RELATIONSHIP BETWEEN CANCER-RELATED DISTRESS AND DIET BEHAVIOR AMONG LOW-INCOME CANCER SURVIVORS - IMPLICATIONS FOR DIETARY BEHAVIOR CHANGE

by

SUNITA MOHABIR

A dissertation submitted to the Graduate Faculty in Clinical Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy,
The City University of New York

2006

ProQuest Information and Learning Company
300 North Zeeb Road
P.O. Box 1346
Ann Arbor, MI 48106-1346

This manuscript has been read and accepted by the Graduate Faculty in Clinical Psychology in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

Date	Anderson J. Franklin, Ph.D. Chair of Examining Committee
Date	Joseph Glick Executive Officer

Elliot Jurist, Ph.D.

Steve Tuber, Ph.D.

Jamie Ostroff, Ph.D.

Tiffany Floyd, Ph.D.
Supervisory Committee

THE CITY UNIVERSITY OF NEW YORK

Abstract

RELATIONSHIP BETWEEN CANCER-RELATED DISTRESS AND DIET BEHAVIOR AMONG LOW-INCOME CANCER SURVIVORS - IMPLICATIONS FOR DIETARY BEHAVIOR CHANGE

by

Sunita Mohabir

Advisor: Professor Anderson J. Franklin, Ph.D.

Continued advances in the early detection and treatment of cancer have led to increased survivorship among people diagnosed with cancer. As a result, researchers are turning to the study of health behaviors to better understand whether gains can be made from healthier lifestyles. The current study explored the relationship between cancer-related distress and diet behavior among low-income cancer survivors as a first step in guiding inquiries into whether cancer-related distress can act as a facilitator of diet behavior change. This study explored levels of cancer-related distress reported by low-income cancer survivors and racial/educational differences in levels of distress. This study also explored levels of adherence to a low-fat diet consisting of five daily servings of fruits and vegetables and racial/educational differences in dietary adherence. Two hypotheses were tested to examine whether a positive linear or curvilinear relationship would be found between cancer-related distress and diet indicating a facilitating relationship between variables of distress and diet (positive linear) or that moderate levels of distress may be necessary to promote change (curvilinear).

Findings of the current study suggest that low-income cancer survivors had higher levels of cancer-related distress compared to recently diagnosed cancer patients and those

with advanced disease. Additionally, adherence to dietary recommendations was better than that reported by the general population, and as good or better than samples of primarily white, moderate-income cancer survivors. Neither a linear nor curvilinear relationship between cancer-related distress and diet was supported in this study suggesting that factors other than cancer-related distress may be predictors of dietary behavior. Future studies should consider the role of diet in regulating affect and examine other social learning constructs such as response efficacy, self efficacy and readiness of participants to make diet changes.

Acknowledgments

I wish to thank members of my committee for their guidance and commitment to this project and to my development as a clinical psychologist. Dr. A.J. Franklin for his immense patience through this process, for helping me bind my dissertation- related anxieties, and for getting me to the finish. Dr. Jamie Ostroff for years of unwavering commitment to teaching me the tools of psychology research and for affording me critical training opportunities. Dr. Tiffany Floyd, without whom, there would be no "results" section and to whom I'm entirely grateful for her support through this arduous process. Dr. Elliot Jurist not only for his critical role on my dissertation committee, but also for years of brilliant supervision that has helped to create the clinician that I have become. And Dr. Steve Tuber, for teaching me the importance of sitting with ambiguity, not to mention tremendous support in helping me get through graduate school.

I also wish to thank a number of people who have played important roles in influencing my decision to become a psychologist and for working with me at various phases to make this happen: Dr. Andy Roth, Dr. Jennifer Hay, Dr. Jack Burkhalter, and Dr. Jennifer Ford. Additionally, I wish to thank Dr. Aileen Blitz, Dr. Kate Oram, Dr. Daniel Rothstein, Dr. Karen Frieder and Dr. Lucy March for providing a safe environment within the context of supervision that has helped my develop as a clinician.

My parents for the many sacrifices made in the name of higher education. My father for impressing upon me the importance of education. My mother for affording me the opportunity she didn't have. My Aunt Soma for years of kindness and support of my various endeavors. I also wish to thank my boyfriend, Anthony Pulgram, for years of encouragement and steadfast support in keeping this dream alive.

Table of Contents

List of Tables

CHAPTER I

Introduction

In recent years, advances in cancer treatment have substantially increased the number of cancer survivors. The 5-year survival rate for all cancers combined is now 64%, with much higher survival rates for some types of cancer (e.g., breast cancer, 88%, and prostate cancer, 99% (American Cancer Society [ACS], 2005). Increases in cancer survivorship have led to growing interest in finding new ways to address issues pertinent to survival and well-being. In one such area of research, investigators are turning to the study of health behaviors to better understand how cancer survivors can stay healthy, prevent cancer recurrence and the development of second primary cancers, among other co-morbid conditions. Although it has not been proven that health behavior change will reduce cancer mortality, a growing body of research suggests that a healthier lifestyle correlates with living longer and having a better quality of life (e.g., Aziz, 2002).

Many cancer survivors still do not practice healthy life-style behaviors (Demark-Wahnefried, Peterson, McBride, Lipkus, & Clipp, 2000; Thomson et al., 2002). In the area of dietary behavior, the American Cancer Society recommends a daily intake of 5 or more servings of fruits and vegetables and a low fat diet. However, prevalence figures indicate that 46 – 55% of cancer survivors are consuming fewer than 5 fruits/vegetables daily (Coups & Ostroff, 2005; Demark-Wahnefried et al., 2000), while 55 – 71% report daily intakes of more than 30% fat (Coups & Ostroff, 2005; Pinto et al., 2002).

The predictors of dietary behavior change in cancer survivors are not well-studied or understood. McBride, Clipp, Peterson, Lipkus, and Demark-Wahnefried (2000) suggest that life-threatening health events such as cancer prompt psychological distress

that may motivate individuals to reduce health risks. These authors suggest that a cancer diagnosis can be a "teachable moment," an event that has the potential to shift awareness of risk in the patient as he/she becomes more receptive to prevention or change. Such an event can be a unique opportunity to introduce health behavior interventions to cancer survivors. Based on this premise, the current study will explore the relationship between cancer-related distress and diet behavior in a sample of low-income cancer survivors as a first step in guiding inquiries into whether cancer-related distress can act as a facilitator of dietary behavior change and whether certain levels of distress would be optimal for such change.

Racial and educational differences in diets have been reported in both the general population and cancer survivors. Race has been reported to play a role in dietary habits, with Blacks being more likely to consume high fat diets (Forshee, Storey, & Ritenbaugh, 2003; Cox et al., 1995) and eat fewer than 5 servings of fruits and vegetables daily (McClelland, Demark-Wahnefried, David Mustian, Cowan, & Campbell, 1998). Educational differences in diet have also been reported with mixed findings. Salminen, Bishop, Poussa, Drummond, and Salminen (2004) report that higher level of education was associated with diet change after a cancer diagnosis, while Thomson et al. (2002) report that higher education was not associated with diet change among cancer survivors. Given ongoing discussions about disparities in cancer survival and health outcomes (Bradley, Given, & Roberts, 2001, 2002; Ayanian, Kohler, Abe, & Epstein, 1993), this study will explore racial and educational differences in levels of cancer-related distress experienced and levels of adherence to dietary recommendations. The intent is to better

understand whether racial/educational differences found within the general population and cancer survivors also exist among low-income cancer survivors.

Using the common-sense model (CSM) of self-regulation of health and illness (Leventhal, Leventhal, & Cameron, 2001) as a theoretical framework, this study will attempt to look at the interactive nature of illness cognitions and cancer-related distress. Within this framework, Leventhal et al. propose that there is a parallel process mechanism in illness representation and regulation that influence each other: a cognitive process for regulating objective health threats and an emotional process for representation and processing of anxiety and fear. This theory holds that when faced with an illness, people are likely to engage in behavior change in order to eliminate the health problem and distress associated with it. This study will examine the relationship between cancer-related distress and diet behavior in an effort to understand whether, in fact, such a phenomenon occurs among cancer survivors as they seek positive health outcomes or whether the distress will be so powerful that it overwhelms their coping mechanisms.

CHAPTER II

Background

Continued advances in the early detection and treatment of cancer have led to cancer survivors living longer after diagnosis. As a result, survival issues such as quality of life and continued survival have taken on greater importance in recent years. Researchers are becoming more interested in the study of health behaviors to better understand whether there are gains to be made from healthier lifestyles. According to Aziz (2002), diet, weight and physical activity interventions holds promise in addressing adverse sequelae of cancer and its treatment. This study will focus on the dietary behavior of low-income cancer survivors. For the purposes of this study, cancer survivorship is defined from the point of diagnosis to the end of life (National Coalition of Cancer Survivorship, 2004). More specifically, the role of cancer-related distress in dietary behavior will be explored, along with the implications for dietary change.

Adherence to ACS dietary guidelines

Population-based estimates of adherence to fruit and vegetable recommendations suggest that 77% of all Americans consume less than 5 servings of fruits and vegetables daily (Behavioral Risk Factor Surveillance System [BRFSS], 2003). In contrast, Coups and Ostroff (2005) conducted a study utilizing the 2000 National Health Interview Survey and found that, among non-cancer controls aged 40-64, 52% were consuming less than 5 fruits and vegetables daily, and 73% were consuming diets consisting of more than 30% fat. These authors reported similar rates of non-adherence among cancer survivors aged 40-64, with 47% consuming less than 5 fruits and vegetables daily and 71% consuming diets consisting of more than 30% fat. Similar findings were reported in fruit

and vegetable intake in another study (Demark-Wahnefried et al., 2000), which found that 55% of cancer survivors ate fewer than 5 servings of fruits and vegetables daily. In contrast to the prevalence data cited above, Demark-Wahnefried et al. found that only 31% of cancer survivors in their study reported consuming diets consisting of more than 30% fat while Pinto et al. (2002) reported that 55% of Breast Cancer survivors reported a dietary fat intake of 30% or higher. Although the findings from these studies are mixed, what can be gleaned from these data is that many cancer survivors still do not adhere to the American Cancer Society's guidelines of a daily intake of five or more fruits/vegetables as well as a low fat diet. Cancer survivors, in particular, stand to gain from dietary behavior change, not only for better cancer outcomes, but more positive health outcomes overall, given that poor dietary habits are associated with other co-morbid illnesses, such as diabetes, hypertension and heart disease.

Existing Literature on Dietary Interventions among Cancer Survivors

The predictors of dietary behavior in cancer survivors are not well understood. In fact, research in this area has largely focused on two areas: 1) Understanding the impact of dietary factors on recurrence/survival, and 2) Assessing the efficacy of dietary interventions. Few studies have looked at psychological correlates of dietary behavior after a cancer diagnosis, an area of study that is very important in understanding why so many do not make changes even when it becomes critical to their health and well-being.

Relationship between dietary factors and recurrence/survival

A number of studies have looked at the association between nutritional factors and disease progression, cancer recurrence and death. Much of this research has been conducted in the area of breast cancer. In reviews conducted by Rock and Demark-

Wahnefried (2002) and Chlebowski, Aiello, and McTiernan (2002), a majority of studies showed that increased body mass index and/or body weight is a significant risk factor for recurrent disease and decreased survival. Bastarrachea, Hortobagyi, Smith, Kau, and Buzdar (1994) found obesity to be an indicator of poor prognosis in a study of breast cancer patients. A number of studies found significant positive associations between total fat intake and treatment failure (i.e., cancer recurrence, development of a new cancer and increased risk of death, Gregorio, Emrich, Graham, Marshall, & Nemoto, 1985; Nomura, Marchand, Kolonel, & Hankin, 1991; Holm et al., 1993; Rohan, Hiller, & McMichael, 1993; Jain, Miller, & To, 1994; Zhang, Folsom, Sellers, Kushi, & Potter, 1995; Saxe, Rock, Wicha, & Schottenfeld, 1999). Additionally, a number of studies have reported that increased fruit and vegetable intake has a protective effect against cancer progression and recurrence, and the development of co-morbid conditions. In studies that examined the relationship between fruit and vegetable intake and survival outcome post-diagnosis, some have reported a significant inverse relationship with death (Jain et al., 1994; Rohan et al., 1993; Kyogoku et al., 1992).

