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An investigation of the colorectal cancer experience and receptivity to family-based cancer prevention programs

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Abstract

Purpose—Cancer is a shared family experience and may provide a “teachable moment” to motivate at-risk family members to adopt cancer prevention and health promotion behaviors. This study explored how a diagnosis of colorectal cancer (CRC) is experienced by family members and may be used to develop a family-based CRC prevention program. Preferences regarding content, timing, and modes of program delivery were examined. Social cognitive theory provided the conceptual framework for the study.

Methods—This study employed mixed methodology (semi-structured interviews and self-report questionnaires). Participants included 73 adults (21 patients, 52 family members) from 23 families (two patients were deceased prior to being interviewed). Most patients ($n=14$; 67 %) were interviewed 1–5 years post-diagnosis. Individual interviews were audio-recorded, transcribed, and content analyzed.

Results—For many, a CRC diagnosis was described as a shared family experience. Family members supported each other's efforts to prevent CRC through screening, exercising, and maintaining a healthy diet. Teachable moments for introducing a family-based program included the time of the patient's initial cancer surgery and post-chemotherapy. Reported willingness to participate in a family-based program was associated with risk perception, self-efficacy, outcome expectancies, and the social/community context in which the program would be embedded. Program preferences included cancer screening, diet/nutrition, weight management, stress reduction, and exercise. Challenges included geographic dispersion, variation in education levels, generational differences, and scheduling.

Conclusions—CRC patients and family members are receptive to family-based programs. Feasibility concerns, which may be mitigated but not eliminated with technological advances, must be addressed for successful family-based programs.

Keywords

Cancer; Oncology; Social cognitive theory; Teachable moment; Colorectal; Qualitative methods

Introduction

Colorectal cancer (CRC) is the third most common neoplasm and the second leading cause of cancer-related death in the USA [1]. Those who have a first-degree relative (FDR) with CRC are at two to three times higher risk of developing this cancer [2–7]. For individuals at increased risk, guidelines for the appropriate age to begin screening and subsequent screening intervals vary by the degree of familial risk, and adherence to the guidelines is generally poor [8]. Regular physical activity and maintaining a diet lower in total fat and higher in fiber, fruits, and vegetables can decrease the likelihood of developing an adenoma prior to a first screening exam [9, 10] and reduce CRC risk independent of family history [11, 12].

Research has examined the effects of cancer on the family system [13]; however, few studies have examined the effects on family members' cancer prevention behaviors [13]. A cancer diagnosis has a strong emotional impact on the family. Reactions of fear, anxiety, sadness, and existential concerns are common and can be greater for family members than for the patient [13, 14]. Family members may perceive they are at greater risk of developing cancer due to real or perceived shared genetic or environmental risk factors and have heightened awareness about cancer and its prevention [15, 16]. Thus, a cancer diagnosis could inspire behavior change among family members of the cancer patient by increasing awareness, perceptions of vulnerability, and receptivity to cancer prevention behaviors [15, 17].

Focusing on family-based prevention activities, especially among high-risk families, could provide an efficient approach toward achieving the Healthy People 2020 goal of reducing the CRC death rate by 15 % [18]. The objective of this study was to explore the perspectives of both patients and family members regarding the CRC experience and receptivity to family-based cancer prevention/health promotion programs.

Theoretical framework

Social cognitive theory (SCT) provided the theoretical framework for this study as well as the concept of a teachable moment (TM). There are several unexplored issues related to the cancer family experience that are consistent with these two frameworks. These include the multidimensional constructs of perceived risk of cancer and worry/concern about developing cancer [19] among family members. SCT illuminates how people acquire and maintain certain behavioral patterns, while also providing the basis for intervention strategies [20]. According to SCT, behavior is a dynamic process that is influenced by the individual and the social environment, with behavior change influenced by goals, outcome expectancies, and self-efficacy. SCT has been used to explain the contribution of family to a variety of health behaviors [21–32]. In this study, SCT provides a conceptual framework in which to explore perceived risk and self-efficacy among family members of CRC patients.

A TM refers to life events or transitions that inspire people to enact health behavior change [33]. These events are often related to one's personal health (e.g., receiving a diagnosis) or the health of a family member. The use of the TM concept to promote health behavior change reflects a belief that timing interventions with TMs can enhance receptivity to, and the efficacy of, an intervention. A diagnosis of cancer may therefore serve as a TM [33–35] for family members, depending upon each family member's subjective interpretation of the significance, cause, and meaning of the event [36]. McBride and Ostroff [16] suggested a conceptualization of this subjective interpretation to include three factors that are important for describing a cancer diagnosis and its related events as TMs for behavior change: (1) the event increases perceptions of personal risk and related expectations of positive or negative outcomes, (2) the event prompts a strong emotional response, and (3) the event redefines self-concept or social role. This study employs this conceptual rationale to explore how a CRC diagnosis influences family members' emotional response, personal risk perception and behavioral response, and receptivity to cancer prevention and health promotion programs.

