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Does the number of cancer patients' close social ties affect cancer-related information seeking through communication efficacy? Testing a mediation model

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Abstract

This study addresses the question of whether having a broad social network of close friends equips cancer patients with increased efficacy to engage in communication about their cancer, which then leads to an increased likelihood of patients' actively seeking cancer-related information. Guided by the theory of motivated information management (TMIM: Afifi & Weiner, 2006), the study also tests whether the effect of the number of close social ties on information seeking is mediated, in part, by communication efficacy. Results are based on data collected from a randomly drawn sample from the Pennsylvania Cancer Registry of 2,013 cancer patients who completed mail surveys in the Fall of 2006. Results are consistent with a cross-sectional mediation effect in which the number of close social ties in one's social network is positively associated with communication efficacy ($b = .17, p = .001$), which, in turn, is positively associated with cancer-related information seeking ($b = .13, p < .001$).

The goal of this study is to examine the impact of a social determinant –number of close social ties – on information seeking behaviors among a population of cancer patients. Among cancer patients, access to a large number of close social ties is expected to provide benefits in the form of increased communication efficacy. Communication efficacy is defined as the perception that one can successfully engage in the communication or observational task required to gather sought-after information (Afifi & Weiner, 2004). Drawing from the theory of motivated information management (TMIM: Afifi & Weiner, 2006), the study works toward achieving this goal by examining whether increased communication efficacy mediates the effects of number of close social ties on increased cancer-related information seeking among cancer patients. The focus of this study reflects the growing conceptual and empirical interest in the impact of social contextual variables on health, and particularly in the benefits that close social ties may provide for health-related outcomes among cancer patients. This study also contributes to a growing body of literature focusing on information seeking among cancer patients, a behavior which has been shown to impact a number of positive health outcomes among this population.

Information seeking among cancer patients

Past studies have identified informational needs of cancer patients as an integral element in their ability to participate in decision-making about their cancer treatments (Feldman-Stewart, Capirci, Brennenstuhl et al., 2010; Vogel, Bengel, & Helmes, 2008), an important part of patient-centered communication (Epstein & Street, 2007), and thus worthy of continued investigation (Nagler, Gray, Romantan et al., 2010; Rutten, Squiers, & Hesse, 2006). Given the ever-increasing emphasis on the part of the U.S. healthcare system for patients to actively participate in health care decisions (Coulter & Ellins, 2007), the need to understand information-seeking behavior and its effects on health-related outcomes among the cancer patient populations is only increasing.

Information seeking is often conceptualized as a purposeful acquisition of information from selected sources (Johnson, 1997). Information seeking has also been conceptualized as an active effort to obtain specific information outside of routine patterns of exposure to information from mediated and interpersonal sources (Niederdeppe, Hornik, Kelly et al., 2007; Shim, Kelly, & Hornik, 2006). Information seeking can be an effective behavior to aid in coping with the cancer experience (Case, Andrews, Johnson, & Allard, 2005; Loiselle, Lambert, & Cooke, 2006), help guide decision-making relating to treatment and survivor issues (Gray, Armstrong, DeMichele, Shwartz, & Hornik, 2009; McInnes, Cleary, Stein et al., 2008; Walsh, Trentham-Dietz, Schroepfer et al., 2010), as well as promote the adoption of healthy lifestyle behaviors (Bandura, 1986; Johnson, 1997; Lewis, Martinez, Freres et al., 2012; Ramirez, Freres, Martinez et al., in press).

Recently, health communication scholars have begun to examine how cancer patients achieve fulfillment of their informational needs (Mayer, Terrin, Kreps et al., 2007; Nagler et al., 2010) through actively searching for cancer-related information from family, friends, and mass media sources (Lewis et al., 2012), health care providers (Leadbeater, 2001; Talosig-Garcia & Davis, 2005), as well as actively engaging in information received from their treating physicians and other health professionals (Lewis, Gray, Freres, & Hornik, 2009; Martinez, Schwartz, Freres, Frazee, & Hornik, 2009; Tan, Bourgoin, Gray, Armstrong, & Hornik, 2011). This is an important population to study given the abundance of cancer-related information publicly available in the current media environment (see Ramirez et al., in press). A significant proportion of cancer patients who experience unmet informational needs may look for or come across such information through a variety of sources (Nagler et al., 2010) following a cancer diagnosis. As previous research has demonstrated positive outcomes resulting from active health searches (e.g., Lewis et al., 2012; Tan, Mello, & Hornik et al., 2012) among cancer patients, it is important to understand the factors that may lead this population to engage with readily accessible cancer-related information.

Previous research has shown that active health-information seeking imparts beneficial outcomes to members of the general population and to the cancer patient population. Ramirez et al. (in press) found a positive lagged association between information seeking about cancer prevention and recommended health behaviors among a nationally representative sample of U.S. adults. Information seeking has also been shown to influence fruit and vegetable consumption (Lewis et al., 2012) and dieting behaviors (Tan et al., 2012)

among a population of cancer patients. For cancer patients, information seeking from the Internet has also found to lead to more active participation in decision making surrounding their cancer (Lee, Gray, & Lewis, 2010). In research on health information seeking, information is seen as serving a sense-making function (Dervin, 1998; Balka, Krueger, Holmes, & Stephen, 2010) as well as serving a role in uncertainty reduction (Albrecht & Adelman, 1987; Mishel, Germino, Lin et al., 2009).

Social determinants of information seeking

As health-information seeking is important for health outcomes, it is imperative to understand what makes people more or less likely to engage in this behavior. A growing body of research has begun to explore this question, focusing primarily on the role of individual-level characteristics on information seeking. For example, a number of studies have found that characteristics such as gender, ethnicity, and other demographics are associated with increased seeking of health information among cancer patients (Fogel, Albert, Schnabel, Ditkoff, & Neugat, 2002; Rutten et al., 2006), and how cancer patients use this information in clinical encounters (Lewis et al., 2009; Rooks, Wiltshire, Elder, BeLue, & Gary, 2012). Other studies have found that age, race, and education predict differential use of various health information resources including the internet (Carlsson, 2000; Chou, Benmei, Post, & Hesse, 2011; Johnson, 1997).

However, health communication researchers have recently begun to pay greater empirical and conceptual attention to the impact of social determinants on health-related outcomes including active information seeking behaviors (Viswanath, 2008). This interest is related to a growing body of work in public health communication – social epidemiology – which has begun to explore how social determinants such as social class, social networks, neighborhood conditions, among others, can influence health outcomes among population subgroups (Berkman & Kawachi, 2000; Christakis & Fowler, 2007; Kawachi & Berkman, 2003; Smith & Christakis, 2008). This approach moves away from a focus on the individual as the unit of analysis, which draws its roots in social psychology, to a more structural approach that takes into account the structural location of an individual within their environment. One theoretical framework within this literature - the structural influence model of communication (SIM) suggests that health communication serves as a pathway through which social determinants in our larger social environment influence proximal antecedents of health outcomes (Viswanath, Ramanadhan, & Kontos, 2007). The SIM proposes that social determinants act through social and demographic characteristics, such as age, race, and social networks, to influence the way that individuals access health information (Viswanath et al., 2007).