While there is no consensus on the relationship between nutritional factors and disease outcome in cancer survivors, there are a significant number of studies that indicate a protective effect of good nutrition. This may take the form of living longer, better chances of preventing recurrences or secondary cancers, and the prevention of other co-morbid conditions, such as cardiovascular disease, obesity, and hypertension (Pinto, Eakin, & Maruyama, 2000). Thus, dietary behavior modifications after a cancer diagnosis may, at the very least, improve the health-related quality of life of the survivor.

Dietary Change Interventions among Cancer Survivors

There are currently two large multicenter studies designed to examine whether diet modification can influence the risk of recurrence and survival of breast cancer patients. The Women's Intervention Nutrition Study (WINS) focuses on reducing dietary fat intake while the Women's Healthy Eating and Living (WHEL) study is a diet intervention to increase fruit and vegetable intake. In a study conducted on breast cancer patients, Nordevang, Callmer, Marmur, and Holm (1992) found that dietary counseling can be an effective method of bringing about changes in fat intake. Kristal, Shattuck, Bowen, Sponzo, and Nixon (1997) tested the feasibility of using volunteer research staff to deliver and evaluate a low-fat dietary intervention in breast cancer patients. Their results were similar to other studies that used professional staff, and while their goal of 15 percent of total energy from fat was not achieved, the mean fat intake of participants was consistently under 20 percent of total energy. The WHEL study conducted a telephone counseling intervention (Pierce et al., 2004) to increase fruit and vegetable intake and to reduce fat intake. Findings from this study showed significant increases in fiber, fruit and vegetables, and a reduction in fat. The WINS study (Winters et al., 2004) looked at dietary patterns among breast cancer patients who had successfully reduced fat intake to see whether there were differences in nutrient intake and found no significant differences between those who were compliant with less than 20 percent energy from fat and those who were not.

Among studies that have examined dietary behavior in cancer survivors, most focus on interventions to achieve better dietary and health outcomes. Few studies have examined the psychological correlates of diet behavior in the creation of interventions. In

particular, only a few studies have looked at the relationship between psychological distress and diet in cancer survivors (Tangney, Young, Murtaugh, Cobleigh, & Oleske, 2002; Maunsell, Drolet, Brisson, Robert, & Deschenes, 2002). Winters et al. (2004) suggest that even though women are clearly able to reduce fat intake, other factors remain to be investigated in order to understand why some are able to make greater changes than others. One such question that can be asked is whether cancer-related distress has a role in dietary behavior of cancer survivors and what the nature of that role might be.

Predictors of Dietary Behavior Change in Cancer Survivors

Among the predictors of dietary behavior change that has been studied, being younger (Maunsell et al., 2002; Thomson et al., 2002; Salminen et al., 2004), having positive nodes, currently receiving adjuvant therapy and being more distressed initially were predictive of dietary change (Maunsell et al., 2002). Longer time since diagnosis (Thomson et al., 2002; Salminen et al., 2004) was associated with positive dietary change. Being White was associated with healthful diets (Demark-Wahnefried et al., 2000). Salminen et al. reported that higher education was associated with dietary change, whereas Thomson et al. found that higher education was not associated with change. In a study conducted by Pinto et al. (2002), being married and not low-income was predictive of change. As in many other studies on health behavior change, low self-efficacy was not predictive of change or adopting healthful diets (Pinto et al., 2002; Demark-Wahnefried et al., 2000). In a study conducted by Reardon and Aydin (1993), a positive reappraisal coping strategy was found to influence changes in stress levels, diet, exercise and mental outlook. Salminen et al. (2002) examined beliefs and attitudes regarding dietary behavior and found that desire for cure was the main reason why cancer survivors changed their

diets. Additionally, Maskarinec, Murphy, Shumay, and Kakai (2001) reported that the reasons for change of diet in a sample of cancer survivors were to increase well-being, maintain health, prevent recurrence, avoid causes of cancer, eat cancer-preventive foods, take control and follow advice.

Disparity in Cancer Outcomes among Low-Income Groups

It is well documented in the literature that people of low socioeconomic status, in particular, African-Americans, suffer great disparities in cancer outcome. According to the Program on Breast Cancer and Environmental Risk Factors in New York State ([BCERF], 2003), women from lower socioeconomic groups have lower rates of breast cancer occurrence but higher death rates. In particular, African-American women were found to have the greatest risk of death from breast cancer compared to other women, independent of Medicaid status (Bradley et al., 2001). African-Americans were more likely to be diagnosed with breast and colon (diet/exercise-related) cancers at younger ages (Bradley et al., 2001). In some studies (Bradley et al., 2002; Farley & Flannery, 1989; Simon & Severson, 1996), low socioeconomic status was found to be associated with late stage breast cancer diagnosis and death (Farley & Flannery, 1989; Simon & Severson, 1996). In similar studies (Ayanian et al., 1993; Roetzheim et al., 1999; Bradley et al., 2002), people who were uninsured or insured by Medicaid presented with more advanced stage cancer and poorer survival compared to people with private insurance. Late stage diagnoses, access to care, and genetics are among the reasons that have been proposed to explain poorer health outcomes in cancer survivors from low socioeconomic and minority backgrounds.

Health behavior factors such as lower levels of cancer screening have also been suggested as reasons for poor disease outcome in low-income cancer survivors. It is well documented in the literature that low socioeconomic status is associated with lower levels of cancer screening and greater numbers of late stage diagnosis of cancer (Demark-Wahnefried et al.,1998; Wells & Horm, 1992; Farley & Flannery, 1989; Mandelblatt, Andrews, Kerner, Zauber, & Burnett, 1991; Wilkinson et al., 1979; Vernon, Tilley, Neale, & Steinfeldt, 1985). According to Howard, Penchansky, and Brown (1998), compliance issues in cancer screening and late stage diagnosis were key determinants of survival. Ayanian et al. (1993) reported that adherence to screening recommendations and follow-up has been found to be less for non-Caucasian and uninsured patients compared to patients with private insurance. Among the reasons for low levels of cancer screening, Powe (1995) suggested that fatalism is a barrier to Fecal Occult Blood Testing (FOBT) for colorectal cancer among elderly African-Americans. Cultural beliefs were also reported by Lannin et al. (1998) to be significant predictors of late stage diagnosis in breast cancer. Low levels of education and living in areas with high numbers of Hispanics were reported by Wells and Horm (1998) to be predictors of low levels of breast and cervical cancer screening.

The reasons for the disparity in cancer outcomes remain a complicated web of demographic, socioeconomic, late-stage cancer diagnosis, biological and belief factors, compliance issues, knowledge and behavioral factors. However, in recent years, more attention is being given to health behavior factors as possible determinants of poor cancer survival outcome in people of low socioeconomic status. According to Howard et al. (1998), health behaviors such as smoking and poor diet could explain the differences in

survival in low-income groups. Newman et al. (2002) also suggests that one area of research to be explored in order to better understand poor breast cancer survival outcome among low-income cancer survivors would be investigations of body mass index/obesity, nutritional factors, and lifestyle behaviors. These authors suggest that socioeconomic status is likely to be correlated with environmental exposures, dietary practices and lifestyle behaviors that can influence cancer incidence and mortality.

While little research has been conducted to examine racial differences in dietary habits among low-income cancer survivors, the general population can be used as a guide to explore such differences. In a study conducted on dietary habits and breast cancer risk (Forshee et al., 2003), African-American women were found to have higher Body Mass Index, poorer quality diets and lower levels of physical activity compared to White women. African-American women consumed more total fat and cholesterol, but less dietary fiber, fewer grains, fruits and vegetables when compared to white women. In another study of low-income women, the mean intake of fat was significantly higher for Blacks than Whites even though both groups were above the recommended daily allowance (Cox et al., 1995). Hargreaves, Baquet, and Gamshadzahi (1989), in contrast, reported lower fat intakes for Black women than for White women. In a study conducted among rural African Americans (McClelland et al., 1998), 77 percent of the participants reported eating less than five daily servings of fruits and vegetables. Similarly, in a low-income, multi-ethnic sample, Emmons et al. (2003) reported that 86% of the participants were eating fewer than 5 servings of fruits and vegetables per day while 50% were eating more than the recommended amounts of red meat and 40% did not meet recommended physical activity levels. Other racial differences in diet were reported in a study by

Thompson et al. (2002), in which Hispanics were found to have a significantly higher intake of fruits and vegetables, but also a higher mean fat score when compared to non-Hispanic whites. In contrast, Winkleby, Albright, Howard-Pitney, Lin, and Fortmann (1994) found that White adults consumed significantly more fat and less dietary carbohydrate and fiber than Hispanic adults.

Not only is cancer mortality higher in low-income groups, the literature also suggests that poor health behaviors, such as diet, smoking, and inadequate physical activity are among the risk factors for cancer and negative health outcomes. The study of diet in low-income cancer survivors becomes an important issue since the pre-cancer diets of many of these survivors may be implicated in their illnesses. Additionally, a number of studies have found that poor dietary behavior post-diagnosis can have implications for treatment, potential recurrences or second primary cancers, among other co-morbid conditions. In effect, the present study is important to conduct because effective dietary interventions could potentially help low-income cancer survivors improve their overall health outcome. It is also well-documented that there are racial differences in the diets of low-income groups within the general population. As such, it is important to ascertain whether the same conditions (presence of cancer-related distress) would facilitate or inhibit dietary behavior change among different racial groups in a low-income sample of cancer survivors.

Theoretical Framework

This study will utilize the Common Sense Model (CSM) of Self-Regulation of Health and Illness as a theoretical framework (Leventhal et al., 2001). This theory proposes that individuals are active problem-solvers who try to make sense of health

threats and illnesses and are motivated to eliminate such threats and illness. The premise of the CSM is that there are two parallel levels of processing – a cognitive mechanism for processing information related to controlling danger, and an emotional mechanism for processing information to control the emotional responses elicited by the danger. The CSM is a comprehensive framework that attempts to take into account various internal and external factors that contribute to how the threat is handled.

The process is a dynamic one, in that the two arms of the CSM are constantly interacting with each other depending on shifts in the patients' perceptions. It is an iterative process that relies on the individual's construction of an illness representation, incorporating coping strategies while at the same time processing the emotions associated with the illness. These two levels of processing are interdependent and impact each other. In Leventhal's construction of the CSM, the individual becomes ill (for instance, diagnosed with cancer) and develops a cognitive representation of the illness. This representation is a combination of the person's attitudes, beliefs, former experiences with the illness, expectations, as well as the cultural context, the doctor's input, family input, etc. There are five phases of the representation that embodies how the individual conceptualizes the illness. The *identity* is the label of the illness, in the case of cancer it is the diagnosis and symptoms associated with it. The second phase, the *timeline*, is the expected duration of the illness. *Consequences*, the third phase, refer to such things as the severity of pain associated with the illness and its impact on life functions. In the case of a cancer diagnosis, consequences also represent the adverse effects of treatment, such as nausea from chemotherapy, surgery, loss of employment, distress, etc. The fourth phase is the *cause* of the illness; for instance, it may be an infection, genetic, or a

history of smoking. A patient diagnosed with colorectal cancer may come to the realization that years of poor dietary habits have contributed to his illness. *Controllability*, the fifth phase, represents whether the disease is perceived as controllable. According to the CSM, these five phases make up the individual's conceptualization of the illness and forms a representation of danger or health threat. The illness representation guides the development of an action plan that calls upon the individual's coping strategies. This may take the form of seeking treatment for a cancer diagnosis and finding other ways to eliminate or reduce further health threats. For instance, cancer patients may initiate health behavior change such as quitting smoking, altering diets, or engaging in regular physical activities as ways of trying to eliminate the danger, promoting health, and reducing chances of recurrence.