Method

Sample and recruitment

Patients were identified through the institution's Biobank for Gastrointestinal Health Research (BGHR). The BGHR is an ongoing collection of biospecimens from patients with normal colonoscopic examinations, colon polyps, or CRC from the year 2000 to the present. Approximately 72 % of patients who were invited to participate in the BGHR agreed and provided consent. Inclusion criteria for patients in the present study were as follows: 18 years of age or older, CRC diagnosis, able to provide informed consent, and have at least two living family members who meet criteria for familial risk. Patients with known heritable

CRC genetic syndromes or whose health or cognitive status would interfere with participation were excluded. Family members were included if they met the criteria for familial risk, i.e., a CRC diagnosis (any stage) of a FDR before age 60 or diagnosis of two family members at any age, were at least 18 years of age, and provided informed consent. In this study, a family is defined as “a group of intimates with strong emotional bonds (identification, attachment, loyalty, reciprocity, and solidarity), with a history and future as a group, as well as those who are also linked genetically [13].”

A letter explaining the purpose of the research and inviting participation was mailed or given to a total of 230 CRC patients attending a clinic appointment. Patients who met inclusion criteria, agreed to participate, and were willing to nominate at least two family members for potential recruitment were enrolled. Family members' contact information was collected from the patient. For patients contacted by mail, repeat mailings were sent to non-responders within 3 weeks; the same process was followed for family members.

Data collection

Data were collected via semi-structured, qualitative interviews and a mailed, self-administered questionnaire. The interview guide included open-ended questions and probes designed to explore the CRC diagnosis as a family experience, family communication about CRC, and receptivity and preferences surrounding family-based cancer prevention programs. Interviews were conducted individually in person ($n=1$) or by telephone ($n=72$), lasted approximately 1 h, and were audio-recorded and transcribed. Transcriptions were verified against recordings for accuracy and annotated with field notes. Four participants were selected to review their transcript and verify the interpretation of their data.

The questionnaire assessed preferences regarding program content and design. Questions addressed willingness to talk with family members about participating in a health promotion program (“not at all,” “somewhat,” or “definitely” willing), specific program interests (yes/no: exercise, weight management, stress reduction, smoking cessation, diet/nutrition, cancer screening, cancer support, caregiver support), preferred method of program delivery (telephone, web/internet, in person, iPod/iPhone application, other), and demographic information.

A total of 105 individuals (42 patients, 63 family members) consented to participate (nearly one half of those who were sent an invitation letter). Of these, four patients ultimately failed to provide family member nominations and were excluded while 15 participants were lost to follow-up in the interval between enrollment and interview. Of the remaining 86 participants, 73 were interviewed (one subsequently declined, and 12 were unable to be scheduled during the study period). The 73 participants reflected 21 patients, 52 family members, and a total of 23 different families (two patients were deceased prior to being interviewed). Eighty two percent ($n=60$) of those interviewed returned a questionnaire, while nine questionnaires were received from individuals who were not interviewed (these are not included in the present analyses or tables, which focus on the sample of interview respondents). Participants were offered \$25 gift cards as remuneration.

Data analysis

Content analysis was assisted by electronic software (NVIVO 9; QSR International, Pty. Ltd.). Initial coding categories, patterns, and themes were established via inductive analysis. As part of this process, each interview was read several times by two individuals to identify preliminary themes that emerged from the data. Items reflecting similar themes were grouped together (converged) into categories reflecting the broad areas of interest: emotional response to a CRC diagnosis, personal risk perception and behavioral response, and family-based cancer prevention programs. New categories and themes were created as they emerged from the data. After establishing themes and categories, confirmatory analysis was deductively established (using the framework provided by SCT) to interpret the data and affirm the authenticity and appropriateness of the inductive content analysis. The presentation of results includes illustrative quotations; each is identified as patient (P) or family member (FM) age in years and male (M) or female (F) participant. Questionnaire data were summarized using SPSS 20 software (IBM); data are presented as frequencies (*n*) and column percent (%) for the total sample and stratified by type of participant (patient or family member).

Results

Participant characteristics are depicted in Table 1 while family structure and composition are shown in Table 2. Of the 21 patients, tumor sites included the rectum (*n*=11, 52 %), right colon (*n*=6, 29 %), and left colon (*n*=4, 19 %). Fifty-seven percent (*n*=12) were stage III at diagnosis, 38 % (*n*=8) were stage II, and the remainder (*n*=1) were diagnosed at stage I. Three patients (14 %) were interviewed within the first year of their diagnosis, and a majority were 1–5 years post-diagnosis (*n*=14, 67 %), while four patients (19 %) were interviewed five or more years post-diagnosis.

