in the environment understandable and predictable (Frazer, 1998; Malinowski, 1935; Vyse, 1997), such potentially widespread use of magical thinking has not been reported in the cancer area, except in children (Fogerty, 2000). This lack of prior finding is likely due to (1) the limited assessment perceived risk of developing cancer again in cancer survivors and (2) limited prior assessment of self-prognostication. Additional research should clarify the role of magical thinking in the assessment of perceived recurrence risk, particularly in the context of self-prognostication.

Strengths and limitations of the current study should be noted. First, although our study had a number of significant findings, it may be that our sample was not large enough to observe small effects. Indeed, our lack of finding of a relationship of family history to worry or perceived risk is very surprising in light of the seeming robust positive relationships in the literature (Katapodi, Lee, Facione, & Dodd, 2004; Kelly, et al., 2005; Lerman, Kash, & Stefanek, 1994); however, we cannot rule out the possibility of a Type II error. Second, the collection of numeracy data would have been helpful in understanding the difficulties individuals had in reporting perceived risk. Yet, based on prior research with cancer patients (Kelly et al., 2004), we did not anticipate such a large amount of missing data. Further, based on the Common Sense Model, we thought perceived risk framed in terms of timeline (i.e., risk assessed in terms of years) would be a cognitively easier and more meaningful task than using percentage or comparative risk. Strengths of this study include its clinic-based, face-to-face recruitment and administration, making this a more representative sample from the clinic. In addition, the Appalachian population is underserved and understudied, and this study provides insight into their clinical presentation and needs.

In conclusion, our results do not indicate drastic differences in informational needs between Appalachian and non-Appalachian patients that would lead to poorer health outcomes. Rather, our results reaffirmed prior data in non-cancer Appalachian patients and other underserved groups (Miller & Champion, 1997; Moadel, Morgan, & Dutcher, 2007), indicating less education, lower income, and greater cancer worry in the Appalachian population, likely due to the higher threat of cancer mortality. Further, it is understandable that those with other gastrointestinal cancers (e.g., liver and pancreatic) were more worried about cancer due to the higher mortality rate from these cancers. Finally, many individuals in the study did not report recurrence risk in terms of projected time of cancer onset or survival time with cancer. It is unclear why those who were older, had less education, and had lower health literacy were less likely to report recurrence risk, but additional exploration of numeracy, physician communication, and magical thinking in this context may be helpful.

Implications for Clinical Practice

One clear implication of these results is that additional resources are needed to assist underserved populations with less access to care and with cancers with poor prognoses to cope with greater levels of worry associated with cancer recurrence. In addition, greater attention to access to primary (i.e., promotion of healthy lifestyle) and secondary (i.e., early diagnosis) cancer prevention modalities is critical to improving the long-term well-being of individuals in such underserved groups.

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Table 1

Demographics and Psychosocial Factors as a Function of Appalachian/non-Appalachian

		Appalachian (n=39) N (%) or Mean (SD)	**non-Appalachian (n=56) N (%) or Mean (SD)**
Gender	Male	21 (42.0%)	29 (58.0%)
	Female	18 (40.9%)	26 (59.1%)
Age		55.92 (13.14)	58.64 (12.48)
Race	White	37 (44.1%)	47 (55.9%)
	Non-white	2 (18.2%)	9 (81.8%)
Years of Education***		12.26 (3.27)	14.52 (3.08)
Annual Income***	$14,999 or less	25 (69.4%)	11 (30.6%)
	$15,000 to $49,999	8 (30.8%)	18 (69.2%)
	$50,000 or more	5 (20.0)	20 (80.0)
Type of Cancer	Colorectal	18 (47.4%)	20 (52.6%)
	Other Gastrointestinal	7 (36.8%)	12 (63.2%)
	Other	12 (37.5%)	20 (62.5%)
Stage Reported	Yes	15 (36.6%)	26 (63.4%)
	No	24 (44.4%)	30 (55.6%)
Years Since Diagnosis	≤ 1	17 (39.5%)	26 (60.5%)
	> 1	13 (43.3%)	17 (56.7%)
Family History	0	11 (35.5%)	20 (64.5%)
	1	11 (36.7%)	19 (63.3%)
	> 1	11 (47.8%)	12 (52.2%)
Projected Age of Onset	=100	9 (39.1%)	14 (60.9%)
	< 100	17 (46.0%)	20 (54.0%)
Projected age of cancer onset (for Onset ≠ 100, in years)		64.64 (12.53)	63.00 (13.89)
Years of Survival	=100	2 (28.6%)	5 (71.4%)
with Cancer	< 100	20 (44.4%)	25 (55.6%)
Survival time with cancer (for Survival ≠ 100, in years)		11.70 (14.50)	10.04 (10.88)
Health information seeking (1–7)		4.18 (1.96)	3.85 (2.20)
Need for cognition (1–5)		3.19 (0.62)	3.25 (0.67)
Cancer worry (1–4)*	< 2	11 (27.5%)	29 (72.5%)
Monitoring (1–8)	≥ 2	28 (50.9%)	27 (49.1%)
Monitoring (1–8)		3.26 (1.96)	3.08 (1.80)
Blunting (1–8)		1.95 (1.30)	1.96 (1.33)
Health literacy (1–66)		57.47 (13.07)	62.38 (5.13)