In an ideal world, a cognitive coping mechanism would be activated and cancer patients would engage in the treatment and behavior change necessary for continued survival and well-being. However, emotion is a critically important feature in how human beings process and respond to health threats. One of the defining and important features of the CSM, which is different from other health behavior models, is its integration of emotion as a critical component of individuals' response to health threats. The emotional mechanism of the CSM is integral to the development of an action plan or lack thereof. Detection of a lump in the breast may elicit a strong emotional reaction as the individual begins to think of the possibility of having cancer. As the individual integrates previous knowledge and experiences into the formulation of an illness representation, such as family history of cancer or the knowledge that a lump in the breast could be benign or malignant, this person will probably start seeking information about

the possible health threat. One way of dealing with the health threat would be to seek medical attention to ascertain the identity of the problem. The knowledge that one has cancer may be so overwhelming that the individual's reaction to such a health threat may be one of denial or avoidance, delaying the ultimate confirmation of a diagnosis. The above example of the emotional processing of a health threat which then feeds back into the cognitive representation of cancer is one way in which cognitive and emotional processes interact leading to varied outcomes.

The interplay between cognitive and emotional components of the CSM leads to the development of action plans on both the cognitive and emotional levels. Lack of an action plan in dealing with the threat of cancer may lead to increased distress. On the other hand, high levels of cancer-related distress may lead to an inability to formulate an action plan. The emotional challenge presented to the cancer survivor is enormous. It is the premise of the CSM that individuals are active problem-solvers who will develop action plans to eliminate the health threat and the negative emotions associated with it. However, it may be that some are unable to create an action plan because distress is too high. Theory holds that the cognitive and emotional arms of the CSM work hand in hand to create an action plan to eliminate the health threat and distress associated with it. However, it is not likely that all survivors will be able to develop such an action plan if distress is very high. As a result, this study will examine the relationship between cancer-related distress and diet for evidence of either a facilitating relationship or inhibiting relationship.

In this study, I will use the CSM as a guiding framework for understanding the dynamic interplay between cancer-related cognitions and emotions. More specifically,

how does cancer-related distress impact individual representations of cancer and the development of action plans that promote continued survival and health and reduce chances of cancer recurrence? Based on the CSM, cancer survivors who are not already engaging in healthy behaviors will initiate health promoting behaviors, such as regular screening, possibly reduce/quit smoking and alcohol intake, and engage in dietary and exercise behavior change. Using the CSM, I will seek to understand the role of emotional processes in facilitating or inhibiting dietary behavior change. Does everyone seek to eliminate distress by engaging in the appropriate health behavior? Or, are there different responses by different groups of people, with cancer-related distress leading to action plans for some, while for others, leading to avoidance of anything having to do with the illness? Or is a moderate level of anxiety optimal for facilitating behavior change?

Role of Cancer-Related Distress in Health Behavior Change

Among the terms that have been used to describe cancer-related distress in the literature are cancer worry, cancer anxiety, fear of cancer, cancer-related distress and cancer-specific distress. In this paper, I will use the term cancer-related distress to refer to all of these ways of describing distress specifically related to cancer.

Cancer-Related Distress and Dietary Change in Cancer Survivors

Much of the research has focused on the role of cancer-related distress in cancer prevention and early detection behaviors, particularly in the area of breast cancer. Few studies have been conducted on cancer-related distress and diet behavior in cancer survivors (e.g., Maunsell et al., 2002). These authors reported that among the predictors of dietary change in breast cancer survivors, women reporting change were more likely to

be younger, have positive nodes, currently receiving adjuvant therapy, and to be more distressed initially. In another study with colorectal cancer survivors, Mullens, McCaul, Erickson, and Sandgren (2004) examined whether the experience of cancer motivates healthy behavior change. They found that greater perceived risk, worry and anxiety correlated positively with intentions to make positive health behavior changes (diet, exercise, weight loss, smoking habits, and using complementary therapies). Additionally, the number of positive changes already made by these survivors correlated significantly with greater intrusive thoughts. In both of these studies, cancer-related distress was positively associated with dietary behavior change.

Cancer-Related Distress and Smoking Behavior in Cancer Survivors

In recent years, the relationship between cancer-related distress and smoking behavior has also been explored. In one such study among head and neck cancer survivors, fear of recurrent disease was among the most frequently chosen response contributing to success in smoking cessation (Spitz, Fueger, Chamberlain, Goepfert, & Newell, 1990). Smoking behavior has also been examined in high-risk groups and the general population. In a study conducted among relatives of people recently diagnosed with lung cancer, those who were above the mean on at least one of the distress indicators (i.e., intrusive or avoidant thinking, depression or worry) were significantly more likely to report that their loved one's lung cancer diagnosis increased their intentions to quit smoking than those who had no indicator of distress (McBride et al., 2003). In another study that examined interest in receiving biomarker testing for tobacco-related cancer susceptibility among smokers seeking routine oral health care, Ostroff et al. (1999) found

that participants who were interested in testing were more worried about developing cancer.

The study of the role of cancer-related distress in health behavior change (such as diet, exercise, and smoking cessation) among cancer survivors is a relatively new area of research. The few studies that have been conducted in this area seem to suggest that cancer-related distress is positively associated with health behavior change. More research is necessary, however, to ascertain or refute such a relationship. In another area of health behavior research, there is currently an ongoing discussion about the role of cancer-related distress in cancer screening/early detection behaviors. Although this is a very different type of health behavior than the focus of the current study, much more work has been done in this area. As a result, I will use the findings of this literature as a background for my study since it is the closest approximation to understanding the relationship between cancer-related distress and diet behavior.

Cancer-Related Distress and Cancer Prevention/Early Detection Behaviors

The relationship between cancer-related distress and cancer screening behavior remains controversial (McCaul, Reid, Rathge, & Martinson, 1996). While many believe that greater worry facilitates self-protective actions (e.g., Leventhal, 1970), others have found an inhibiting relationship between cancer-related distress and cancer screening behavior. A few studies have reported no relationship between cancer-related distress and cancer screening behavior (Lindberg & Wellisch, 2001; Schwartz et al., 1999). Other researchers have hypothesized that that if worry is too high people will avoid self-protective behaviors (e.g., Janis & Feshbach, 1953). This phenomenon has been commonly referred to as the "curvilinear hypothesis." This model suggests that a

moderate level of arousal or fear is optimal for motivating preventative health behaviors while a small amount of fear may promote denial of risk and too much arousal may lead to avoidance.

Among the general population, a number of studies have reported facilitating relationships between cancer-related distress and cancer screening behavior. In a review paper by McCaul, Branstetter, Schroeder, and Glasgow (1996), six studies found that greater worry was related to higher levels of breast cancer screening. In a study conducted among randomly selected women in North Dakota, McCaul, Schroeder, and Reid (1996) and McCaul, Reid, et al. (1996), reported that greater concern about breast cancer was linearly related to a higher likelihood that women performed breast self exam, had a mammography screening, and had a clinical breast examination. These findings also suggest that women who reported the lowest levels of worry were the least likely to engage in self-protective behavior. Gram & Slenker (1992) reported findings suggesting that breast cancer anxiety may motivate attendance to mammography screening among a random sample of women. In another study conducted among a sample of women from the general population (Wilcox, Ainsworth, LaMonte, & DuBose, 2002), worry regarding cancer was significantly associated with self-reported monthly breast self-examinations, but not with a pap smear or stool blood test. Within a multi-ethnic sample, cancer worry was positively associated with mammography and clinical breast examination frequency (Consedine, Magai, & Neuget, 2004). In a sample of low-income African-American women that examined knowledge, attitudes, beliefs and practices related to flexible sigmoidoscopy screening, women in the pre-contemplation stage reported significantly less worry and had lower perceptions of risk for colorectal cancer than women in the

action/maintenance stage, suggesting that those who were taking action/maintenance were more worried (Brenes & Paskett, 2000).

In research conducted on women with a family history of cancer, some studies report findings suggesting a positive relationship between cancer-related distress and cancer screening behavior. McCaul, Branstetter, O'Donnell, Jacobson, & Quinlan (1998) reported that thinking and worrying about breast cancer was positively related to frequency of screening behaviors. In a study that sought to understand factors associated with interest in genetic counseling and intentions to obtain colorectal cancer susceptibility testing, cancer worry was found to be positively associated with testing intentions. Similarly, in a study (Lerman et al., 2000) that examined prophylactic surgery and surveillance behavior in women during the year following BRCA1/2 gene testing, cancer-related distress had a positive, although non-significant association with adherence. Similar findings were also reported by Bowen et al. (2003) in which, cancer worry significantly and positively predicted genetic testing interest and regular screening. In another study (Andersen et al., 2002) among women with high-risk family histories, women with moderate or severe levels of worry were more likely to report use of testing than those reporting either little or no worry about their risk. Among women with a family history of breast cancer, Diefenbach, Miller, and Daly (1999) reported that cancer worry was a significant predictor of mammography adherence. Similarly, elevated worry about prostate cancer and concerns about treatment-related side effects were associated with greater interest in genetic testing among participants with a family history of prostate cancer (Diefenbach, Schnoll, Miller, & Brower, 2000). Stefanek and Wilcox (1991) also reported a positive relationship between breast cancer worry and

mammography use and breast self examination competence. Brain, Norman, Gray, and Mansel (1999) reported finding a positive linear relationship between breast cancer worry and breast self examination in women with a family history of breast cancer.

Though many studies have found a facilitating relationship between cancer-related distress and cancer screening behavior, some studies have found inhibiting relationships. Kash, Holland, Halper, and Miller (1992) conducted a study among women at high risk for breast cancer and found that higher anxiety was directly related to poor attendance at a clinical breast examination and poor adherence to monthly breast self-examination. In another study by Lerman et al. (1993) that looked at mammography adherence among women with a family history of breast cancer, intrusive thoughts about cancer and breast cancer worries that interfered with daily functioning were negatively associated with adherence to mammography. In another study of women with a family history of breast cancer (Lerman, Kash, & Stefanek, 1994), psychological distress was associated with non-adherence to mammography and with both infrequent and excessive breast self-examination. Anxiety reduced the likelihood of repeat mammography screening (Lerman, Rimer, Trock, Balshem, & Engstrom, 1990) in a high-risk sample of women over 50. Schwartz, Taylor, and Willard (2003) found that moderate breast cancer worries were inversely associated with mammography adherence in a sample of women with a family history of breast cancer.

An inhibiting relationship between cancer-related distress and cancer screening behavior has also been reported among population-based samples. In a study conducted among asymptomatic women (Friedman et al., 1995), Caucasians and Hispanics were more likely than African-American women to report having had a clinical breast exam in

the past year and African-Americans were more likely to report cancer-related fears and worries as barriers to mammography. In a sample of low-income Mexican-American participants, cervical cancer screening was inversely associated with anxiety about cancer (Lobell, Bay, Rhoads, & Keske, 1998). Additionally, Miller and Hailey (1994) reported that African-American women who had not had a mammogram had higher levels of cancer anxiety compared to those who had at least one mammogram.