Emotional response to a CRC diagnosis

Although 67 % of patients had a family history of CRC, their own diagnosis came as a shock: “I was 49 years old and felt like I had run into a brick wall. I just could not believe it!” (P, 54 years, M); “... even though I had had these colonoscopies for so long, I was completely shocked!” (P, 79 years, F). Many of the participants described their emotional response as a process that moved from shock, fear and denial to acceptance: “... he [patient] was a healthy person... he just ran a marathon just a year ago. Did the... diet book. And yet—you know, nobody’s safe... we were just in shock” (FM, 63 years, F). “Well... none of us really has 100 % control, over our lives, and we’re all God’s children. You may think you have control over your life, but you really don’t” (P, 61 years, M).

Personal risk perception and behavioral response

A diagnosis of CRC in the family heightened perceived vulnerability and risk perception for many participants and was a call to action: “It definitely made me more aware of my own risk, and I have seen a doctor in the last week and I got a referral to get a colonoscopy” (FM, 47 years, F). “I don’t think I really thought that hard about my own health until, frankly... since mom’s diagnosis with colon cancer added to the record of my brothers and also my

uncles cropping up as well... This all kind of makes me aware and get this checked out..." (FM, 52 years, M). "The family that scopes together stays together" (FM, 62 years, F).

One participant (a 63-year-old female) recounted how, after a sibling was diagnosed with CRC, her family openly discussed screening and held each other accountable; she described how her brother (a medical doctor) facilitated prevention when the family was gathered together: "Like I said we're always on each other. We talk about colon cancer and, you know, ask when people have the colonoscopies: 'What did you have to drink for your scoping...' For our seating chart for Thanksgiving... we all had our prescriptions for colonoscopies."

Open communication about CRC within families enabled individuals to have informed conversations with their doctors. Consequently, many family members described being screened earlier than "normal people," consistent with recommendations for those at increased risk due to family history. Still, others expressed concern and confusion regarding the "right" age to begin screening: "... I mean, if mom and my brother had it, and his daughter has polyps at 32—so, if she would have waited to 10 years before onset, it would have been 39. Well, she would have had her polyps from 32 to 39. So when are we supposed to go in? We don't know... we're all trying to find out how to keep our kids safe..." (FM, 63 years, F).

While some participants felt they could help avoid CRC through exercise and diet, few family members initiated behavior change together: "I'm trying to exercise more... I'm not doing a real good job of it but... [my daughter] has exercise equipment and she says, 'now mom, Monday mornings and Friday mornings come on over and we both exercise', but of course, things have interfered..." (P, 79 years, F); "I have really tried to strive for eating healthy... after he had his first surgery and when he went in to do the chemo and the radiation because I see what it did to his system and his body..." (FM, 48 years, F).

Some family members expressed that they were aware of their increased risk of CRC, but factors such as joint pain or child care were impediments to staying active to reduce their risk. Others expressed a perceived lack of control over CRC; for these individuals, engaging in healthy behavior was a lower priority: "I largely believe that [I] don't have any control of it" (FM, 66 years, F), and "I have also seen people that are healthy that have gotten cancer and I don't know what elements going on in their life that would have maybe activated it. You know, I think it [physical activity] is a step in the right direction, but I just don't know if it is a lifetime guarantee that you are not going to get cancer" (FM, 48 years, F).

Family-based cancer prevention programs

Overall, family-based programs were viewed favorably, provided participation is the choice of individual family members. Participation was believed to be dependent on the internal dynamics of the family, such as whether the family is "close knit." Suggested modes of program delivery varied: "Well, I don't think I would want to drive back and forth to [the clinic] so I think it would be Internet or telephone call" (P, 79 years, F); "... our family would read it [newsletter]. And that way, you could get the information like right in front of you... instead of something with the phone—you don't have anything to look at" (FM, 63

years, F); "... web-based and Facebook page is a good idea for the younger generation especially" (P, 61 years, M).

A majority of participants (55/60 or 91 % of those who answered the question) were "somewhat" or "definitely" willing to participate in a health promotion program designed specifically for families with cancer (Table 3). Less than 5 % of respondents were "not at all willing" to talk to family members about taking part in a health promotion program. Overall, programs that included family members were preferred over individual programs, with "cancer screening" being the most frequently endorsed program topic for both patients and family members (Table 3). With regard to the most preferred method of delivering a health promotion program, use of the internet/web was endorsed most frequently overall although, for patients, endorsement of internet/web and telephone-based programs was similar, while family members showed a stronger preference for internet/web program delivery. In this sample, only one individual (a family member) indicated the use of a smartphone "app" as the preferred mode of program delivery.