Social networks describe the patterns through which individuals are connected to one another through social ties (Berkman & Glass, 2000). Social networks are important channels for sharing resources and can be described in terms of density or strength of ties, range, boundaries, and homogeneity (Viswanath et al., 2007). Research has found that socially isolated individuals are less able than others to handle the impact of health stressors, and are consequently at a greater risk for adverse health outcomes (Holt-Lunstad et al., 2010; Cornwell & Waite, 2009; Seeman, 1996). Conversely, close social ties with others in

one's network can be an important source of information exchange. In addition to providing information about health, family and friends can encourage or reinforce health-enhancing behaviors (Stoller & Pollow, 1994). However, there is a qualitative distinction made in research in this area between social networks comprising strong ties, compared with those comprising weak ties (Granovetter, 1973). Strong ties also tend to exist between individuals who are more similar to each other, compared with weak ties, which tend to form between individuals who are less similar to one another. As a result, weaker ties may be expected to offer more in the way of new information in the course of a social exchange than strong ties (Viswanath et al., 2007). Weak ties have been shown to be important in exposing people to new ideas, in particular with regard to the transfer of health information (Pettigrew, 2000). However, empirical research on this topic is inconclusive. For example, Fisher et al. (2005) found that people reported strong ties as the most important source of health information (Fisher, Naumer, Durrance, Stromski, & Christiansen, 2005) whereas Cohen (2004) emphasized the importance of both types of connections. The current study focuses on the association between strong social ties and information seeking.

Social ties and informational support

Social networks represent an important source of health information for information seekers through informational support, one form of social support. Social support can take the form of (1) emotional support, such as esteem support (Holmstrom, 2012), (2) instrumental support, such as material aid or help, (3) appraisal support, such as information that serves self-evaluative purposes, and (4) informational support, taking the form of information, advice or tips (Heaney & Israel, 2002). Although informational support has been identified as a form of social support (see Cutrona, Suhr, & MacFarlane, 1990), it has received less attention in health communication research than emotional support.

Conceptualizations and operationalizations of social support as a theoretical construct have varied across studies within this area (Haber, Cohen, Lucas, & Baltes, 2007). It is important to distinguish between research on social network effects and research on social support, which have traditionally been conflated to a large extent (Berkman and Glass, 2000). The current study focuses on a *structural* measure of intimate social ties within an individual's social network, and the effects of these ties on health information seeking, which is distinct from studies that assess the *function* of social ties. The functions of social ties within one's social network can include social capital, social influence, social undermining, companionship, and social support (Heaney & Israel, 2002).

There may be a number of mechanisms through which the number of close ties within one's social networks' influence will directly impact active information seeking behaviors. Social networks provide opportunities to see similar others address health concerns, model coping behaviors, and hold interpersonal discussions about health-related issues (Viswanath, Randolph, & Finnegan, 2006). Social networks can also promote social norms, and acceptable beliefs and behaviors among their members, and influence what norms are held among the group (Valente, Hoffman, Ritt-Olson, Lichtman, & Johnson, 2003). All of these factors may serve to increase the salience of a health topic (Valente & Saba, 2001), which might increase an individual's motivation to seek further information. Our first hypothesis

predicts that individuals with a large number of close social ties will be more likely to have access to health information because they have access to a wider range of informational resources.

H1: The number of close social ties will be positively associated with cancer-related information seeking.

Mediating role of Communication Efficacy on Information Seeking

In addition to testing the main effect of number of social ties on information seeking, this study tests whether having a greater number of close social ties will increase the likelihood of information seeking through its positive effects on communication efficacy, a concept defined within the theory of motivated information management (TMIM) (Afifi & Weiner, 2006). The TMIM is a theoretical framework that accounts for active information management efforts that occur through interpersonal channels (Afifi & Weiner, 2004). The TMIM has been applied to account for information seeking behavior across several contexts, but has not yet been widely applied in the context of cancer-related information seeking. The TMIM is well suited to the current study, which focuses on the process of information management through interpersonal connections (i.e., through close social ties) and its effects on information seeking behaviors.

One of the conceptual contributions of the TMIM is the concept of communication efficacy, an antecedent of information seeking behavior within the model. Communication efficacy is defined as “individuals’ perception that they possess the skills to complete successfully the communication tasks involved in the information-management process” (Afifi & Weiner, 2004, p. 178). Communication efficacy captures a person’s belief that he or she is capable of performing communication behaviors that are integral to implementing a specific strategy (Afifi & Weiner, 2004, p. 179). The more an individual senses that he/she possesses the skills and ability to engage in communication or other information-gathering behavior, the more likely it will be that this individual will engage in information-seeking efforts. Previous studies using the TMIM framework have supported the role of communication efficacy in influencing information-seeking behavior (Afifi & Afifi, 2009; Afifi & Weiner, 2006)

Our study, however, diverges from the TMIM in the conceptualization of information-seeking behavior. Originally conceived as a model of interpersonal communication, the TMIM’s conceptualization of information-seeking behavior is specific to an interpersonal context. However, studies examining information seeking behaviors among the cancer patient population indicate that patients report seeking from a broad range of sources, including interpersonal sources as well as mediated sources and medical sources (Carlsson, 2000; Nagler et al., 2010). In addition, in one study, the majority of cancer patients who reported seeking from an interpersonal source also reported seeking from at least one medical, and one media source (Nagler et al., 2010). Thus, we expect that the TMIM’s conceptualization of communication efficacy should also be positively associated with information seeking from a broader range of sources. The present study uses a broad measure of information seeking behavior that includes seeking from interpersonal sources, as well as from media sources and clinical sources.

The TMIM proposes that communication efficacy plays an important role in influencing information management behaviors including information seeking which are motivated by the need to reduce feelings of uncertainty (Afifi & Weiner, 2004). Uncertainty among cancer patients (Shaha et al., 2008) and their need for information that often follows a cancer diagnosis (Rutten et al., 2006) may cause patients to rely on members of their social networks partly for informational support (Lewis et al., 2012; Nagler et al., 2010; Tan et al., 2012). This informational support may take the form of information exchange with others or seeking aid from members of their social network in obtaining the needed information (see Scharer, Colon, Moneyham, Hussey, & Shugart, 2009). We expect then that the number of close social ties will lead to increased levels of communication efficacy because it confers enhanced informational skills. Our hypothesis is based on the expectation that having a greater number of close social ties equates to greater number of opportunities to learn and master skills necessary to procure the desired information.

In sum, based on the research reviewed here and studies indicating that the more proximal benefits of social support, as a psychosocial resource, may take the form of psychological benefits, including efficacy (Haber et al., 2007), we propose that the number of close social ties in one's social network will be positively associated with increased communication efficacy among cancer patients. Additionally, as predicted in the TMIM, we also expect that communication efficacy will in turn be positively associated with seeking cancer-related information from a range of sources, including medical, interpersonal, and media sources.