Though more studies than not, report a facilitating relationship between cancer-related distress and cancer screening behavior, some report an inhibiting relationship. This lack of consensus in the field has led some researchers to speculate that the relationship between cancer-related distress and cancer screening behaviors is actually curvilinear. In such a relationship, it is argued that some optimal level of cancer-related distress may facilitate screening behavior while too much distress may overwhelm the coping mechanisms of the individual.

The curvilinear hypothesis has been supported by a few studies. In a study that examined the association between cancer worry and mammography use in a population-based sample, Andersen, Smith, Meischke, Bowen, & Urban (2003) found that annual mammography use was highest among women who reported moderate levels of worry. Lerman, Trock, and Rimer (1991) reported similar findings among women with elevated levels of mammography-related anxiety and breast cancer worries in regards to their practice of breast self examinations. Specifically, women with moderate levels of impairment in mood or functioning were more likely to practice monthly breast self-examinations than women with either high or low levels of impairment. Additionally, in a population-based sample, Drescher, Holt, Andersen, Anderson, and Urban (2000) found

that mild worry or thoughts about ovarian cancer were more frequent among those screened. Similar results were found in a prospective study by Sutton, Bickler, Sancho-Aldridge, and Saidi (1994) which suggest that women from a population-based sample who reported a moderate amount of worry about breast cancer were more likely to attend breast cancer screening than those at the two extremes. Diefenbach et al. (1999) found that moderate levels of cancer worry facilitate rather than undermine adherence to mammography while Stefanek and Wilcox (1991) reported findings of a moderate but statistically significant relationship between breast cancer worry and mammography/breast self examinations. These authors suggest that these modest correlations may be explained by a curvilinear relationship in that cancer worry may serve a motivational function when mild-moderate, but perhaps becomes disabling as anxiety worsens. Other authors (Lerman et al., 1993; Lerman et al., 1994; Miller & Hailey, 1994) have suggested that a curvilinear relationship may help to explain some of the mixed results found in the cancer prevention literature regarding the role of cancer-related distress and cancer screening behavior.

Another suggestion of the curvilinear hypothesis is one that takes into account, both population-based and high risk samples. Alagna, Morokoff, Bevett, and Reddy (1987) suggest that while low risk women approach breast self-examination with the expectation that they can reassure themselves, non-practice of breast self-examination among high risk women may be an avoidance strategy since a diagnosis of breast cancer may have grave prognostic implications. These authors suggest that a curvilinear relationship may exist between breast self-examination and familial risk such that moderate risk women would exhibit higher rates of breast self-examination practice than

either very low or very high risk women. These ideas are echoed by Brain et al. (1999) in the form of an inverted U-shaped relationship between anxiety and adherence, such that, high levels of cancer-specific concern can be conceptualized as falling on the ascending side of the curve, with high levels of general anxiety falling on the descending side of the curve.

Research Limitations in Cancer-Related Distress and Health Behavior

Research in the area of cancer-related distress and health behavior has resulted in varied findings. There is a great deal of controversy surrounding the ideas of whether cancer-related distress promotes or inhibits health behavior or whether an optimal level of cancer-related distress is necessary to promote behavior change. Among the limitations of this literature is the fact that there are still too few studies examining the relationship between cancer-related distress and health behaviors, particularly in areas such as diet and exercise behaviors. Among the more studied area of cancer prevention behaviors, the literature often does not differentiate between different types of screening behaviors, for instance, breast self examination, clinical breast examination and mammography may be lumped together in the same study, without paying particular attention to the fact that these screening behaviors are inherently different and require different motivations. For instance, people with a family history of breast cancer may have higher levels of cancer-related distress and may practice breast self examination more frequently, but their mammography attendance may not be high since it is a more involved procedure that could potentially evoke more distress.

Another criticism of the literature is that different populations are often lumped together. For example, some studies combine high risk and average risk samples while

other studies treat them separately. This may explain some of the contradictory findings that are reflected in the literature. So, in effect, the relationship between cancer-related distress and various health behaviors may be different depending on the sample. For instance, the relationship between cancer-related distress and health behavior in an average risk sample may be linear. This idea is based on the premise that this group would be motivated to eliminate their distress through the initiation of health behavior change. Alternatively, the relationship between cancer-related distress and health behavior in a sample comprised of both high risk and average risk participants may be reflected by an inverted U-shaped curve. This idea is based on the premise that people of average risk may be motivated by distress to engage in healthy behavior, while high risk groups may engage in similar behavior when distress is moderate, but may be overwhelmed and less likely to engage in health promoting behaviors when distress is too high. These different findings in the literature may partly be attributed to the lumping together of high risk and average risk samples.

Additionally, much work remains to be done in order to better understand racial/ethnic differences in the relationship between cancer-related distress and health behaviors. Few studies have examined such differences with varying results. There may even be within group differences in low-income samples. For instance, there may be cultural differences between Black immigrants from the Caribbean and African-Americans that may moderate the effect of the cancer-related distress/health behavior relationship.

Lastly, some criticism has been generated regarding the different instruments used to measure cancer-related distress, which may contribute to contradictory findings in the

literature. Schwartz et al. (2003) points out that a number of methodological issues may be contributing to the inconsistencies across these types of studies. Cancer worry, cancer anxiety, cancer-related distress, cancer-specific distress, and anxiety regarding cancer are among the many terms used to describe the construct of distress relating to cancer. As the variety of labels would suggest, different types of measurements are also used to assess cancer-related distress. Consedine, Magai, Krishekova, Ryzewicz, and Neuget (2004) note that studies use a wide range of fear and anxiety methods, divergent in terms of both the precise source of anxiety targeted and in how psychometrically robust the measurements used are. They go on to say that studies targeting "breast cancer worry" do not always identify how many items from a questionnaire are used in a worry subscale and sometimes equate negative cancer attitudes with anxiety. Other studies use a single item to measure breast cancer worry, which are notoriously unreliable. Other methodological issues such as different ways of defining distress have also been raised. For instance, Lerman and Schwartz (1993) suggest that studies finding a negative linear association between anxiety and screening adherence have used measures of general anxiety and distress, whereas studies finding a positive linear relationship between anxiety and adherence have used measures of anxiety that are specific to breast cancer. Schwartz et al. (2003) also point out that "fear" measurements seem to elicit ratings that may be dysfunctional, turning women to repressive regulatory styles or avoidance, while "worry" may access a lower, more manageable range of affect, with lower levels indicating either apathy or avoidance and greater levels of "worry" indicating a level of anxiety conducive to appropriate vigilance and self-care.

Application to Dietary Behaviors

Very little work has been done in the area of cancer-related distress and diet behavior change in cancer survivors. In one study that looked at cancer-related distress and health behavior change, Mullens et al. (2004) reported that cancer worry and anxiety among colorectal cancer survivors correlated positively with intentions to make positive health behavior changes and that changes already made correlated significantly with intrusive thoughts. These findings are consistent with many studies in the cancer screening literature that suggest a facilitating effect between cancer-related distress and cancer screening behavior. It is also consistent with the CSM that people are motivated to eliminate health threats and distress by changing the problem behavior. However, as discussed earlier, the existing literature on cancer-related distress and cancer screening behavior is fraught with many problems, at times contradictory in its mixed findings. As such, it seems important to explore whether similar relationships to those described above also exist between cancer-related distress and diet among low-income cancer survivors. The existence of such relationships would be important to contemplate in the creation of dietary interventions. For instance, if varied levels of cancer-related distress impact dietary behavior differently, that would need to be taken into account in creating an intervention. If, for example, a curvilinear effect exists, it would be important to treat the anxiety of those with high distress first before attempting a plan for diet change.

The CSM suggest that people are motivated to actively engage in health behavior change as a way of addressing and eliminating the health threat. Yet, we know that many become too emotionally overwhelmed to engage in such active coping strategies. For these survivors, cancer-related distress can lead to avoidance of active coping strategies

as a way of dealing with the emotional reaction to cancer diagnosis and treatment. The current study aims to explore the relationship between cancer-related distress and diet behavior to ascertain whether cancer-related distress can have a facilitating or inhibiting effect on diet behavior. I will also seek to ascertain whether a curvilinear effect exists between cancer-related distress and diet behavior that may help to explain the divergent findings of previous studies.

Clinical Implications

Few studies have sought to understand the psychological correlates of diet behavior in cancer survivors. In fact, existing research has mostly focused on dietary change interventions without considering the psychological barriers/facilitators to change. The current study is based on the premise that psychological factors are critical in facilitating change. In particular and based on previous research, the construct of cancer-related distress was explored in the current study in an attempt to better understand whether cancer-related distress has a role in dietary behavior and the nature of such a role. Previous studies have found a facilitating effect, while others have supported the theory that a certain optimal level of distress will facilitate health behavior change. While the current study is cross-sectional, and no direct conclusions can be made about diet change per se, this study will examine the relationship between cancer-related distress and diet behavior in order to make inferences about the potential effect of cancer-related distress on diet.

The clinical implications of this study are that a better understanding of the role of cancer-related distress in diet behavior can be utilized in the creation of interventions seeking to effect diet change in cancer patients. If for instance, it is found that cancer-

related distress is positively correlated with diet behavior, clinicians may want to utilize the distress to motivate diet behavior change as a way of achieving two goals: better diets and reducing distress. This type of intervention may be more fruitful than one that attempts to eliminate distress only. In a similar way, if it is found that a certain optimal level of cancer-related distress is positively correlated with diet behavior, clinicians can utilize this knowledge in working with patients to reduce high levels of distress as a way of creating a psychological state in cancer patients that would better lend itself to diet change. Alternatively, if levels of distress were too low, clinicians may work more effectively on assessing the patient's desire to make a diet change, consequently utilizing the information on distress to help the patient bring this goal into awareness as a first step in creating change.

Understanding the role of cancer-related distress in diet behavior can potentially lead to the creation of more effective interventions. In particular, it gives clinicians more information of how best to work with cancer survivors' psychological resources to achieve less distress and better dietary outcomes overall.

Proposed Analyses

In the health behavior literature I have cited, three types of relationships have been described between cancer-related distress and health behaviors: facilitating, inhibiting, and curvilinear relationships. In the current study, I will first describe the prevalence of cancer-related distress and adherence to two dietary recommendations (avoiding high fat foods and eating five or more fruits/vegetables daily) among low-income cancer survivors. Next, I will explore whether there is a relationship between

cancer-related distress and diet behavior. Finally, the nature of this relationship will be explored.

Specific Aims

Aim 1: To describe the level of cancer-related distress in low-income cancer survivors.

a) Overall levels of cancer-related distress will be described.
b) Cancer-related intrusive and avoidant thoughts will be described.
c) The sample will then be stratified by race to examine subgroup differences in cancer-related distress.
d) The sample will also be stratified by education to examine subgroup differences in cancer-related distress.

Aim 2: To describe adherence to the American Cancer Society's dietary recommendations among low-income cancer survivors.

a) Adherence to dietary recommendations (avoiding high fat foods and eating five or more fruits/vegetables daily) will be described among low-income cancer survivors.
b) The sample will then be stratified by race to explore racial differences in adherence to dietary recommendations.
c) The sample will also be stratified by education to explore educational differences in adherence to dietary recommendations.