The optimal timing of introducing a family-based prevention program was equivocal. For some, a TM occurred at or near the time of diagnosis or initial surgery, as families were eager for information, highly communicative, and when possible, gathered together: "You [family member] have a lot of time sitting in a waiting room [during surgery] so that would be a great opportunity" (FM, 54 years, M); "If you wait too long [after diagnosis], then they are already gonna have formed opinions about stuff. By then, it might be not so effective... There's a certain point of vulnerability where you gotta do that" (P, 61 years, M). For other families, a TM occurred after treatment: "Well, you know, I don't feel sick now, I feel good because I haven't been getting chemo. So, you know, right now it is okay with me" (P, 79 years, F); "... when mom was all going through it, maybe we were all focused on her, and thinking we wouldn't want to take any time away... Now that that's over, now I think would be a good time" (FM, 63 years, F).

Many participants discussed aligning new programs with existing programs in their communities. For instance, church programs on cancer offered support but would benefit from adding educational aspects. Networking opportunities with other families affected by CRC were also suggested as well as programs through one's place of employment. With regard to program content, patients expressed a desire for specific, tailored information regarding recovering from CRC treatment/surgery and behaviors to prevent recurrence: "We didn't get any advice from anyone on diet, food supplements, anything like that. All we really heard was, you have to eat a balanced diet now... I wanted to know what can I do to help myself and I never really got that. Get rest, take your naps, eat right... I mean I wasn't really sure if I could exercise and was told I could walk, but not to wear myself out too much" (P, 79 years, F).

Several participants expressed a need for education and support programs for caregivers: "The caregiver probably [needs] just as much reinforcement as the patient... They give up.... It's a tough position to be in" (P, 61 years, M); "... the colostomy that was no problem, they went over that... But as a caregiver it is just a terrible, terrible time and you

just need to talk to somebody” (FM, 70 years, F); “... support groups for caregivers should be a little bit more emphasized” (P, 61 years, M).

The feasibility of family-based programs was explored. Four main challenges were identified, including geographic dispersion, different education levels within families, generational differences (e.g., use of social media), and scheduling conflicts. Geographic dispersion of families emerged as the principal barrier to successful implementation of family-based prevention programs. The use of technology (e.g., videoconferencing) to bridge physical distance failed to eliminate other key challenges such as scheduling sessions for family members living in different time zones and managing the demands of different life stages, as recognized by this 79-year-old patient: “You know how young people are, they are always really, really busy, but I think they would want to participate, and I would hope that they would take the time, that would be the question for them.”

Discussion

This study showed that CRC patients and family members are receptive to family-based cancer prevention programs. The interconnectedness of the families represented in this study may be an artifact of selection bias, or it may suggest that a CRC diagnosis can be a unifying force. Most participants, however, articulated concerns regarding the feasibility of participation as a family group. Designing a successful family-based cancer prevention program will require combining the need for individual flexibility with the strength of a family bond to reinforce learning, preventive action, and support.

Most family members reported heightened feelings of anxiety in response to a CRC diagnosis occurring within the family, including increased perceptions of risk and vulnerability to CRC and concerns about CRC screening guidelines. This finding is congruent with those of previous studies [13–16]. Similarly, the findings of this study are consistent with literature outlining the challenges of behavior change irrespective of the motivation for change (i.e., cancer prevention, health promotion), such as disease-related disabilities and busy work schedules [37, 38]. For instance, in this study, even though family members had a heightened awareness of their own risk for CRC and the protective effect of exercise or being physically active, factors such as joint pain and lack of child care inhibited their efforts to stay active.

Several findings from this study align well with the wider literature on cancer prevention and health promotion. For instance, patients and family members in this study suggested a variety of ways in which family-based programs can be delivered given current technology, and yet, many recognized that the feasibility of these methods may differ across families. Previous studies have reported similar preferences for delivering educational intervention programs, including web-based methods, use of text messaging, and video formats [39]; however, challenges akin to those identified in this study were also noted, such as difficulty navigating websites or using available technology [40, 41]. In addition, patients and family members in this study strongly recommended aligning new programs with existing programs within communities; this is consonant with literature showing that health promotion

programs which are developed in collaboration with a community-based organization tend to enjoy high participation rates [42, 43].

The findings of this study are consistent with principles underlying SCT. Specifically, anticipated participation in a family-based cancer prevention program was viewed as a dynamic process that would be motivated by increased risk perception experienced through the family member's diagnosis, self-efficacy for performing CRC prevention behaviors, outcome expectancies, and the social context (environment) in which the program would be embedded (e.g., church, place of employment). For instance, at-risk family members who perceived they could mitigate risk of CRC through their own behavior reported efforts to exercise and make healthy food choices. In addition, small, specific steps to reduce CRC risk were encouraged in innovative ways such as place cards at a holiday dinner that were prescriptions for colonoscopy. Finally, observational learning was evidenced by older family members talking to younger family members about their own experience with colonoscopy to allay fears. In contrast, those who perceived a CRC diagnosis as outside of their control were less likely to favor lifestyle changes. According to SCT, these individuals have less self-efficacy, negative outcome expectancies, and already experienced a lack of reinforcement, with seemingly "healthy" family members developing cancer. The difference between a diagnosis rousing a family into preventative action vs. complacency (due to factors that behavior cannot change, such as genetics) is worthy of further investigation.