H2: Number of close social ties will be positively associated with communication efficacy.

H3: Communication efficacy will be positively associated with cancer-related information seeking.

Finally, we expect that for cancer patients, who represent the 'information managers' in the present study, the association between the number of close social ties and cancer-related information seeking will be partly explained by communication efficacy. We hypothesize that cancer patients who have a large number of close social ties will be more likely to seek cancer-related information because these ties provide a psychological benefit in the form of greater communication efficacy. Furthermore, we predict that cancer patients with a larger number of close social ties within their social networks will feel greater confidence in their ability to engage in communication related to their cancer and will, in turn, be more likely to seek cancer-related information. As there is a possibility that communication efficacy may not be the only mediator to explain the process by which the number of close social ties influences information seeking, we hypothesize this mechanism will be one of partial rather than full mediation.

H4: The association between the number of close social ties and cancer-related information seeking will be partially mediated by communication efficacy.

Method

Participants

The sample was randomly selected in Fall 2006 from the Pennsylvania Cancer Registry's (PCR) complete list of all breast (female only), prostate, and colorectal cancer patients diagnosed in 2005 with three of the most common cancers in the US (breast – women only, prostate – men only, colorectal) (N = 2,013). All cancer cases are required by law to be reported to the PCR within six months of diagnosis, thus our sampling frame consisted of approximately 95% of all cancer cases expected to be included in the registry. We mailed a survey to all potential participants after pilot-testing questionnaire items with cancer patients at the University of Pennsylvania. Participants included individuals currently in treatment for cancer, as well as those who were post-treatment. The mailing procedure followed Dillman's (2000) methods for mail surveys. The study procedure and materials were approved by the University of Pennsylvania Institutional Review Board.

The American Association for Public Opinion Research response rates (AAPOR RR#4) (AAPOR, 2006) for the primary sample were 68%, 64%, and 61% for the respective cancer groups. Although the primary sample was similar to the PCR population on core demographics, we report estimates that rely on post-stratification sample weights designed to adjust the final sample to the PCR population with regard to race, age, gender, marital status, calendar quarter of diagnosis, and disease stage at diagnosis. Adjustments were made within cancer type. We oversampled for colorectal cancer, Stage IV, and African American respondents to increase sample sizes for analyses of those subgroups (adding 372 cases to the sample); however, all analyses using weights correct for this oversampling to permit the analytic sample to represent the population of interest. These sampling procedures yielded an analytic sample of 2,013 cancer patients who participated in the baseline survey study administered in the Fall of 2006.

Procedure—Cancer patients residing in Pennsylvania received a 61-question paper survey in the mail which included questions regarding patient characteristics, lifestyle behaviors, and information-seeking about cancer and treatments. Surveys were tailored according to the type of cancer. The data were collected between September and November of 2006, between 9 and 23 months after diagnosis ($M = 15.5$ months.). Procedures for data collection followed procedures outlined in Dillman's (2000) procedures for data collection. Question wording and format were shaped by results of interviews with patients in a pilot study. For further details regarding procedures and survey administration see Lewis et al. (2009, 2012), Martinez et al (2009), and Nagler et al. (2010).

Measures

Number of close social ties—The number of close social ties was assessed by asking: *"In general, how many close friends do you have? ("Close friends" include relatives or non-relatives that you feel at ease with, can talk to about private matters, and can call on for help.)"* Response options included "None", "1–2", "3–4", "5–10", or "11 or more".

Communication efficacy—Patients' communication efficacy with regard to their ability to engage in communication or perform information-seeking tasks was measured with a four-item question asking *"This series of statements asks about how confident you are about dealing with the future. Indicate whether you agree or disagree with each statement: (1) I am confident in my ability to actively participate in decisions related to my cancer, (2) I am confident in my ability to get help if I don't understand something about my cancer."* Full question wording is provided in the appendix. Response options ranged from "Strongly disagree" (1) to "Strongly agree" (5). The means of the items were combined to form a scale, which demonstrated strong internal consistency ($M = 4.28$, $SD = 0.54$, $\alpha = 0.87$).

Cancer-related information seeking—We assessed cancer-related information seeking using an index of information seeking that has been used in several studies (Lewis et al., 2012; Moldovan-Johnson, Martinez, Lewis, Freres, & Hornik, 2012). Participants were asked whether they had actively sought information about two general topics: cancer treatment or other cancer-related issues, and quality of life, from a range of sources. Sources included medical sources (i.e., treating physician, and medical professional sources other than treating physician) as well as media and interpersonal sources. Full question wording is provided in the appendix. Each individual received a summed score for each of the two seeking items (topics), which was then combined, standardized and mean-centered prior to forming the final index of information seeking ($M = 2.90$, $SD = 1.42$, $\alpha = 0.83$).

Disease and Demographic Characteristics—Disease factors were entered in the analyses as covariates, particularly cancer type (prostate, colorectal, or breast cancer), cancer stage (in situ, regional, or metastatic), number of treatments, and health status. Cancer type was obtained from the PCR and included breast, prostate, and colon cancers. We also included a measure of how many different types of treatment patients underwent for their cancer. This index was standardized within cancer since the number of treatments available was different for each type of cancer. In addition, we assessed number of cancer-related visits to a doctor made in the last 12 months, with answer options including '0 times', '1–2 times', '3–4 times', '5–7 times', and 'more than 7 times'. Respondents also reported their self-perceived health status with a standard item, with five-response options ranging from 'poor' to 'excellent'. Demographic characteristics were also considered: gender, age in years (a continuous variable), race (White vs. Other), education (five-level categorical variable: 1 '8th grade or less', 2 'Some high school', 3 'High School diploma or GED', 4 'Some college or 2-year degree', 5 '4-year college degree or higher'), marital status (married vs. not married). Due to lack of variability, insurance status was omitted from the list of control variables – 98% of the sample claimed to have insurance.

In addition to these variables and ones mentioned earlier, analyses included individual-level characteristics which were incorporated as possible confounders for causal claims about the number of close social ties - information seeking relationship. These include a dichotomous measure assessing whether the respondents recalled receiving recommendations from their physicians to make lifestyle changes ('Yes'/'No' response options). Information avoidance was measured using a 3-item question asking about frequency of avoiding *"talking with family or friends about cancer"*; *"talking with my doctor about cancer"*; and *"reading books,*

newspaper or magazine articles about cancer". Responses were assessed with four-response options ranging from 'never' to 'very often'. Patients' physical symptoms were assessed by a 9-item measure asking whether patients had experienced a series of known symptoms after their diagnosis and treatment (e.g., pain, fatigue, sleep problems, bowel problems). We include a measure of patients' preferences regarding autonomy in decision making relating to treatment, as this may be related to both information seeking behaviors and to communication efficacy. Responses were assessed with three response options ranging from 'The doctor should make the final decision without considering my opinion' to 'I should make the final decision based on the facts I learn from the doc and elsewhere, without considering my doctors' opinion.' In accordance with Weisburg's Total Survey Error Approach (Weisburg, 2005) we also included a measure of early vs. late responders to the survey to account for any possible systematic differences due to the timing of response to the survey. Patients are categorized as early or late responders based on a dichotomous measure of response to the baseline survey (using a median split of 3 months from the first response. Finally, family history of cancer was measured by asking whether a family member or close friend had ever had [colon/breast/prostate] cancer when respondents who indicated 'no' were compared with others.