Aim 3: To explore the relationship between cancer-related distress and adherence to dietary recommendations among low-income cancer survivors.

a) Explore the relationship between total cancer-related distress (total IES score) and adherence to dietary recommendations (avoiding high fat foods and eating five or

more fruits/vegetables daily). Next, I will explore whether a curvilinear effect exists between total cancer-related distress (total IES score) and adherence to dietary recommendations (avoiding high fat foods and eating five or more fruits/vegetables daily).

b) Explore the relationship between cancer-related avoidant thoughts and adherence to dietary recommendations (avoiding high fat foods and eating five or more fruits/vegetables daily). Next, I will explore whether a curvilinear effect exists between total cancer-related avoidant thoughts (total Avoidance score) and adherence to dietary recommendations (avoiding high fat foods and eating five or more fruits/vegetables daily).

c) Explore the relationship between cancer-related intrusive thoughts and adherence to dietary recommendations (avoiding high fat foods and eating five or more fruits/vegetables daily). Next, I will explore whether a curvilinear effect exists between total cancer-related intrusive thoughts (total Intrusion score) and adherence to dietary recommendations (avoiding high fat foods and eating five or more fruits/vegetables daily).

CHAPTER III

Method

Participants were sampled from a larger study investigating the impact of a cancer diagnosis on an ethnically diverse, low socioeconomic sample of Medicaid cancer survivors at a large metropolitan cancer center in New York City.

Procedure

The Medicaid recipient population was identified through a hospital database at Memorial Sloan-Kettering Cancer Center (MSKCC). Participants had to have been diagnosed with cancer. Eligibility criteria included: (a) being registered at MSKCC between 1994 and 2000, (b) being a Medicaid recipient, (c) being between the ages of 21 and 64 years of age at the time of first MSKCC cancer diagnostic visit, (d) received cancer treatment at MSKCC, (e) reside in the New York Metropolitan area, and (f) speak English or Spanish. Information on patients' health insurance and cancer diagnoses were obtained through the hospital database. In order to examine differences among key patient groups, attempts were made to sample equal proportions of patients by ethnicity. Based on data from 1994 to 1996, the ethnic breakdown of the pool was estimated to include 22% Blacks, 22% Hispanics and 45% Whites. Additionally, the initial pool included high proportions of women. As a result, attempts were made to balance ethnicity by gender groups by oversampling Blacks and Hispanics.

Eligible cancer survivors were initially contacted by a letter from the study investigators explaining the purpose of the study. Potential participants were provided with a telephone number to call if they were not interested in participating in the study. Those who did not call were contacted by telephone, verbal informed consent was

obtained, and a time was set up to administer a structured interview. Questionnaires were administered by telephone, took approximately 45 minutes to complete and participants were paid $20 for completing the questionnaire. This study was conducted between August 1999 and May 2001. The study refusal rate was 30 percent. A total of 300 participants completed questionnaires assessing the variables being used in this study.

Participants

Table 1 lists sample demographics. The average age of the sample was 50.2 years (SD=10.09, range = 30 to 72). The mean number of years since first primary cancer diagnosis was 5.06 (SD=4.95, range = .25 to 36.31). This variable is positively skewed with 75 percent of the sample having been diagnosed within 6.2 years. The sample was largely female (77%, n=232). Racial breakdown of the sample was as follows: Whites accounted for 42% (n=125) of the sample, Blacks 36% (n=107), and Hispanics 22% (n=68). Over half the sample had a high school education (56%, n=167), a third (34%, n=101) had an education that was greater than high school, and 10% (n=32) had a grade school education or less. The sample was comprised of varied cancer diagnoses, however the most common was Breast Cancer (43%, n=129) followed by Lymphoma (12%, n=36) and gynecological cancers (11%, n=33). The vast majority of the sample was not currently employed (81%, n=243) and 48% (n=143) had household incomes of less than $20,000. Finally, only 23% (n=69) of the sample was married.

Table 1

Sample Demographics by Race

Variable	Black N=107	White N=125	Hispanic N=68	Total N=300 (% of total)
Age (SD)	49.77 (10.25)	51.05 (10.57)	49.32 (8.87)	50.20 (10.09)
Time since Diagnosis	4.90 (5.45)	5.34 (5.08)	4.81 (3.80)	5.06 (4.95)
Gender				
Female	87 (81%)	87 (70%)	58 (85%)	232 (77%)
Male	20 (19%)	38 (30%)	10 (15%)	68 (23%)
Education				
Grade School	8 (7%)	5 (4%)	19 (28%)	32 (10%)
High School	67 (63%)	62 (50%)	38 (56%)	167 (56%)
Above High School	32 (30%)	58 (46%)	11 (16%)	101 (34%)
Current Employment				
Employed	20 (19%)	26 (21%)	10 (15%)	56 (19%)
Not employed	87 (81%)	98 (79%)	58 (85%)	243 (81%)
Household Income				
< $10,000	32 (29%)	38 (31%)	20 (30%)	90 (30%)
$10,000-$20,000	20 (18%)	18 (15%)	15 (22%)	53 (18%)
$20,000-$29,000	12 (11%)	7 (5%)	4 (5%)	23 (7%)
$30,000 or Greater	14 (13%)	28 (23%)	9 (13%)	51 (17%)
Missing	31 (29%)	32 (26%)	20 (30%)	83 (28%)

Table 1 (continued). Sample Demographics by Race

Variable	Black N=107	White N=125	Hispanic N=68	Total N=300 (% of total)
Diagnosis				
Breast	52 (49%)	46 (37%)	31 (46%)	129 (43%)
Lymphoma	9 (8%)	16 (13%)	11 (16%)	36 (12%)
Gynecological	11 (10%)	14 (11%)	8 (12%)	33 (11%)
Other	9 (8%)	15 (12%)	5 (7%)	29 (10%)
Colorectal	7 (7%)	11 (9%)	5 (8%)	23 (8%)
Head & Neck	7 (6%)	9 (7%)	3 (4%)	19 (6%)
Hematologic	4 (4%)	7 (6%)	2 (3%)	13 (4%)
Lung	8 (8%)	2 (1%)	0 (0%)	10 (3%)
Genitourinary	0 (0%)	5 (4%)	3 (4%)	8 (3%)
Marital Status				
Never Married	31 (29%)	26 (21%)	12 (18%)	69 (23%)
Married	16 (15%)	33 (26%)	20 (29%)	69 (23%)
Separated	13 (12%)	12 (10%)	13 (19%)	38 (13%)
Divorced	22 (21%)	37 (30%)	14 (21%)	73 (25%)
Widowed	14 (13%)	12 (10%)	5 (7%)	31 (10%)
Other	10 (10%)	5 (3%)	4 (6%)	19 (6%)

Measures

Demographic Information

This questionnaire was created for the purposes of this study and is a self-report measure. Demographic variables include: gender, age, race, level of education, employment status, occupation, income, marital status, number of children, housing situation, and number of years living in neighborhood.

Medical Information

Cancer diagnostic information was collected from the patients' medical records. Information collected included type of cancer diagnosis, date of first cancer diagnosis, time since diagnosis and types of cancer treatment received.

Impact of Events Scale (See Appendix A)

The Impact of Events Scale (IES) was developed by Horowitz, Wilner, and Alvarez (1979) to measure subjective distress related to a specific event. It was initially created for the study of bereaved individuals, but has since been used to explore the psychological impact of a variety of traumas, including exposure to earthquake, combat exposure, threat of violence, death of a loved one, psychiatric illness, accidents and medical illnesses, such as cancer. The IES is a 15-item Likert-style measure that consists of two subscales: The seven-item intrusion subscale measures the frequency and severity of intrusive thoughts, worries, and feelings about a stressful event while the eight-item avoidance subscale measures the frequency and severity of avoidant ideation about the stressful event. Examples of intrusion items are as follows: "I thought about it when I didn't mean to," and "Pictures about it popped into my mind," while examples of

avoidance items are: "I avoided letting myself get upset when I thought about it or was reminded of it," and "I stayed away from reminders of it."

Each item had the following response choices: not at all, rarely, sometimes or often and received a score of 0, 1, 3 or 5, respectively, with higher scores reflecting higher degree of severity. The scores were then summed for each subscale, with the intrusion subscale ranging from 0 to 35, and the avoidance subscale ranging from 0 to 40. The sum of the two subscales is the total stress score.

Both the intrusion and avoidance subscales have been found to be internally consistent across a broad range of studies. Alphas have been reported for the IES Intrusion subscale ranging from 0.72 to 0.92, and for the IES Avoidance subscale ranging from 0.65 to 0.90 (Sundin & Horowitz, 2002). In the current study, both the Intrusion and the Avoidance subscales were found to be internally consistent: for the Intrusion subscale, Cronbach's $\alpha = 0.86$; and for the Avoidance subscale, Cronbach's $\alpha = 0.80$ (See Table 2).

Diet Behavior Survey (See Appendix B)

The Diet Behavior Survey was adapted from a similar instrument (Greene, Rossi, Reed, Willey, & Prochaska, 1994) that assess adherence to dietary recommendations advanced by American Cancer Society and the U.S. Department of Health and Human Services, which are to reduce dietary fat to less than 30% of total energy intake and increase fruit and vegetable consumption (Greene et al., 1994). Dietary adherence was assessed by administering a series of 10 dichotomous questions pertaining to the current diet habits of participants. Response choices were "yes" or "no" and questions assessed adherence to a low fat diet and consisting of 5 or more fruits and vegetables daily.

Examples of diet questions are as follows: "Do you avoid eating foods from restaurants, fast-food places, or take-out food two or more times per week?" "Do you usually eat fewer than two servings of red meat per week?" "Do you usually eat 5 or more servings of fruits/vegetables per day? and "Do you sometimes eat fruit and vegetables as snacks?" The Diet Survey was scored by tabulating the number of "yes" responses, which is indicative of the number of items to which participants were adherent.

The Diet Survey in this study was found to have a Cronbach's alpha of 0.66 (See Table 2). Deletion of individual items of the diet survey resulted in no significant change in internal consistency.

Table 2

Reliability

	Cronbach's alpha (α)			
Scale -Subscale	Blacks	Whites	Hispanics	Total sample
Full IES Scale	.90	.88	.88	.89
IES Intrusion Subscale	.87	.85	.86	.86
IES Avoidance Subscale	.81	.78	.79	.80
Diet Scale	.65	.71	.62	.66

CHAPTER IV

Results

Preliminary Analyses

Preliminary analyses were conducted to assess for any differences in mean patient or personal demographics as a function of race. Results of chi-square analyses indicated significant racial differences in level of education, χ^2 (4, 300) = 39.66, p<.001. Follow-up chi-square analyses indicated that Hispanics were more likely to have an education level of "grade school or less," while Whites were more likely to have an education of "greater than high school."

There were no significant racial differences in time since diagnosis, diagnosis type, employment status, marital status or household income (all p-values > .05). Additionally, no significant educational differences were found in time since diagnosis, diagnosis type, employment status, marital status or household income. These findings are not unexpected given that this is a low-income sample and income and education are highly correlated.

Descriptive Statistics for Main Study Variables

Aim 1

Overall levels of cancer-related distress (IES total), and cancer-related intrusive (IES Intrusion) and avoidant thoughts (IES Avoidance) are described in Table 3. The average IES total score reported by this sample was 26.72 (SD = 18.24). The mean IES Intrusion score for this sample was 11.73 (SD = 9.83) and the mean IES Avoidance score was 14.99 (SD = 10.33).

Analyses (ANOVAs) were conducted to assess for racial differences in total IES scores, IES Intrusion and IES Avoidance scores. Education was added as a covariate in each of these analyses. Findings indicate no significant racial difference in IES total scores [F(3, 296) = .85, p=.47] or IES Intrusion scores [F(3, 296) = .11, p=.95]. However, Hispanics were found to have a significantly higher mean IES Avoidance score when compared to Whites, [F(3, 296) = 3.74, p<.05]. See Table 3.