A single, "universal" TM in which to introduce a family-based cancer prevention program could not be identified. For some, a TM occurred when families were gathered at the time of the patient's cancer surgery, while for others, a TM occurred after the patient completed treatment, was well enough to participate him/herself, and required less care. The knowledge that families can identify such a moment is novel and arguably more important than arriving at a single TM that applies to every family. Importantly, data from this study suggest that the time when family members are gathered for a patient's initial surgery may not be too soon to broach the topic.

This study is not without limitations. Our findings are not derived from a representative sample; only 14 % of the patients enrolled had received their CRC diagnosis within the past year; thus, the perspective of newly diagnosed patients is less well represented in the data. Additionally, the 23 families in this study were heterogeneous and not representative of every family structure, and two families lacked the patient perspective (due to death). Similarly, while some patients were fathers (and sons and daughters were interviewed), no patient's father was interviewed. The omission of the perspective of fathers was unintentional and limits our understanding of this influence within the family dynamic. Most of the study participants were white and of European descent; the data may not reflect the perspectives of individuals from diverse racial or ethnic backgrounds. This limitation is important to note because of recognized racial and ethnic disparities in CRC incidence and mortality [1]. Furthermore, family composition, dynamics, and roles are highly culturally influenced. Thus, the development of effective and desired family-based programs that are culturally appropriate and sensitive will require further formative research.

Future work could consider family-based theories, such as family systems theory, as a conceptual framework for collecting and analyzing data collected from family units. Doing so would expand what was learned in this study from SCT and enable a deeper examination of important family dynamics and processes, including the interconnectedness of the family groups/units and their environment. In addition, although this study focused on CRC and assessed many theory-based constructs, subsequent work could assess other factors such as the degree of connection to the family cancer experience, emotional and cognitive involvement, and perceived similarity to the affected person [44] within CRC, and extend this work to other familial cancers. A greater understanding of how these factors relate to risk perception and receptivity to family-based prevention programs would further inform program development and cancer prevention strategies for families.

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References

1. American Cancer Society. Cancer facts & figures 2011. Atlanta: American Cancer Society; 2011. <http://ncert.org/cancer-facts-figures-2011/> [Accessed 14 January 2013]
2. Winawer SJ, Zauber AG, Fletcher RH, et al. Guidelines for colonoscopy surveillance after polypectomy: a consensus update by the US Multi-Society Task Force on Colorectal Cancer and the American Cancer Society. *Gastroenterology*. 2006; 130:1872–1885.10.1053/j.gastro.2006.03.012 [PubMed: 16697750]
3. Burt RW. Screening of patients with a positive family history of colorectal cancer. *Gastrointest Endosc Clin N Am*. 1997; 7:65–79. [PubMed: 8995113]
4. Duncan JL, Kyle J. Family incidence of carcinoma of the colon and rectum in north-east Scotland. *Gut*. 1982; 23:169–171.10.1136/gut.23.2.169 [PubMed: 7068040]
5. Kune GA, Kune S, Watson LF. The Melbourne Colorectal Cancer Study. Characterization of patients with a family history of colorectal cancer. *Dis Colon Rectum*. 1987; 30:600–606.10.1007/BF02554806 [PubMed: 3622163]
6. Ponz de Leon M, Antonioli A, Ascari A, Zanghieri G, Sacchetti C. Incidence and familial occurrence of colorectal cancer and polyps in a health-care district of northern Italy. *Cancer*. 1987; 60:2848–2859.10.1002/1097-0142(19871201)60:11<2848::AID-CNCR2820601141>3.0.CO;2-F [PubMed: 3677018]
7. Fuchs CS, Giovannucci EL, Colditz GA, Hunter DJ, Speizer FE, Willett WC. A prospective study of family history and the risk of colorectal cancer. *N Engl J Med*. 1994; 331:1669–1674.10.1056/NEJM199412223312501 [PubMed: 7969357]
8. Lin OS, Gluck M, Nguyen M, Koch J, Kozarek RA. Screening patterns in patients with a family history of colorectal cancer often do not adhere to national guidelines. *Dig Dis Sci*. 2013; 58:1841–1848.10.1007/s10620-013-2567-3 [PubMed: 23371014]
9. Brooks DD, Winawer SJ, Rex DK, et al. Colonoscopy surveillance after polypectomy and colorectal cancer resection. *Am Fam Physician*. 2008; 77:995–1002. [PubMed: 18441865]
10. Gatof D, Ahnen D. Primary prevention of colorectal cancer: diet and drugs. *Gastroenterol Clin N Am*. 2002; 31:587–623. xi. 10.1016/S0889-8553(02)00011-0
11. Le Marchand L, Wilkens LR, Hankin JH, Kolonel LN, Lyu LC. Independent and joint effects of family history and lifestyle on colorectal cancer risk: implications for prevention. *Cancer Epidemiol Biomarkers Prev*. 1999; 8:45–51. [PubMed: 9950239]
12. Le Marchand L, Wilkens LR, Kolonel LN, Hankin JH, Lyu LC. Associations of sedentary lifestyle, obesity, smoking, alcohol use, and diabetes with the risk of colorectal cancer. *Cancer Res*. 1997; 57:4787–4794. [PubMed: 9354440]