Analytic Approach

As missing data occurred at a rate greater than 10% for several variables, we performed a multiple imputation procedure recommended by Allison (2001) and Little and Rubin (2002) to address problems of missing data on covariates, using STATA 12. This procedure produces consistent and unbiased estimates when missing-at-random assumptions are met (Allison, 2001; Little & Rubin, 2002; Rubin, 1987). Data were weighted using post-stratification weights to ensure that sample participants were comparable to the population of registry cases based on the following variables: age, date of diagnosis, marital status, stage of disease, race (majority, African American, other minority), and sex (colorectal cancer only).

The approach to testing hypotheses of main effects relies on a series of OLS regressions. To test a hypothesis of partial mediation effects, we used an approach described by Preacher, Rucker and Hayes (2007), which has strengths over the traditional method described in Baron and Kenny (1986) (see Mackinnon & Fairchild, 2009). This approach requires that several conditions be fulfilled in order to arrive at an inference of partial mediation. First, the independent variable (i.e., number of close social ties) must be significantly related to the mediator (i.e., communication efficacy). Then, the mediator must be significantly related to the dependent variable (i.e., health information seeking). Finally, the effect of the mediator on the dependent variable must be statistically significant, after accounting for the effects of the independent variable.

Results

Descriptive Analysis

The final sample included 2,013¹ cancer patients. Demographic characteristics are presented in Table 1. The mean age for the sample was 66 years old ($SD = 12.4$). The majority of the

cancer patient sample was White (86%), married or cohabiting (68%) and had less than a 4-year college education (79%). The majority of patients (76%) self-reported good or better general health. Patient characteristics, including cancer-related variables are described in Table 2. Table 3 describes the sample on the three variables of interest, number of close social ties, communication efficacy, and cancer information seeking. Confounders included in analyses include demographic characteristics (age, general health status, race, marital status, education, and gender, decision making preferences, information avoidance) and cancer history characteristics (cancer type and stage, number of treatments received, family history of cancer, number of physical symptoms, lifestyle change recommendations, decision making preferences, and number of cancer-related physician visits), as well as early vs. late response to the survey. Finally, Table 4 shows the correlations among the primary variables, which were all statistically significant at the .001 level or less and positively correlated.

OLS Regression Analysis

To test the central hypotheses, we performed a series of OLS regressions. Table 5 presents the results of five OLS regression models. For a visual representation of the results, please see Figure 2. Briefly, Model 1 displays the effects of demographic and patient characteristics of the sample on communication efficacy to cope with the overall cancer experience. Model 2 adds the effect of number of close social ties to the effect of demographic and patient characteristics on communication efficacy. Model 3 shows the effects of demographic and patient characteristics on cancer-related information seeking. Model 4 adds the effect of number of close social ties, and Model 5 adds the effect of communication efficacy.

Main effects—The first main effects hypothesis (H1) posited that number of close social ties would be positively associated with cancer-related information seeking after adjusting for patient characteristics and demographic confounders. The results displayed in Model 4 ($R^2 = .29$, $p < .01$) support this hypothesis; number of close social ties was positively associated with cancer-related information seeking ($b = .09$, $SE = .04$, $p = .016$), above and beyond the effect of confounders.

In addition, we expected that number of close social ties would be positively related to increased communication efficacy in ability to deal with the overall cancer experience (H2). The results shown in Model 2 ($R^2 = .09$, $p < .001$) supported this hypothesis; number of close social ties was positively associated with communication efficacy ($b = .09$, $SE = .01$, $p < .001$), above and beyond the effect of the confounders.

Test of mediation—The third hypothesis (H3) predicted that communication efficacy would be positively associated with cancer-related information seeking. As expected, the results shown in Model 5 ($R^2 = .31$, $p < .001$) supported this hypothesis; communication efficacy was positively associated with the dependent variable ($b = .38$, $SE = .06$, $p < .001$), above and beyond the effect of the confounders.

¹The process of applying post-stratification weights led to a final N of 2,010 for analyses.

Lastly, the fourth hypothesis (H4) postulated that number of close social ties would indirectly affect cancer-related information seeking by increasing communication efficacy. The results support this hypothesis as well. Following the requirements of the mediation approach, we showed earlier that number of close social ties was positively associated with communication efficacy ($b = .09$, $SE = .01$, $p < .001$), adjusting for confounders. As mentioned above, we found that communication efficacy was significantly associated with information seeking ($b = .38$, $SE = 0.06$, $p < .001$), adjusting for the effect of number of close social ties and patient and demographic confounders. Taken together, these findings support an inference of partial mediation.

In addition, the effect of number of close social ties on information seeking was decreased in magnitude (from regression coefficients of .09 to .06), upon introducing the effect of communication efficacy, adjusting for confounders. A Sobel test (Sobel, 1982) confirmed a significant indirect effect of number of close social ties on cancer-related information seeking partially through communication efficacy ($Z = 4.37$, $p < .001$). Based on this observation, we concluded that results provided evidence in support of a partial mediation mechanism.

The number of close social ties, communication efficacy, and the confounders explained roughly 30% of the variance in cancer-related information seeking. The addition of social ties in Model 4 (compared to Model 3) provides a significant contribution to the amount of explained variance ($R^2 = .004$, $p < .01$). Communication efficacy also significantly contributes to the amount of explained variance ($R^2 = .016$, $p < .001$) in Model 5 (compared to Model 4). Combined, both of these variables contribute 2% to the total variance in information seeking.

In sum, number of close social ties appears to positively influence information seeking among cancer survivors directly but also indirectly by positively affecting communication efficacy to deal with cancer-related information and cancer experience.

Discussion

This is the first study to show the effects of the number of close social ties on information seeking among a sample of cancer patients, and its indirect effects through communication efficacy. The results presented here provide evidence for the mediating role of communication efficacy in the positive association between number of social ties and cancer-related information seeking. These findings contribute to research on the influence of social determinants on information seeking behaviors in the context of cancer. While prior research has largely explored individual-level antecedents of information seeking, health communication scholars have begun to focus on the impact of social determinants on health outcomes (Viswanath, 2008). Consistent with predictions based on the structural influence model of communication (SIM), the results presented here illustrate that a structural measure of an individual's social network –number of close social ties – influences information seeking behaviors (Viswanath et al., 2007).

This study focuses on one social determinant – the number of close social ties – and its association with information seeking behaviors among cancer patients. The SIM framework includes a number of social determinants that are proposed to influence the way that individuals access health information (Viswanath et al., 2007). Thus, it may be possible that other unmeasured social determinants may also impact information seeking behavior among the cancer patient population. However, the findings reported here reinforce the notion that research on information seeking should expand beyond a focus on individual-level characteristics, and take into account a wider range of factors related to the larger social environment.