Table 3

Means and Standard Deviations for IES Total, IES Subscale and Diet Scores by Race

	Blacks	Whites	Hispanics	Total (SD)	Range
IES Total	26.54_{a}	25.28_{a}	29.64_{a}	26.72 (18.24)	0-75
- IES Avoidance	14.68_{ab}	13.39_{a}	18.41_{b}	14.99 (10.33)	0-40
- IES Intrusion	11.86_{a}	11.89_{a}	11.23_{a}	11.73 (9.83)	0-35
Diet Score	6.27_{a}	5.97_{a}	6.19_{a}	6.13 (2.28)	0-10

Note: Means with varying subscripts differ by p < .05 or greater.

Analyses (ANOVAs) were also conducted to assess for educational differences in total IES scores, IES Intrusion and IES Avoidance scores. Race was added as a covariate in each of these analyses. No significant educational differences were found in total IES scores [F(3, 296) = .51, p=.68], IES Intrusion scores [F(3, 296) = .29, p=.83] or IES Avoidance scores [F(3, 296) = 1.97, p=.12]. All p-values > .05 (See Table 4).

Table 4

Means and Standard Deviations for IES Total, IES Subscale and Diet Scores by Education

Scale	Grade school or less	High school	Greater than high school	Total (SD)	Range
IES Total	29.80_a	26.35_a	26.35_a	26.72 (18.24)	0-75
- IES Avoidance	17.74_a	15.04_a	14.03_a	14.99 (10.33)	0-40
- IES Intrusion	12.06_a	11.31_a	12.32_a	11.73 (9.83)	0-35
Diet Score	6.44_a	5.98_a	6.29_a	6.13 (2.28)	0-10

With the exception of finding a statistically significant racial difference in IES Avoidance scores, there were no other significant findings in variables of cancer-related distress as a function of either race or education. It should be noted, however, that even though differences do not reach statistical significance, there is a sizeable variability in scores reported for both IES total and subscale scores.

Aim 2

In a diet survey of 10 questions measuring adherence to a low-fat, increased fruit and vegetable diet, the mean diet score was 6.13 (SD = 2.28) indicating that participants, on average, were adherent to 6 out of 10 recommended dietary behaviors. Fifty-three percent of the sample reported eating 5 or more fruits/vegetables daily while 59% reported consistently avoiding high fat foods. Analyses (ANOVA) were conducted to assess for racial differences in diet using education as a covariate. No significant

differences were found [F(3, 284) = .48, p=.69]. See Table 3. Analyses (ANOVA) were also conducted to assess for educational differences in diet using race as a covariate. No significant differences were found [F(3, 284) = .67, p=.57]. See Table 4.

Although there was no significant difference in total diet score as a function of race, there were some racial differences in adherence to individual diet items. Table 5 lists the percentage of participants who were adherent to individual diet items. Chi-square analyses were conducted to ascertain race differences in adherence to individual diet items. Results indicate significant race differences in adherence to the following items: Almost always take the skin off your chicken, χ^2 (2, 289) = 7.4, $p<.05$; Sometimes eat fruit and vegetables as snacks, χ^2 (2, 289) = 10.32, $p<.01$; Usually eat whole grains at least once daily, χ^2 (2, 300) = 7.74, $p<.05$; and Usually eat beans/legumes two or more times per day, χ^2 (2, 300) = 14.99, $p<.001$. Follow-up chi-square analyses indicate that Hispanics were more likely than both Whites and Blacks to endorse "Almost always take the skin off your chicken." Blacks were more likely than Hispanics to endorse "Sometimes eat fruit and vegetables as snacks." Blacks were more likely than both Whites and Hispanics to endorse "Usually eat whole grains at least once/day." Lastly, both Hispanics and Blacks were more likely than Whites to endorse "Usually eat beans/legumes two or more times per day."

Table 5

Percentages of Participant Response to Diet Questions by Race

Item	Blacks (%)	Whites (%)	Hispanics (%)	Total (%)
***Almost always take skin off chicken**	**64**	**66**	**83**	**68**
Often eat reduced fat or low-fat cheese	50	48	42	47
Often use light, fat free, or no salad dressing	57	58	51	56
***Sometimes eat fruit and vegetables as snacks**	**96**	**91**	**81**	**91**
Often eat bread, rolls, muffins or vegetables without butter or margarine	59	65	48	60
Avoid eating food from restaurants, fast-food places or take-out 2 or more times per week	83	77	83	81
Usually eat fewer than 2 servings of red meat per week	68	69	72	69
Usually eat 5 or more servings fruits and vegetables per day	50	55	52	53
***Usually eat whole grains at least once daily**	**71**	**54**	**57**	**61**
***Usually eat beans/legumes 2 or more times per day**	**29**	**16**	**41**	**26**

*Indicate significant racial differences by $p < .05$ or greater

Main Study Hypotheses

Aim 3

Based on prior research suggesting that cancer-related distress can serve as a facilitator of health behavior change, the main hypothesis of this study was tested to ascertain whether a similar relationship would be found between total IES score and diet in this low-income cancer survivor sample. Bivariate correlation analyses were performed to assess for any relationship between total IES score (IES-T) and total diet score (Diet-T). No statistically significant relationship was found between these variables (See Table 6). As a result, a linear relationship (facilitating or inhibiting) was not supported by this sample.

Similar analyses were performed to assess for any relationship between IES subscale scores and diet. Bivariate correlation analyses were conducted between total IES Intrusion score and total diet score. Similar analyses were conducted between total IES Avoidance score and total diet score. No statistically significant correlation was found for either hypothesis (See Table 6).

Table 6

Correlation Matrix for Main Variables

	IES-T	IES-A	IES-I	Diet-T
IES-T	1.00			
IES-A	.910**	1.00		
IES-I	.898**	.635**	1.00	
Diet-T	.001	.005	-.003	1.00

** Correlation is significant at the 0.01 level

Consistent with Andersen et al. (2003), the curvilinear hypothesis was tested by entering the quadratic term (e.g., IES total X IES total) into a linear regression analysis to predict total diet score. The curvilinear hypothesis was tested between IES total score and total diet score which resulted in no statistically significant findings, $t(2, 285) = .27$, $\beta=.05$, $p = .79$. The curvilinear hypothesis was also tested between individual subscales of Avoidance and Intrusion with total diet score. These analyses also resulted in no statistically significant findings. For the Avoidance subscale, $t(2, 285) = .35$, $\beta=.07$, $p=.73$. For the Intrusion subscale, $t(2, 285) = -.49$, $\beta= -.09$, $p=.62$.

In this sample, no statistically significant relationship was found between total IES score and total diet score, between total Intrusion subscale score and diet, or between total Avoidance subscale score and diet. The findings of this study did not support a linear relationship (facilitating or inhibiting) or a curvilinear relationship between cancer-related distress and diet behavior. In fact, no relationship was found between cancer-related distress and diet behavior in this low-income cancer survivor sample. These findings will be discussed in greater detail in the next chapter.

CHAPTER V

Discussion

Advances in cancer treatment and early detection technology have led to increased rates of cancer survivorship. However, people of low-income backgrounds have poorer survival rates and greater adverse cancer outcomes (Bradley et al., 2001, 2002; Howard et al., 1998) when compared to other groups. This is particularly seen in the lower survivorship rates of Blacks compared to Whites, with Blacks being more likely to belong to low-income groups. While multiple factors such as healthcare access, affordability, knowledge, and attitude/belief factors are being studied as possible reasons for such disparities in cancer survivorship, this study attempted to explore another aspect of survivorship and well-being: that of diet behavior among low-income cancer survivors. In particular, this study explored the dietary habits of a diverse group of low-income cancer survivors, levels of cancer-related distress experienced, and whether there is evidence for a relationship between cancer-related distress and current diet behavior as a first step in understanding whether distress can act as a facilitator of diet behavior change.

Few studies have looked at the role of cancer-related distress in the diet behavior of cancer survivors. However, a sizeable body of research has explored the relationship between cancer-related distress and other aspects of health behavior, in particular cancer prevention behaviors. Findings from these studies are mixed. Many have found a facilitating relationship between cancer-related distress and cancer prevention behavior. Fewer studies have found an inhibiting relationship, and yet others have suggested the existence of a curvilinear relationship, such that moderate levels of cancer-related distress

may facilitate cancer prevention behavior while high and low levels of cancer-related distress may inhibit cancer prevention behavior. These findings have been used to inform the creation of interventions to address non-adherence to cancer prevention recommendations. The current study explored whether similar relationships would be found between cancer-related distress and diet behavior to better understand the implications for dietary behavior change among low-income cancer survivors, an area that is becoming increasing important in continued survivorship and well-being.

Discussion of Findings

Aim I

The first aim of this study was to describe the levels of cancer-related distress experienced by this low-income sample. The mean level of cancer-related distress in the current study was higher than those reported by patients with metastatic melanoma and renal cell cancer (Devine, Parker, Fouladi, & Cohen, 2003), head and neck cancer patients with advanced disease (Sherman, Simonton, Adams, Vural, & Hanna, 2000), recently diagnosed breast cancer patients (Goodwin et al., 2004), and advanced stage ovarian cancer patients (Norton et al., 2005). Compared to the current study, which consisted of a racially diverse, low-income sample, participants from the studies cited above were primarily white, mostly married, and well-educated. It is notable that participants of the current study were more distressed about cancer than were recently diagnosed cancer patients and those with advanced disease. One possible explanation for these higher levels of distress may be that people from low-socioeconomic backgrounds already face a number of adversities on a day-to-day basis, and a cancer diagnosis becomes an additional stressor to contend with.

The low-income sample under study is unique in that it is not a well represented group in cancer research. In fact, much of research in the area of cancer-related distress has been conducted with mostly white, educated samples, and as such, the literature is lacking in data on minority and low-income groups. Findings from a study conducted with a random sample of racially diverse, non-cancer participants with a trauma history suggest that African-Americans and Hispanics scored significantly higher on total IES, Intrusion subscale and Avoidance subscale scores (Briere & Elliot, 1998). In the current study conducted among a racially diverse low socioeconomic sample, no significant racial differences were found in either total IES score or IES Intrusion score. However, Hispanics scored significantly higher than Whites on total IES Avoidance score. Although racial differences in IES total and IES intrusion score did not reach statistical significance, it should be noted that there was some variability in scores. The findings of this study then suggest that when income is taken into account, some of the racial differences in levels of distress seen in the general population are lessened. Though racially diverse, it may be that participants from low socioeconomic groups have similar experiences in general, and when diagnosed with cancer, they look even more similar in terms of distress experienced.

Although this sample reported high levels of cancer-related distress when compared to other cancer patients/survivors, there were no statistically significant differences in overall IES score as a function of education. This may be because education is highly correlated with socioeconomic status, which may explain why no significant differences were found. There was, however, a trend towards higher levels of overall cancer-related distress among the less educated participants in the sample,

perhaps explained by a greater numbers of stressors, need to work harder and having less autonomy over their lives.

Although there were no statistically significant differences in overall IES scores as a function of race, Hispanics did have a tendency towards higher scores overall compared to the rest of the sample. Hispanics were also more likely to have a higher mean level of cancer-related avoidant thoughts when compared to Whites. In general, the specific items for which Hispanics were more likely to respond in the affirmative were those that tap active behavioral attempts at avoiding distress as opposed to more generic non-specific efforts. However, items in the avoidance subscale are highly correlated and, as such, these significant findings perhaps speak more to greater overall levels of distress in the Hispanic group's experience with cancer than anything else. This may be attributed to factors such as greater numbers of recent immigration, language barriers, minority status, lower levels of education, just to name a few of the factors that could perhaps make the Hispanic experience more trying than other low-income groups.