13. Lewis FM. The effects of cancer survivorship on families and caregivers. More research is needed on long-term survivors. *Am J Nurs.* 2006; 106:20–25.10.1097/00000446-200603003-00008 [PubMed: 16481844]
14. Turner D, Adams E, Boulton M, et al. Partners and close family members of long-term cancer survivors: health status, psychosocial well-being and unmet supportive care needs. *Psycho-Oncology.* 2013; 22:12–19.10.1002/pon.2050 [PubMed: 21905160]
15. Kristeller JL, Hebert J, Edmiston K, et al. Attitudes toward risk factor behavior of relatives of cancer patients. *Prev Med.* 1996; 25:162–169.10.1006/pmed.1996.0042 [PubMed: 8860281]
16. McBride CM, Ostroff JS. Teachable moments for promoting smoking cessation: the context of cancer care and survivorship. *Cancer Control.* 2003; 10:325–333. [PubMed: 12915811]
17. Gerlach RW, Gambosi JR, Bowen RH. Cancer survivors' needs reported by survivors and their families. *J Cancer Educ.* 1990; 5:63–70.10.1080/08858199009528037 [PubMed: 2400673]
18. U.S. Department of Health and Human Services. Office of Disease Prevention and Health Promotion. Healthy People 2020. Washington, D.C: <http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=5> [Accessed 14 January 2013]
19. Bowen DJ, Patenaude AF, Vernon SW. Psychosocial issues in cancer genetics: from the laboratory to the public. *Cancer Epidemiol Biomarkers Prev.* 1999; 8:326–328. [PubMed: 10207636]
20. Bandura, A. Self-efficacy: the exercise of control. W. H. Freeman; New York: 1997.
21. Bartholomew LK, Parcel GS, Swank PR, Czyzewski DI. Measuring self-efficacy expectations for the self-management of cystic fibrosis. *Chest.* 1993; 103:1524–1530.10.1378/chest.103.5.1524 [PubMed: 8486038]
22. Clasen CM, Vernon SW, Mullen PD, Jackson GL. A survey of physician beliefs and self-reported practices concerning screening for early detection of cancer. *Soc Sci Med.* 1994; 39:841–849.10.1016/0277-9536(94)90046-9 [PubMed: 7973880]
23. Goodson P. Predictors of intention to promote family planning: a survey of protestant seminarians in the United States. *Health Educ Behav.* 2002; 29:521–541.10.1177/109019802237022 [PubMed: 12238698]
24. Graves KD. Social cognitive theory and cancer patients' quality of life: a meta-analysis of psychosocial intervention components. *Health Psychol.* 2003; 22:210–219.10.1037/0278-6133.22.2.210 [PubMed: 12683741]
25. Ievers-Landis CE, Burant C, Drotar D, Morgan L, Trapl ES, Kwok CK. Social support, knowledge, and self-efficacy as correlates of osteoporosis preventive behaviors among preadolescent females. *J Pediatr Psychol.* 2003; 28:335–345.10.1093/jpepsy/jsg023 [PubMed: 12808010]
26. Jemmott JB III, Jemmott LW, Spears H, Hewitt N, Cruz-Collins M. Self-efficacy, hedonistic expectancies, and condom-use intentions among inner-city black adolescent women: a social cognitive approach to AIDS risk behavior. *J Adolesc Health.* 1992; 13:512–519.10.1016/1054-139X(92)90016-5 [PubMed: 1390819]
27. Krummel DA, Humphries D, Tessaro I. Focus groups on cardiovascular health in rural women: implications for practice. *J Nutr Educ Behav.* 2002; 34:38–46.10.1016/S1499-4046(06)60223-6 [PubMed: 11917670]
28. Lee S, Reicks M. Environmental and behavioral factors are associated with the calcium intake of low-income adolescent girls. *J Am Diet Assoc.* 2003; 103:1526–1529.10.1016/j.jada.2003.08.020 [PubMed: 14576721]
29. Ransdell LB, Taylor A, Oakland D, Schmidt J, Moyer-Mileur L, Shultz B. Daughters and mothers exercising together: effects of home- and community-based programs. *Med Sci Sports Exerc.* 2003; 35:286–296.10.1249/01.MSS.0000048836.67270.1F [PubMed: 12569218]
30. Stahl T, Rutten A, Nutbeam D, et al. The importance of the social environment for physically active lifestyle—results from an international study. *Soc Sci Med.* 2001; 52:1–10.10.1016/S0277-9536(00)00116-7 [PubMed: 11144909]
31. Story M, Neumark-Sztainer D, French S. Individual and environmental influences on adolescent eating behaviors. *J Am Diet Assoc.* 2002; 102:S40–S51.10.1016/S0002-8223(02)90421-9 [PubMed: 11902388]
32. Vakalahi HF. Adolescent substance use and family-based risk and protective factors: a literature review. *J Drug Educ.* 2001; 31:29–46.10.2190/QP75-P9AR-NUVJ-FJCB [PubMed: 11338964]