Furthermore, the findings of this study indicate that having a greater number of close social ties may enhance a cancer patients' ability to perform communication behaviors, such as information gathering that are an important aspect of coping with the cancer experience. This may occur through a number of ways, including through increased access to cancer-related information among members of one's close social network. Alternately, having many close ties may reinforce or promote social norms related to information seeking and boost efficacy to engage in this behavior and/or may increase the salience of cancer-related information through interpersonal exchanges with friends or family. In this context, the structural measure of the number of intimate ties one has with others may be an indirect measure of informational support, which influences information seeking behaviors through its effect on communication efficacy (Reynolds et al., 1994).

The results also converge with findings of studies testing the TMIM framework. Specifically, past studies using this framework have generally shown significant effects of communication efficacy on information-seeking behavior (Afifi & Afifi, 2009; Afifi & Weiner, 2006). Although not a test of the full TMIM, in the current study we contribute to this body of research by showing that communication efficacy is also positively associated with a more broadly-defined conceptualization of information-seeking behavior. The conceptualization of information seeking in this study includes a variety of sources which extend beyond interpersonal sources to include clinical sources (e.g., treating physicians) as well as mediated ones (e.g., television, newspapers etc.). This suggests that communication efficacy may have important implications for information seeking from non-interpersonal sources, as well as interpersonal ones.

Some differences across demographic and patient characteristics observed here in information seeking have been previously reported. For example, Nagler et al. (2010) previously noted that age was negatively associated with information seeking, with younger participants reporting greater likelihood of engaging in these behaviors. Similarly, Nagler et al. (2010) showed higher levels of education were positively associated with information seeking. The results of this study, however, also demonstrate parallel effects of age and education on communication efficacy. Older patients and those with less education were more likely to report low levels of communication efficacy. Information avoidance was also negatively associated with communication efficacy, suggesting that low levels of communication efficacy may lead cancer patients to avoid cancer-related information. Given the benefits of active information seeking for cancer patients (see Lewis et al., 2012; Tan et al., 2012), it may be worth focusing efforts on enhancing communication efficacy among

this population. Improving communication efficacy will, in turn, be likely to bolster information seeking behaviors, and may also temper information avoidance.

The analysis demonstrated here offers novel evidence for the positive influence of number of close social ties on cancer-related information seeking, and its indirect effects through communication efficacy among cancer patients. Analyses also control for effects of a wide range of potential confounding demographic and cancer-related variables. However, we acknowledge certain limitations to the findings presented here that are worthy of discussion. First, the sample used here are representative of Pennsylvania residents diagnosed with three types of cancer but does not represent patients in other states or with other cancers or in other time periods. It is possible that different results might be observed among different cancer populations or individuals residing elsewhere. Second, the measure of information-seeking behavior captures breadth of seeking from various sources without indicating depth of information-seeking behavior. Similarly, we relied on a single-item measure of number of close social ties, which may not have adequately captured other dimensions of this construct.

Another limitation of this study is that the mechanism of effects proposed here is based on cross-sectional data. Thus it is difficult to ascertain the flow of causal influence between the primary variables. It is possible that information-seeking behavior may lead to increased communication efficacy and greater number of close social ties (for example, if seeking from interpersonal sources or other patients creates more intimate social ties). Further research is necessary to test and establish the flow of causal order between the number of close social ties, communication efficacy, and information-seeking behavior. Lastly, in terms of magnitude of effects at the individual-level, the results among the primary variables of interest are rather modest. However, at the aggregate-level the effects offer some promise for understanding important factors that may explain the impact of social support on improved outcomes for cancer patients.

Conclusion

The present study proposes a mechanism for explaining the role of the number of close social ties in determining cancer patients' cancer-related information-seeking behavior, which has been shown to lead to desirable health-related outcomes. Although the study tests this mechanism among a cancer patient sample, the results may shed light on how the number of close social ties may operate to increase communication efficacy and information-seeking behavior among patients diagnosed with other types of illnesses not included in the scope of this study. Future research may test this mechanism among patient populations afflicted with other chronic or infectious diseases.

Practical Implications

Although the benefits of having many close social ties in one's social network have been recognized, possible mechanisms for the role of this social determinant in shaping desirable behavior remain under-researched. Based on the findings presented here, it seems possible that having a greater number of close social ties might lead to improved outcomes as a result of its positive impact on communication efficacy and information seeking. In light of these findings, physicians and health care professionals should make an effort to encourage

information seeking behaviors among patients who report having few close social ties compared with others. This perspective entails expanding the focus on the patient as an individual to the patient as an individual anchored within a social network/s, which can influence their behaviors and health-related decision making processes. Similarly, clinicians may develop interventions to increase communication efficacy through cancer support groups or skills training workshops, which will have the desirable effect of increasing information seeking behaviors.

References

- Afifi WA, Afifi TD. Avoidance among adolescents in conversations about their parents' relationship: Applying the theory of motivated information management. *Journal of Social and Personal Relationships*. 2009; 26:488–511.
- Afifi WA, Weiner JL. Seeking information about sexual health: Applying the theory of motivated information management. *Human Communication Research*. 2006; 32:35–57.
- Afifi WA, Weiner JL. Toward a theory of motivated information management. *Communication Theory*. 2004; 14:167–190.
- Albrecht, TL.; Adelman, MB. Communication networks as structures of social support. In: Albrecht, TL.; Adelman, MB., editors. *Communicating social support*. Newbury Park, CA: Sage; 1987. p. 40-63.
- Allison Paul, D. Missing data. Thousand Oaks, CA: Sage Publications; 2001.
- American Association for Public Opinion Research. Standard definitions: Final dispositions of case codes and outcome rates for surveys. 4th ed.. Lenexa, KS: American Association for Public Opinion Research; 2006.
- Balka E, Krueger G, Holmes BJ, Stephen JE. Situating internet use: Information-seeking among young women with breast cancer. *Journal of Computer-Mediated Communication*. 2010; 15:389–411.
- Bandura, A. Social foundations of thought and action. Englewood Cliffs, NJ: Prentice-Hall; 1986.
- Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*. 1986; 51:1173–1182. [PubMed: 3806354]
- Berkman, LF.; Glass, TA. Social integration, social networks, social support, and health. In: Berkman, LF.; Kawachi, I., editors. *Social epidemiology*. New York: Oxford University Press; 2000. p. 137-173.
- Berkman, LF.; Kawachi, I., editors. *Social epidemiology*. New York: Oxford University Press; 2000.
- Carlsson M. Cancer patients seeking information from sources outside the health care system. *Support Care Cancer*. 2000; 8:453–457. [PubMed: 11094989]
- Case DO, Andrews JE, Johnson JD, Allard SL. Avoiding versus seeking: the relationship of information seeking to avoidance, blunting, coping, dissonance, and related concepts. *Journal of the Medical Library Association*. 2005; 93:353–362. [PubMed: 16059425]
- Chou WS, Benmei L, Post S, Hesse B. Health-related Internet use among cancer survivors: data from the Health Information National Trends Survey, 2003–2008. *Journal of Cancer Survivorship*. 2011; 5:263–270. [PubMed: 21505861]
- Christakis NA, Fowler JH. The spread of obesity in a large social network over 32 years. *New England Journal of Medicine*. 2007; 357:370–379. [PubMed: 17652652]
- Cohen S. Social relationships and health. *American Psychologist*. 2004; 59:676–684. [PubMed: 15554821]
- Cornwell EY, Waite LJ. Social disconnectedness, perceived isolation, and health among older adults. *Journal of Health and Social behavior*. 2009; 50:31–48. [PubMed: 19413133]
- Coulter A, Ellins J. Effectiveness of strategies for informing, educating, and involving patients. *British Medical Journal*. 2007; 335:24–27. [PubMed: 17615222]