In spite of racial diversity, income appears to be an incredibly salient factor in explaining the similar levels of cancer-related distress reported. It may be that a similar socioeconomic status means having similar histories, similar lifestyles, having faced similar adversities, have similar experiences with lack of access to care and greater levels of late stage cancer diagnoses, all part of the low socioeconomic experience. In fact, racial disparities in health outcome commonly cited in the literature are leveled out in this sample because of similarities based on socioeconomic status. These findings are consistent with what has been widely reported in the literature that when socioeconomic status is taken into account, racial disparities in health outcomes are lowered, or in some

cases, disappear (Bradley et al., 2001, 2002; Howard et al., 1998; Simon & Severson, 1996; Farley & Flannery, 1989). Additionally, when a cancer diagnosis is introduced, a group that is already quite similar looks even more alike because of their common experiences.

Aim 2

The second aim of this study was to describe the diets of this low-income sample. In the current study, 53% of participants reported eating 5 or more fruits/vegetables daily while 59% reported consistently avoiding high fat foods. Participants in the current study reported similar levels of adherence to fruit/vegetable recommendations when compared to cancer survivors from other studies, however, the findings are mixed on adherence to low-fat recommendations. In similar studies conducted in this area, Coups and Ostroff (2005) found that 53% of a primarily white, mixed-income cancer survivor sample were consuming 5 or more fruits/vegetables daily while 29% were consuming diets with less than 30% fat. Demark-Wahnefried et al. (2000) found that 45% of a primarily white, cancer survivor sample were consuming 5 or more fruits/vegetables daily while 74% of cancer survivors reported diets with less than 30% fat. Pinto et al. (2002) found that 45% of a primarily white, moderate-income cancer survivor sample were consuming diets of less than 30% fat.

The national adherence rate to the daily recommendation of 5 fruits/vegetables is 23 percent (BRFSS, 2003). The adherence rate of cancer survivors in the current study and similar studies cited above is much higher. In fact, it is notable that this low-income cancer survivor sample reported similar levels of adherence to the fruit/vegetable recommendations when compared to other samples of mostly white, mixed or moderate

income cancer survivors. Additionally, no significant racial differences were found in adherence to fruit/vegetable recommendations in the current study. It may be that income determines a certain level of dietary consumption while a cancer diagnosis initiates positive changes in diet. It is possible that participants have already made diet changes in the time since diagnosis as a way of addressing the stressor of health problems and trying to alter their health outcome. In effect, a teachable moment may already have taken place with participants altering their diets to increase their well-being and chances of survival.

The findings on adherence to low-fat dietary recommendations among cancer survivors are mixed. Interpreting these findings is complicated by the fact that research studies have not been consistent in assessing low-fat intake. The current study assessed whether participants were "consistently avoiding high fat foods" and asked questions on adherence to specific low-fat and high foods. As noted above, some studies report on diets consisting of less than 30% fat. In the Demark-Wahnefried et al. (2000) study that reported a high level of adherence to low-fat diets (74%), the authors note that respondents did not know if they followed a low-fat diet. This is frequently a problem for self-report measures that do not objectively measure low-fat intake and makes interpretation of findings difficult. Inconsistencies in measuring low-fat intake may partly explain some of the mixed findings.

There were no significant differences in fat intake as a function of either race or education in this study. This is surprising given that much has been written in the literature about the role of race and culture in influencing diet. Demark-Wahnefried et al. (2000) reported that among cancer survivors (largely white sample), whites were more likely to report low-fat diets when compared to blacks. In the general population, blacks

have been reported to consume diets with higher fat contents (Forshee et al., 2003; Cox et al., 1995) and many eat fewer than 5 fruits and vegetables daily (McClelland et al., 1998). Hispanics have been noted to have a higher daily fruit and vegetable intake (Thompson et al., 2002) and a lower fat intake compared to Whites (Winkleby et al., 1994). Hargreaves, Schlundt, & Buchowski (2002) noted that Black women's attempts to eat healthy were hampered by traditions, social influences, habits and meanings. These racial differences in dietary consumption seen in the general population do not appear to be replicated in the current study. It may be that income determines a certain level of dietary consumption while a cancer diagnosis initiates positive changes in diets, which in effect eliminates some of the racial differences seen in the general population. In effect, low-income cancer survivors in this sample appear to have similar quality of diets when compared to each other. Additionally, they have similar levels of consumption of fruits and vegetables when compared to other cancer survivors and better levels than the general population. In terms of dietary fat intake, there were no significant racial differences in this study, and levels of fat intake were better than those reported by some samples of cancer patients, but not all.

Analyses indicated some racial differences in adherence to individual diet items. It is likely that some of these differences in behavioral pattern are driven by cultural practices and orientation to food. For example, Hispanics were more likely to endorse eating skinless chicken and beans/legumes while Blacks were more likely to endorse eating fruits/vegetables as snacks and whole grains at least once daily. Although there are some racial/cultural differences in adherence to individual diet items, the results of the survey as a whole suggest no differences in overall adherence to dietary

recommendations. This lack of a difference may be the result of sample similarities in income levels and similar experiences of a cancer diagnosis as opposed to race. In some ways, perhaps having similar levels of income may translate into eating in a similar fashion. Additionally, these long-term cancer survivors may have already responded to a "teachable moment" closer to their cancer diagnosis in response to the threat of cancer by changing their diets to protect long-term health.

Aim 3

The main goal of this study was to assess for any relationship between cancer-related distress and diet behavior among low-income cancer survivors and to determine the nature of such a relationship. Drawing on the common-sense model (CSM) of self-regulation of health and illness as well as the cancer prevention literature, this study explored whether cancer-related distress can act as a facilitator of diet change. According to the CSM model, people are motivated to eliminate health threats, thus they would be more likely to change diet behavior at a time of illness if they believed it would be beneficial to health (facilitating effect). Since the current study is a cross-sectional, little can be said of behavior change, per se, however inferences can be made based on the nature of the relationship between variables of distress and diet. Furthermore, this study sought to explore whether certain levels of cancer-related distress may have a particular effect on diet behavior. As discussed previously, a number of studies from the cancer prevention literature have reported that increasing levels of cancer-related distress correlates with behavior change (facilitating relationship), some studies have reported that increasing levels of cancer-related distress correlates with inhibiting behavior change (inhibiting relationship), and yet other studies have suggested that an optimal level of

cancer-related distress is necessary for behavior change (curvilinear relationship). In such a model, low and high levels of distress do not correlate with change (low levels of distress has no effect on the emotional system and high levels of distress overwhelms it), but a moderate amount of distress may facilitate change. This study sought to expand on the CSM model by not only exploring whether a facilitating relationship could be found between cancer-related distress and diet, but whether a curvilinear relationship exists.

First, a linear hypothesis was tested to explore whether a facilitating or inhibiting relationship exists between cancer-related distress and diet behavior. Neither of these hypotheses was supported. These relationships that have featured prominently in the cancer prevention literature were not replicated between distress and diet in this low-income cancer survivor sample. Additionally, a curvilinear hypothesis was also not supported. Analyses were also conducted between individual IES subscales and diet (Intrusion and diet; Avoidance and diet) to assess for any relationship between individual subscales of cancer-related distress and diet behavior. No significant relationship was found.

Meaning of Findings

Strikingly, no significant relationship was found between study variables of cancer-related distress and diet. A number of factors could possibly explain the lack of significant findings. Firstly, the lack of any significant relationship may be in part due to the fact that participants have similar levels of both cancer-related distress and current diets. Perhaps, some have already made changes after their cancer diagnoses as a way of staying healthy and preventing recurrence leading to similar responses to diet questions. It is also likely that similar earning potential (low-income) may translate into affording a

similar quality of diet. An important finding of this study, therefore, is that when income and a cancer diagnosis are taken into account, this low-income group looks very similar in both their experience of cancer-related distress and diets. The low-income factor appears to be a profound equalizer of experience in both cancer-related distress and diet across all races.

While a cancer diagnosis may prompt some to make certain types of health protective changes such as adherence to mammography recommendations or performance of breast self examination, diet may not be an important personal goal for many cancer survivors. In fact, there is still much controversy surrounding whether or not diet changes can improve chances of survival. Although an existing literature supports the idea that diet quality is positively related to cancer outcome, findings from a recent large scale intervention study (Prentice, Caan, Chlebowski, Patterson, Kuller, Ockene et al., 2006; Beresford, Johnson, Ritenbaugh, Lasser, Snetselaar, Black et al., 2006) suggest that a low-fat dietary pattern did not result in a statistically significant reduction in risk for either breast cancer or colorectal cancer. Unlike cancer screening behaviors which can directly impact cancer outcome, the importance of diet quality in cancer treatment and survival still remains controversial among researchers, so it would not be surprising if it did not feature prominently among the personal goals of cancer survivors. In effect, response efficacy may be low. If people do not believe that diet change will positively affect their health outcome, they may be less likely to make changes.

Additionally, the question of priorities becomes important when looking at a low-income sample. It is known that low socioeconomic status is associated with higher

incidences of late stage cancer and death (Bradley et al., 2001). Access to quality care, knowledge about cancer prevention and ability to prioritize health care are among the reasons for such poor outcomes among people of low socioeconomic status. It may be that people of low-income backgrounds have similar difficulties prioritizing diet as an important factor into the myriad of competing challenges of living in poverty. It is not uncommon that people of low-income face multiple stressors including living in drug-ravished neighborhoods, struggling to earn a living, difficulty holding jobs, perhaps having large families who are in equally dire straits, childcare responsibilities and having other medical and/or emotional illnesses. Faced with multiple stressors, people from low socioeconomic groups may be setting priorities based on eating three meals a day versus the higher goal of eating a low-fat, high fruit and vegetable diet. This is consistent with a study (Guidry, Mathews-Juarez, & Copeland, 2003) which reported that low-income African-American women were primarily concerned with immediate economic and societal needs and that health only became a priority when they became ill. Even so, it may be less of a priority in the lives of the socio-economically disadvantaged when compared to other groups.

It is also possible that the factors influencing what and how people eat are different from those influencing other types of health behaviors like cancer prevention behaviors. For instance, diet can serve a self-soothing or self-regulating function in order to eliminate distress. Many turn to food when anxious or distressed. So when it becomes necessary to change diet behavior in order to increase chances of survival, a self-regulating mechanism is at risk of being taken away. This complicates the CSM's premise that people are motivated to eliminate health threats by taking appropriate action

to lower distress and ensure better health outcomes. In effect, diet may be a more complicated health behavior. There are now two tasks. First, that of altering diet behavior to ensure a positive health outcome, but secondly, altering the manner in which one copes with health threats (emotional response), namely eating as a coping or self-soothing mechanism. It becomes a balancing act of figuring out how important it is to eat to stay healthy versus how personally meaningful it is to use food as a self-soothing mechanism or stress reliever. If food is sometimes used for self-regulating purposes, the relationship between cancer-related distress and diet may then be different from one person to another depending on their coping style. In effect, understanding whether participants use food in a self-regulating capacity may be an important factor to consider in any diet change model.

Additionally, food has cultural relevance and is often a very central part of family life and cultural gatherings. The significance of cultural aspects of diet is not to be understated. In many ways, food is tied to family identify and rootedness in a particular culture. In effect, the cultural aspects of food may be very important in reducing distress. As such, these variables may be important to consider in any diet change model.

In this study, factors such as desire for change, self-efficacy, readiness and intention to make diet changes were not explored. Someone may think that a diet change would lead to a positive health outcome, but questions his/her ability to effect such a change (self efficacy). On the other hand, someone may think there is no reason to change diet as he/she is happy with current diet, therefore he/she has no intention to make a change (intention). Another person may think that he/she should make a change, but is not ready to do so (readiness). These factors were not considered in the current study, but

may be important to consider in understanding predictors of dietary behavior and putting any diet change model into effect.