[*] p<.05,

[***] p<.001

Table 2

Univariable Logistic Regression Results for High and Low Levels of Worry

		Cancer Worry < 2 (n = 41)	**Cancer Worry ≥ 2 (n = 43)**
Gender	Male	26 (57.8%)	19 (42.2%)
	Female	15 (39.5%)	23 (60.5%)
Age		58.46 (12.05)	55.09 (55.09)
Race	White	35 (46.1%)	41 (53.9%)
	Non-white	6 (75.0%0	2 (25.0%)
Years of Education*		14.37 (3.27)	12.74 (3.15)
Annual Income	$14,999 or less	10 (41.7%)	14 (58.3%)
	$15,000 to $49,999	16 (53.3%)	14 (46.7%)
	$50,000 or more	12 (50.0%)	12 (50.0%)
Appalachian*	Yes	11 (32.4%)	23 (67.6%)
	No	29 (59.2%)	20 (40.8%)
Type of Cancer**	Colorectal	15 (44.1%)	19 (55.9%)
	Other Gastrointestinal	5 (27.8%)	13 (72.2%)
	Other	21 (72.4%)	8 (27.8%)
Stage Reported	Yes	21 (52.5%)	19 (47.5%)
	No	20 (45.5%)	24 (54.5%)
Years Since Diagnosis*	≤ 1	13 (34.2%)	25 (65.8%)
	> 1	18 (66.7%)	9 (33.3%)
Family History	0	11 (39.3%)	17 (60.7%)
	1	18 (64.3%)	10 (35.7%)
	> 1	9 (47.4%)	10 (52.6%)
Projected Age of Onset	=100	13 (56.5%)	10 (43.5%)
	< 100	18 (48.6%)	19 (51.4%)
Projected age of cancer onset (for Onset ≠ 100, in years)		66.77 (15.23)	60.40 (8.07)
Years of Survival	=100	2 (33.3%)	4 (66.7%)
with Cancer	< 100	21 (46.7%)	24 (53.3%)
Survival time with cancer (for Survival ≠ 100, in years)		9.86 (10.63)	11.58 (14.10)
Health information seeking (1–7)		4.32 (2.14)	3.86 (1.95)
Need for cognition (1–5)**		3.44 (0.61)	3.03 (0.67)
Monitoring (1–8)		2.79 (1.77)	3.43 (1.84)
Blunting (1–8)		2.03 (1.33)	1.93 (1.28)
Health literacy (1–66)		63.11 (3.29)	58.33 (12.18)

*p<.05,

**P<.01

Table 3

Demographics and Psychosocial Factors as a Function of Missing Risk Data

		No Missing Risk Data (n=51)	Missing Risk Data (n=45)
Gender	Male	28 (54.9%)	23 (45.1%)
	Female	22 (50.0%)	22 (50.0%)
Age**		53.78 (12.00)	61.82 (12.21)
Race	White	47 (55.3%)	38 (44.7%)
	Non-white	4 (36.4%)	7 (63.6%)
Years of Education*		14.25 (3.52)	12.76 (2.96)
Annual Income	$14,999 or less	13 (50.0%)	13 (50.0%)
	$15,000 to $49,999	20 (54.1%)	17 (45.9%)
	$50,000 or more	17 (68.0%)	8 (32.0%)
Appalachian	Yes	22 (56.4%)	27 (43.6%)
	No	29 (51.8%)	27 (48.2%)
Type of Cancer	Colorectal	21 (55.3%)	17 (44.7%)
	Other Gastrointestinal	10 (52.6%)	9 (47.4%)
	Other	18 (54.6%)	15 (47.4%)
Stage Reported	Yes	25 (61.0%)	16 (39.0%)
	No	26 (47.3%)	29 (52.7%)
Years Since Diagnosis	≤ 1	21 (48.8%)	22 (51.2%)
	> 1	18 (60.0%)	12 (40.0%)
Family History	0	16 (51.6%)	15 (48.4%)
	1	13 (43.3%)	17 (56.7%)
	> 1	11 (47.8%)	12 (52.2%)
Health information seeking (1–7)		4.06 (2.19)	3.89 (1.99)
Need for cognition (1–5)		3.31 (0.73)	3.13 (0.52)
Cancer worry (1–4)	< 2	23 (56.1%)	18 (43.9%)
	≥ 2	27 (62.8%)	16 (37.2%)
Monitoring (1–8)*		3.53 (1.70)	2.63 (1.96)
Blunting (1–8)*		2.22 (1.27)	1.60 (1.28)
Health literacy (1–66)*		61.87 (10.26)	59.03 (8.15)

*p<.05,

**p<.01