- Cutrona, CE.; Suhr, JA.; MacFarlane, R. Interpersonal transactions and the psychological sense of support. In: Duck, S.; Silver, RC., editors. Personal relationships and social support. Newbury Park, CA: Sage; 1990. p. 30-45.
- Dervin B. Sense-making theory and practice: An overview of user interests in knowledge seeking and use. *Journal of knowledge management*. 1998; 2:36–46.
- Dillman, DA. Mail and internet Surveys: The tailored design method. 2nd Ed.. New York: John Wiley and Sons; 2000.
- Epstein, RM.; Street, RL, Jr. Patient-centered communication in cancer care: Promoting healing and reducing suffering, NIH Publication No. 07–6225. Bethesda, MD: National Cancer Institute; 2007.
- Feldman-Stewart D, Capirci C, Brennenstuhl S, Tong C, Abacioglu U, Gawkowska-Suwinska M, ... Wördehoff H. Information needs of early-stage prostate cancer patients: A comparison of nine countries. *Radiotherapy and Oncology*. 2010; 94:328–333. [PubMed: 20116122]
- Fisher, KE.; Naumer, C.; Durrance, J.; Stromski, L.; Christiansen, T. Something old, something new: preliminary findings from an exploratory study about people's information habits and information grounds; *Information Research*. 2005. p. 10 Retrieved from <http://InformationR.net/ir/10-2/paper223.html>
- Fogel J, Albert SM, Schnabel F, Ditkoff BA, Neugut AI. Use of the internet by women with breast cancer. *Journal of Medical Internet Research*. 2002; 4:e9. [PubMed: 12554556]
- Granovetter MS. The strength of weak ties. *American Journal of Sociology*. 1973; 78:1360–1380.
- Gray SW, Armstrong K, DeMichele A, Schwartz JS, Hornik RC. Colon cancer patient information seeking and the adoption of targeted therapy for on-label and off-label indications. *Cancer*. 2009; 115:1424–1434. [PubMed: 19235785]
- Haber MG, Cohen JL, Lucas T, Baltes BB. The relationship between self-reported received and perceived social support: a meta-analytic review. *American Journal of Community Psychology*. 2007; 39:133–144. [PubMed: 17308966]
- Heaney, C.; Israel, B. Social networks and social support. In: Glanz, K.; Rimer, BK.; Lewis, FM., editors. Health behavior and health education: Theory, research and practice. 3rd ed.. San Francisco, CA: Jossey-Bass; 2002. p. 185-209.
- Holmstrom AJ. What helps-and what doesn't-When self-esteem is threatened?: Retrospective reports of esteem support. *Communication Studies*. 2012; 63:77–98.
- Holt-Lunstad J, Smith TB, Layton JB. Social relationships and mortality risk: A meta-analytic review. *PLoS Med*. 2010; 7:e1000316. Accessed at <http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1000316>. [PubMed: 20668659]
- Johnson, JD. Cancer-related information seeking. Cresskill, NJ: Hampton Press; 1997.
- Kawachi, I.; Berkman, L. Neighborhoods and health. New York, NY: Oxford University Press; 2008.
- Leadbeater M. Information needs of patients with cancer. *Nursing Standard*. 2001; 16:33–35. [PubMed: 11977700]
- Lee C, Gray SW, Lewis N. Internet use leads cancer patients to be active health care consumers. *Patient Education & Counseling*. 2010; 8(S1):63–69.
- Lewis N, Gray SW, Freres DR, Hornik RC. Examining cross-source engagement with cancer-related information and its impact on doctor-patient relations. *Health Communication*. 2009; 24:723–734. [PubMed: 20183381]
- Lewis N, Martinez L, Freres D, Nagler R, Bourgoin A, Hornik R. Information seeking from media and family/friends increases fruit and vegetable consumption among cancer patients. *Health Communication*. 2012; 27:380–388. [PubMed: 21932985]
- Little, RJA.; Rubin, DB. Statistical analysis with missing data. New York, NY: John Wiley & Sons; 2002.
- Loiselle CG, Lambert SD, Cooke A. The searching, processing, and sharing of breast cancer information by women diagnosed with the illness. *Canadian Journal of Nursing Research*. 2006; 38:82–104. [PubMed: 17037115]
- MacKinnon DP, Fairchild AJ. Current directions in mediation analysis. *Current Directions in Psychological Science*. 2009; 18:16–20. [PubMed: 20157637]