33. McBride CM, Emmons KM, Lipkus IM. Understanding the potential of teachable moments: the case of smoking cessation. *Health Educ Res.* 2003; 18:156–170.10.1093/her/18.2.156 [PubMed: 12729175]
34. McBride CM, Pollak KI, Garst J, et al. Distress and motivation for smoking cessation among lung cancer patients' relatives who smoke. *J Cancer Educ.* 2003; 18:150–156.10.1207/S15430154JCE1803_08 [PubMed: 14512262]
35. McBride CM, Puleo E, Pollak KI, Clipp EC, Woolford S, Emmons KM. Understanding the role of cancer worry in creating a “teachable moment” for multiple risk factor reduction. *Soc Sci Med.* 2008; 66:790–800.10.1016/j.socscimed.2007.10.014 [PubMed: 18037204]
36. Fife BL. The role of constructed meaning in adaptation to the onset of life-threatening illness. *Soc Sci Med.* 2005; 61:2132–2143.10.1016/j.socscimed.2005.04.026 [PubMed: 16026913]
37. Lennon OC, Doody C, Choideabh CN, Blake C. Barriers to healthy-lifestyle participation in stroke: consumer participation in secondary prevention design. *Int J Rehabil Res.* 2013; 36:354–361.10.1097/Mrr.0b013e3283643d48 [PubMed: 23873221]
38. Satia JA, Walsh JF, Pruthi RS. Health behavior changes in White and African American prostate cancer survivors. *Cancer Nurs.* 2009; 32:107–117. [PubMed: 19258825]
39. Vandelanotte C, Duncan MJ, Plotnikoff RC, Mummery WK. Do participants' preferences for mode of delivery (text, video, or both) influence the effectiveness of a web-based physical activity intervention? *J Med Internet Res.* 2012; 14:e37.10.2196/jmir.1998 [PubMed: 22377834]
40. Bastian LA, Fish LJ, Peterson BL, et al. Assessment of the impact of adjunctive proactive telephone counseling to promote smoking cessation among lung cancer patients' social networks. *Am J Health Promot.* 2013; 27:181–190. [PubMed: 23286595]
41. Lana A, del Valle MO, Lopez S, Faya-Ornia G, Lopez ML. Study protocol of a randomized controlled trial to improve cancer prevention behaviors in adolescents and adults using a web-based intervention supplemented with SMS. *BMC Public Health.* 2013; 13:10.1186/1471-2458-13-357
42. Beauchamp M, Francella S, Romano J, Goldstein R, Brooks D. A novel approach to long-term respiratory care: results of a community based post-rehabilitation maintenance program. *Respir Med.* 2013; 107:1210–1216. [PubMed: 23706779]
43. Wilson LC. Implementation and evaluation of church-based health fairs. *J Community Health Nurs.* 2000; 17:39–48. [PubMed: 10778028]
44. Hawkins NA, McCarty F, Peipins LA, Rodriguez JL. Measuring the degree of closeness to the cancer experience: development and initial validation of the CONNecTion to the Experience of Cancer Scale (CONNECS). *Patient Educ Couns.* 2012; 89:292–299.10.1016/j.pec.2012.08.009 [PubMed: 22940373]

Table 1Participant characteristics (*N*=73)