- Martinez LS, Schwartz JS, Freres D, Frazee T, Hornik RC. Patient-clinician information engagement increases treatment decision satisfaction among cancer patients through feeling of being informed. *Patient Education and Counseling*. 2009; 77:384–390. [PubMed: 19815365]
- Mayer DK, Terrin NC, Kreps GI, Menon U, McCance K, Parsons SK, Mooney KH. Cancer survivors information seeking behaviors: a comparison of survivors who do and do not seek information about cancer. *Patient Education and Counseling*. 2007; 65:342–350. [PubMed: 17029864]
- McInnes DK, Cleary PD, Stein KD, Ding L, Mehta CC, Ayanian JZ. Perceptions of cancer-related information among cancer survivors: a report from the American Cancer Society's studies of cancer survivors. *Cancer*. 2008; 113:1471–1479. [PubMed: 18666212]
- Mishel MH, Germino BB, Lin L, Pruthi RS, Wallen EM, Crandell J, Blyler D. Managing uncertainty about treatment decision making in early stage prostate cancer: A randomized clinical trial. *Patient Education and Counseling*. 2009; 77:349–359. [PubMed: 19819096]
- Moldovan-Johnson, M.; Martinez, LS.; Lewis, N.; Freres, D.; Hornik, RC. The role of patient clinician information engagement and information seeking from nonmedical sources in fruit and vegetable intake among cancer patients; Phoenix. Paper presented at the annual meeting of the International Communication Association (ICA); 2012 May.
- Nagler RH, Gray SW, Romantan A, Kelly BJ, DeMichele A, Armstrong K, Schwartz JS, Hornik RC. Differences in information seeking among breast, prostate, and colorectal cancer patients: Results from a population-based survey. *Patient Education and Counseling*. 2010; 81(Suppl):S54–S62. [PubMed: 20934297]
- Niederdeppe J, Hornik RC, Kelly BJ, Frosch DL, Romantan A, Stevens RS, Schwartz JS. Examining the dimensions of cancer-related information seeking and scanning behavior. *Health Communication*. 2007; 22:153–167. [PubMed: 17668995]
- Pettigrew KE. Lay information provision in community settings: How community health nurses disseminate human services information to the elderly. *Library Quarterly*. 2000; 70:7–85.
- Preacher KJ, Rucker DD, Hayes AF. Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. *Multivariate Behavioral Research*. 2007; 42:185–227.
- Ramirez AS, Freres D, Martinez LS, Lewis N, Bourgoin A, Kelly B, Lee CJ, Nagler R, Schwartz JS, Hornik RC. Information seeking from media and family/friends increases the likelihood of engaging in healthy lifestyle behaviors. *Journal of Health Communication*. in press
- Reynolds P, Boyd PT, Blacklow RS, Jackson JS, Greenberg RS, Austin DF, Chen VW, Edwards BK. The relationship between social ties and survival among black and white breast cancer patients. National Cancer Institute black/white cancer survival study group. *Cancer Epidemiology and Biomarkers Prevention*. 1994; 3:253–259.
- Rooks RN, Wiltshire JC, Elder K, BeLue R, Gary LC. Health information seeking and use outside of the medical encounter: Is it associated with race and ethnicity? *Social Science & Medicine*. 2012; 74:176–184. [PubMed: 22154611]
- Rubin, DB. Multiple imputation for nonresponse in surveys. New York, NY: John Wiley & Sons; 1987.
- Rutten LJF, Squiers L, Hesse B. Cancer-related information seeking: Hints from the 2003 Health Information National Trends Survey (HINTS). *Journal of Health Communication: International Perspectives*. 2006; 11(S1):147–156.
- Scharer K, Colon E, Moneyham L, Hussey J, Tavakoli A, Shugart M. A comparison of two types of social support for mothers of mentally ill children. *Journal of Child and Adolescent Psychiatric Nursing*. 2009; 22:86–98. [PubMed: 19490279]
- Seeman TE. Social ties and health: The benefits of social integration. *Annals of Epidemiology*. 1996; 6:442–451. [PubMed: 8915476]
- Shaha M, Cox CL, Talman K, Kelly D. Uncertainty in breast, prostate, and colorectal cancer: Implications for supportive care. *Journal of Nursing Scholarship*. 2008; 40:60–67. [PubMed: 18302593]
- Shim M, Kelly B, Hornik R. Cancer information scanning and seeking behavior is associated with knowledge, lifestyle choices, and screening. *Journal of Health Communication*. 2006; 11(S1):157–172. [PubMed: 16641081]

- Smith KP, Christakis NA. Social networks and health. *Annual Review of Sociology*. 2008; 34:405–429.
- Sobel, ME. Asymptotic confidence intervals for indirect effects in structural equation models. In: Leinhardt, S., editor. *Sociological methodology*. San Francisco, CA: Jossey-Bass; 1982. p. 290-312.
- Stoller EP, Pollock R. Factors affecting the frequency of health enhancing behaviors by the elderly. *Public Health Reports*. 1994; 109:377–389. [PubMed: 8190861]
- Talosig-Garcia M, Davis SW. Information seeking behavior of minority breast cancer patients: an exploratory study. *Journal of Health Communication*. 2005; 10:53–64. [PubMed: 16377600]
- Tan ASL, Bourgoin A, Gray SW, Armstrong K, Hornik RC. How does patient-clinician information engagement influence self-reported cancer-related problems? *Cancer*. 2011; 117:2569–2576. [PubMed: 24048804]
- Tan ASL, Mello S, Hornik R. A longitudinal study on engagement with dieting information as a predictor of dieting behavior among adults diagnosed with cancer. *Patient Education and Counseling*. 2012; 88:305–310. [PubMed: 22401791]
- Valente TW, Hoffman BR, Ritt-Olson A, Lichtman K, Johnson A. Effects of a social-network method for group assignment strategies on peer-led tobacco prevention programs in schools. *American Journal of Public Health*. 2003; 93:1837–1843. [PubMed: 14600050]
- Valente TW, Saba WP. Campaign exposure and interpersonal communication as factors in contraceptive use in Bolivia. *Journal of Health Communication*. 2001; 6:303–322. [PubMed: 11783665]
- Viswanath, K. Social capital and health communications. In: Kawachi, I.; Subramanian, SV.; Kim, D., editors. *Social capital and health*. New York: Springer; 2008. p. 259-272.
- Viswanath, K.; Ramanadhan, S.; Kontos, EZ. Mass media. In: Galea, S., editor. *Macrosocial determinants of population health*. New York: Springer; 2007. p. 275-294.
- Viswanath K, Randolph Steele W, Finnegan J. Social capital and health: Civic engagement, community size, and recall of health messages. *American Journal of Public Health*. 2006; 96:1456–1461. [PubMed: 16809608]
- Vogel BA, Bengel J, Helmes AW. Information and decision making: Patients' needs and experiences in the course of breast cancer treatment. *Patient Education and Counseling*. 2008; 71:79–85. [PubMed: 18191933]
- Walsh MC, Trentham-Dietz Schroepfer TA, Reding DJ, Campbell B, Foote ML, Kaufman S, Barrett M, Remington PL, Cleary JF. Cancer information sources used by patients to inform and influence treatment decisions. *Journal of Health Communication*. 2010; 15:445–463. [PubMed: 20574881]
- Weisberg, HF. *The total survey error approach: A guide to the new science of survey research*. Chicago, Chicago, IL: University of Chicago Press; 2005.

Appendix: Full Question Wording

Communication efficacy

This series of statements asks about how confident you are about dealing with the future. Indicate whether you agree or disagree with each statement:

I am confident in my ability To...	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Actively participate in decisions related to my cancer.					
Get help if I don't understand something about my cancer.					

I am confident in my ability To...	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Ask my doctors or nurses questions about my cancer.					
Manage any unexpected problems related to my cancer.					

Cancer-Related Information Seeking

Think back to the first few months after you were diagnosed with your cancer. In making decisions about what treatments to choose, did you **actively look** for information about **treatments** from any sources?

- A. I did not actively look for information about treatments [Yes/No]
- B. I did **actively look** for information about treatments from the following sources
(Check all that apply)

My treating doctors	
Other doctors or health professionals	
Family members, friends or co-workers	
Other cancer patients	
Face-to-face support groups	
On-line support groups	
Telephone hotlines (e.g., from the American Cancer Society)	
Television or radio	
Books, brochures or pamphlets	
Newspapers or magazines	
Internet (other than personal e-mail and on-line support groups)	
Other	

- C. What sources did you use when you were **actively looking** for any information related to your cancer?
- D. I did not actively look for information about my cancer [Yes/No]
- E. I did **actively look** for information about my cancer from the following sources
(Check all that apply)

My treating doctors	
Other doctors or health professionals	
Family members, friends or co-workers	
Other cancer patients	

My treating doctors	
Face-to-face support groups	
On-line support groups	
Telephone hotlines (e.g., from the American Cancer Society)	
Television or radio	
Books, brochures or pamphlets	
Newspapers or magazines	
Internet (other than personal e-mail and on-line support groups)	
Other	

- F.** *Where have you actively looked for **quality of life** issues (e.g., physical symptoms, memory problems, etc.)?*
- G.** I did not actively look for information about quality of life after cancer [Yes/No]
- H.** I have **actively looked** for this **quality of life** information from (*Check all that apply*):

My treating doctors	
Other doctors or health professionals	
Family members, friends or co-workers	
Other cancer patients	
Face-to-face support groups	
On-line support groups	
Telephone hotlines (e.g., from the American Cancer Society)	
Television or radio	
Books, brochures or pamphlets	
Newspapers or magazines	
Internet (other than personal e-mail and on-line support groups)	
Other

Figure 1.

Proposed Mediation Path between Number of Close Social Ties and Cancer-Related Information Seeking

Figure 2.
Observed Results of Mediation Analysis between Number of Close Social Ties and Cancer-Related Information Seeking

Table 1

Demographics of Sample (N=2010)

	%	<i>M</i>	<i>SD</i>
Marital status			
Currently married	68		
Not currently married	32		
Age		67.87	12.69
General health status			
Poor	4		
Fair	20		
Good	42		
Very good	27		
Excellent	7		
Race			
White	86		
Other	14		
Education			
8th grade or less	5		
Some high school	12		
High school diploma	41		
Some college/2 year degree	22		
4 year college degree or more	21		
Gender			
Female	51		
Male	49		
Survey response			
Early	45		
Late	55		

Table 2

Patient Characteristics (N=2010)

	%	<i>M</i>	<i>SD</i>
Family history of cancer diagnosis			
Yes	58		
No	42		
Lifestyle change recommendation			
Yes	41		
No	59		
Cancer Type			
Colorectal	34		
Breast	34		
Prostate	32		
Cancer stage			
In situ	61		
Regional spread	22		
Metastatic	17		
Cancer-related physician visits			
0 times	2		
1–2 times	21		
3–4 times	29		
5–7 times	14		
more than 7 times	34		
Decision-making preference			
Physician decides	19		
Physician and patient decide	44		
Patient decides	37		
No. of physical symptoms	2.26	1.91	
Information avoidance	1.62	0.75	
No. of treatments received	0.01	0.93	

Table 3

Primary variables (N=2010)

	%	<i>M</i>	<i>SD</i>
No. of Close social ties			
No one	2		
1–2 people	13		
3–4 people	30		
5–10 people	35		
11 or more	20		
Communication efficacy		4.28	0.54
Cancer information seeking		2.90	1.42

Table 4

Correlations Among Primary Variables (N=2010)

	1	2	3
1. No. of Close social ties	-		
2. Communication efficacy	0.22	-	
3. Cancer information seeking	0.13	0.25	-

Note: All correlations are statistically significant at $p < 0.001$.

Table 5

Formal Test of Mediation (N=2010)

	Model 1			Model 2			Model 3			Model 4			Model 5		
	Communication efficacy			Communication efficacy			Information Seeking			Information Seeking			Information Seeking		
	B	SE	p	B	SE	p	B	SE	p	B	SE	p	B	SE	p
Step 1															
Demographic characteristics															
Marital status (Not married = ref.)	-0.02	0.03		-0.01	0.03		0.19	0.07	**	0.19	0.07	**	0.19	0.07	**
Age	-0.01	0.00	***	-0.01	0.00	***	0.02	0.00	***	-0.02	0.00	***	-0.01	0.00	***
General health status	0.13	0.01	***	0.12	0.01	***	0.07	0.04		0.06	0.04		0.01	0.04	
Race (Nonwhite = ref.)	-0.04	0.04		-0.05	0.04		0.20	0.11		0.18	0.11		0.20	0.11	
Education	0.03	0.01	**	0.05	0.01	***	0.19	0.03	***	0.19	0.03	***	0.17	0.03	***
Gender (Female = ref.)	0.01	0.04		0.01	0.05		-0.19	0.11		-0.17	0.11		-0.18	0.11	
Survey Response (Early response = ref.)	0.01	0.02		0.01	0.03		0.02	0.06		0.02	0.06		0.02	0.06	
Patient characteristics															
Cancer type (Colorectal = ref.)															
Breast	0.00	0.04		0.03	0.04		0.33	0.10	***	0.34	0.09	***	0.33	0.09	***
Prostate	-0.07	0.05		-0.02	0.04		0.74	0.10	***	0.74	0.10	***	0.75	0.10	***
Family history of cancer diagnosis	-0.02	0.03		-0.01	0.03		-0.22	0.70	**	-0.19	0.08	*	-0.19	0.08	*
Lifestyle change recommendation	0.00	0.03		-0.01	0.03		-0.34	0.08	***	-0.33	0.08	***	-0.33	0.08	***
Cancer stage (Metastatic = ref.) in situ	0.01	0.04		0.05	0.04		0.21	0.11		0.23	0.11	*	0.21	0.11	
Regional	-0.04	0.04		-0.01	0.04		0.17	0.13		0.19	0.13		0.19	0.12	
No. of cancer-related physician visits	0.01	0.01		0.01	0.01		0.17	0.03	***	0.16	0.03	***	0.15	0.03	***
Decision-making preference (Physician decides = ref.)															
Both Decide	0.05	0.04		0.06	0.04		0.31	0.10	**	0.31	0.10	**	0.28	0.10	**
Patient decides	0.07	0.04		0.07	0.04		0.32	0.11	**	0.30	0.11	**	0.28	0.11	*
No. of physical symptoms	-0.01	0.01		-0.01	0.01		0.14	0.02	***	0.14	0.02	***	0.14	0.02	***
Information avoidance	-0.06	0.02	**	-0.05	0.02	*	0.00	0.05		0.01	0.05		0.03	0.05	
No. of treatments received	0.01	0.02		0.02	0.02		0.05	0.04		0.05	0.04		0.04	0.04	

	Model 1			Model 2			Model 3			Model 4			Model 5		
	Communication efficacy			Communication efficacy			Information Seeking			Information Seeking			Information Seeking		
	B	SE	p	B	SE	p	B	SE	p	B	SE	p	B	SE	p
Step 2															
No. of close social ties				0.09	0.01	***				0.09	0.04	*	0.06	0.06	
Step 3															
Communication efficacy													0.40	0.06	***
R-Squared	0.154			0.090			0.289			0.293			0.310		
Adj. R-Squared	0.146			0.172		***	0.282			0.286		**	0.302		***

Note:
* p<0.05;
** p<0.01;
*** p<0.001.