Characteristics	Patients (<i>N</i> =21), <i>n</i> (%)	Family members (<i>N</i> =52), <i>n</i> (%)	Total <i>n</i> (%)
Employed, yes (full- or part-time)	9 (42.8)	31 (59.7)	40 (54.8)
Missing	3 (14.3)	10 (19.2)	13 (17.8)
Gender			
Male	14 (66.7)	17 (32.7)	31 (42.5)
Female	7 (33.3)	35 (67.3)	42 (57.5)
Marital status			
Married	13 (61.9)	35 (67.3)	48 (65.8)
Divorced	2 (9.5)	0	2 (2.7)
Widowed	1 (4.8)	1 (1.9)	2 (2.7)
Single, never married	2 (9.5)	6 (11.5)	8 (11.0)
Missing	3 (14.3)	10 (19.2)	13 (17.8)
Education			
High school/GED	7 (33.3)	3 (5.8)	10 (13.7)
Vocational/technical/business	3 (14.3)	3 (5.8)	6 (8.2)
Some college/associate's degree	4 (19.0)	13 (25.0)	17 (23.3)
College, bachelor's degree	3 (14.3)	19 (36.5)	22 (30.1)
Graduate/professional school	1 (4.8)	4 (7.7)	5 (6.8)
Missing	3 (14.3)	10 (19.2)	13 (17.8)
Age	Range 33–80; <i>M</i> =60.7±13	Range 19–80; <i>M</i> =47.4±15.8	Range 19–80; <i>M</i> =51.5±16.1
50	4 (19.0)	23 (44.2)	27 (37.0)
51–60	6 (28.6)	10 (19.2)	16 (21.9)
61–70	3 (14.3)	6 (11.5)	9 (12.3)
71+	6 (28.6)	3 (5.8)	9 (12.3)
Missing	2 (9.5)	10 (19.2)	12 (16.4)

Table 2

Composition of 23 participating families (N=73)

Family	Patient	Spouse	Sister	Mother	Brother	Daughter	Son
1	X	X					
2	X		X		X		
3	Deceased					X	(3)
4	X					X	
5	X					X	
6	X					X	
7	X	X				X	X
8	Deceased	X				X	X
9	X	X				(2)	
10	X		X				
11	X					X	X
12	X	X		X			X
13	X		X				X
14	X					X	X
15	X	X	X	X	X		
16	X	X				X	X
17	X	X				X	(2)
18	X	X				X	
19	X	X				X	
20	X	X				(2)	
21	X	X	X				
22	X	X	X				
23	X	X	X				

Table 3Participation in health programs (*N*=73)

Characteristics	Patients (<i>N</i> =21), <i>n</i> (%)	Family members (<i>N</i> =52), <i>n</i> (%)	Total <i>n</i> (%)
Willingness to participate ^a			
Definitely willing	11 (52.4)	22 (42.3)	33 (45.2)
Somewhat willing	5 (23.8)	17 (32.7)	22 (30.1)
Not at all willing	2 (9.5)	3 (5.8)	5 ^d (6.8)
Missing	3 (14.3)	10 (19.2)	13 (17.8)
Willingness to talk ^b			
Definitely willing	7 (33.3)	22 (42.3)	29 (39.7)
Somewhat willing	9 (42.9)	15 (28.8)	24 (32.9)
Not at all willing	0	2 (3.8)	2 (2.7)
Missing	5 (23.8)	13 (25.0)	18 (24.7)
Most preferred mode of delivery			
Telephone	7 (33.3)	7 (13.5)	14 (19.2)
Internet/web	7 (33.3)	29 (55.8)	36 (49.3)
In person	2 (9.5)	2 (3.8)	4 (5.5)
Smartphone app	0	1 (1.9)	1 (1.4)
Missing	5 (23.8)	13 (25.0)	18 ^d (24.7)
Role in health program			
Support others (family/friends)	6 (28.6)	8 (15.4)	14 (19.2)
Take part myself	6 (28.6)	17 (32.7)	23 (31.5)
Support others and take part myself	2 (9.5)	12 (23.1)	14 (19.2)
Not take part myself ^c	2 (9.5)	1 (1.9)	3 (4.1)
Missing	5 (23.8)	14 (26.9)	19 ^d (26.0)
Most preferred program			
Exercise	1 (4.8)	2 (3.8)	3 (4.1)
Weight management	3 (14.3)	4 (7.7)	7 (9.6)
Stress reduction	1 (4.8)	4 (7.7)	5 (6.8)
Diet/nutrition	2 (9.5)	5 (9.6)	7 (9.6)
Cancer screening	4 (19.0)	10 (19.2)	14 (19.2)
Cancer support	2 (9.5)	2 (3.8)	4 (5.5)
Missing	8 (38.1)	25 (48.0)	33 ^d (45.3)

^aWillingness to participate in family-based health programs^bWillingness to talk to your family members about taking part in a health promotion program^cNot take part but would like my family members to participate^dThese five individuals who were “not at all willing” to take part in a health promotion program were not asked further questions regarding program preferences and were included under “missing” for these items