Summary and Conclusions

Firstly, this study explored the levels of cancer-related distress experienced by a low-income cancer survivor sample. Although this was a diverse sample, participants reported similar overall levels of cancer-related distress. One exception was that Hispanics were more likely to have higher levels of avoidant thoughts about cancer when compared to Blacks or Whites. In spite of racial differences, this group is similar in earning potential, educational level and perhaps, overall experience of belonging to a low socioeconomic group and having faced similar adversities. It is notable that the Hispanic group also has lower levels of education than the other two groups, which may speak to a higher level of stressors. Overall, participants reported relatively high levels of cancer-related distress when compared to other cancer survivors including recently diagnosed patients and those with advanced disease. This may speak to the fact that people from low socioeconomic backgrounds are already faced with multiple stressors and a cancer diagnosis increases the level of distress experienced. Income and a cancer diagnosis, therefore, appear to be incredibly salient equalizers of experience for this sample.

Secondly, this study sought to explore levels of adherence to dietary recommendations of lowering fat intake and increasing fruit and vegetable consumption. Here again, this sample looks very similar in levels of adherence to dietary recommendations. These findings are surprising in light of the racial/cultural differences in diet that has been reported among the general population (Forshee et al., 2003; Cox et al., 1995; McClelland et al., 1998; Winkleby et al., 1994; Hargreaves, et al., 2002).

Analyses were conducted on three races, Blacks, Whites and Hispanics, and there were no significant differences in overall adherence to the above mentioned dietary recommendations. They appeared to have similar diets compared to each other and other cancer survivors, and better diets than the general population. However, fat intake in this study is difficult to interpret when compared to other studies and may speak to methodological issues in measurement of fat.

Thirdly, this study explored the relationship between cancer-related distress and dietary behavior of low-income cancer survivors with the intention of understanding implications for dietary behavior change. This study explored whether increasing levels (facilitating relationship) of cancer-related distress or a moderate amount of cancer-related distress might have a facilitating effect on diet behavior. Both these hypotheses were not supported by this sample. In fact, no significant relationship was found between cancer-related distress and dietary behavior in this sample. The lack of any significant finding may be partly related to the fact that though racially diverse, being from low-income backgrounds and having cancer may act as leveling forces leading to similar experiences of both cancer-related distress and dietary behavior.

Limitations and Future Research

The results of this study point to a number of limitations and directions for future research. Measurement limitations may have contributed to a lack of significant findings in this study. In fact, the internal consistency of the Diet Survey was low. Study questions were dichotomous variables that did not attempt to differentiate what adherence meant to each participant. For instance, some of the questions posed were: “Sometimes eat fruit and vegetables as snacks?” “Often use light, fat free, or no salad dressing?”

"Often eat reduced fat or low-fat cheese?" Questions such as these do not allow us to find out a great deal about participants' quality of diets. For instance, an answer of yes to the question "Sometimes eat fruit and vegetables as snacks?" could mean that the person eats fruit/vegetables as snacks once weekly while someone else may eat fruit/vegetables as snacks daily. It is possible that the dichotomous nature of this survey was a hindrance to gleaning adequate information about participants' diets and as a result, did not allow for an adequate appraisal of the quality of their diets.

This study focused solely on understanding whether cancer-related distress has a role in dietary behavior. It may be that diet is a very complex health behavior that does not work in the same way as other health behaviors such as cancer preventative behaviors. As mentioned previously, diet is not only a survival tool, but is used by many in regulating affect. It may be important to better understand other factors that influence dietary behavior. Future studies should use exploratory methodology to elicit first-hand impressions from cancer survivors of factors that they believe influence diet behavior.

This study is also limited by the fact that the diet survey was a self-report measure and participants' diets were not corroborated by any actual measurement. As a result, it is possible that participants gave what they believe to be socially appropriate responses. Future studies should attempt to confirm responses given by study participants.

Given that this study was conducted among cancer survivors, many of whom are at least 5 years from initial diagnosis, it is possible that many have already made diet changes in the time directly after diagnosis as a way of altering health outcome. Future studies should focus on a shorter time since diagnosis (perhaps 1 year) since people are more likely to alter health behaviors soon after a life-changing event.

This was a cross-sectional study and although we can generate hypotheses about the meanings of the data, this study is limited by the fact that there was no measurement of diet change over time. As such, even if a positive linear relationship was found between study variables of cancer-related distress and diet, we could speculate that there might be a facilitating effect of distress on diet, however, there is no way to know for certain whether there is a causative effect between these variables without prospective data. Future studies should measure the variables in question over time to appropriately test diet behavior change.

Other social learning constructs should be explored in conducting research in the area of diet behavior change in cancer survivors. Response efficacy should first be considered to assess whether study participants believe that changing diet will lead to positive health outcomes. Another aspect to consider in future research is to better understand whether the sample under study has any interest to changing diets, whether they have an intention to make such a change, and level of readiness to make the change. Finally, it may be important to consider participants' self efficacy, whether or not they believe they have the ability to make a behavior change.

Implications for Clinical Practice

The findings of this study suggest that even after a significant amount of time has elapsed after diagnosis, cancer survivors from low socioeconomic backgrounds continue to be more highly distressed than survivors from higher income, higher education groups. This is particularly seen in the higher levels of distress evidenced by this sample as compared with newly diagnosed cancer patients and those with advanced disease. Clinicians should therefore be aware that low-income cancer survivors face many daily

stressors and adversities that may contribute to keeping their levels of cancer-related distress high.

Also evident from the findings of this study is that participants displayed higher levels of adherence to ACS dietary recommendations of eating a low-fat, high fruit and vegetable diet when compared to other cancer survivors. In fact, the participants of this study reported eating much healthier than the general population and had similar of better levels of dietary adherence compared to other samples of mostly white, moderate-income groups. These findings are counter-intuitive to what might be expected given low earning potential and higher levels of adversities faced by low-income cancer survivors. Clinicians should therefore be aware that although faced with much adversity, low-income cancer survivors have relatively better dietary patterns compared to the general public and other cancer survivors.

Appendix A

Impact of Event Scale (Horowitz et al., 1979)

You have experienced a diagnosis and treatment for cancer. Below is a list of comments made by people after stressful life events. Please check each item, indicating how frequently these comments were true for you DURING THE PAST SEVEN DAYS. If they did not occur during that time, please mark the "not at all" column.

	0 = Not at all 1 = Rarely 3 = Sometimes 5 = Often			
I thought about it when I didn't mean to	0	1	3	5
I avoided letting myself get upset when I thought about it or was reminded of it	0	1	3	5
I tried to removed it from memory	0	1	3	5
I had trouble falling asleep or staying asleep, because of pictures or thoughts about it that came into my mind	0	1	3	5
I had waves of strong feelings about it	0	1	3	5
I had dreams about it	0	1	3	5
I stayed away from reminders of it	0	1	3	5
I felt as if it hadn't happened or it wasn't real	0	1	3	5
I tried not to talk about it	0	1	3	5
Pictures about it popped into my mind	0	1	3	5
Other things kept making me think about it	0	1	3	5
I was aware that I still had a lot of feelings about it, but I didn't deal with them	0	1	3	5
I tried not to think about it	0	1	3	5
Any reminder brought back feelings about it	0	1	3	5
My feelings about it were kind of numb	0	1	3	5

Appendix B

Diet Behavior Survey (Adapted from Greene et al., 1994)

1. Do you **almost always** take the skin off your chicken? (If you do not eat chicken, but you do eat read meat, please choose "No." If you do not eat chicken or red meat, please choose "Yes.") _____No _____Yes

2. Do you **often** eat reduced fat or low-fat cheese? (If you rarely eat cheese, please choose "Yes.") _____No _____Yes

3. Do you **often** use light, fat free, or no salad dressing? (If you do not eat salads, please choose "No.") _____No _____Yes

4. Do you **sometimes** eat fruit and vegetables as snacks? (If you do not eat high-fat snacks like chips, pastry or donuts, please choose "Yes.") _____No _____Yes

5. Do you **often** eat bread, rolls, muffins or vegetables **without** butter or margarine? _____No _____Yes

6. Do you **avoid** eating food from restaurants, fast-food places, or take-out food 2 or more times per week? _____No _____Yes

7. Do you **usually** eat fewer than 2 servings of red meat per week? _____No _____Yes

8. Do you **usually** eat 5 or more servings of fruits and/or vegetables per day (1/2 cup is a serving)? _____No _____Yes

9. Do you **usually** eat whole grains such as brown rice, oats, whole grain breads, and bran-type cereals at least once per day? _____No _____Yes

10. Do you **usually** eat beans/legumes 2 or more times per day? _____No _____Yes

References

Alagna, S. W., Morokoff, P. J., Bevett, J. M., & Reddy, D. M. (1987). Performance of breast self-examination by women at high risk for breast cancer. *Women & Health*, *12,* 29-46.

American Cancer Society (2005). *Cancer facts & figures.* New York: American Cancer Society.

Andersen, M. R., Peacock, S., Nelson, J., Wilson, S., McIntosh, M., Drescher, et al. (2002). Worry about ovarian cancer risk and use of ovarian cancer screening by women at risk for ovarian cancer. *Gynecol Oncol, 85,* 3-8.

Andersen, M. R., Smith, R., Meischke, H., Bowen, D., & Urban, N. (2003). Breast cancer worry and mammography use by women with and without a family history in a population-based sample. *Cancer Epidemiol Biomarkers Prev, 12,* 314-320.

Ayanian, J. Z., Kohler, B. A., Abe, T., Epstein, A. M. (1993). The relationship between health insurance coverage and clinical outcomes among women with breast cancer. *New England Journal of Medicine, 329,* 326-331.

Aziz, N. M. (2002). Cancer survivorship research: Challenge and opportunity. *J Nutr, 132,* 3494S-3503S.

Bastarrachea, J., Hortobagyi, G. N., Smith, T. L., Kau, S-W. C., & Buzdar, A. U. (1994). Obesity as an adverse prognostic factor for patients receiving adjuvant chemotherapy for breast cancer. *Annals of Internal Medicine, 120,* 18-25.

Behavioral Risk Factor Surveillance System (BRFSS) (2003). Trends in consumption of five or more recommended vegetable and fruit servings for cancer prevention, adults 18 and older, US, 1994-2002. Retrieved July, 27, 2005, from http://apps.nccd.cdc.gov/brfss/display.asp?cat=FV&yr=2003&qkey=4415&state=US.

Beresford, S.A., Johnson, K.C., Ritenbaugh, C., Lasser, N.L., Snetselaar, LG., Black, H.R., et al. (2006). Low-fat dietary pattern and risk of colorectal cancer. The Women's Health Initiative Randomized Controlled Dietary Modification Trial. *JAMA, 295,* 643-654.

Bowen, D. J., Helmes, A., Powers, D., Andersen, M. R., Burke, W., McTiernan, A., et al. (2003). Predicting breast cancer screening intentions and behavior with emotion and cognition. *J Soc and Clin Psych, 22,* 213-232.

Bradley, C. J., Given, C. W., & Roberts, C. (2001). Disparities in cancer diagnosis and survival. *Cancer, 91,* 178-88.

Bradley, C. J., Given, C. W., & Roberts, C. (2002). Race, socioeconomic status, and breast cancer treatment and survival. *Journal Natl Cancer Institute, 94,* 490-6.

Brain, K., Norman, P., Gray, J., & Mansel, R. (1999). Anxiety and adherence to breast self-examination in women with a family history of breast cancer. *Psychosom Med, 61,* 181-187.

Brenes, G. A., & Paskett, E. D. (2000). Predictors of stage of adoption for colorectal cancer screening. *Prev Med, 31,* 410-416.

Briere, J., & Elliot, D.M. (1998). Clinical utility of the Impact of Event Scale: Psychometrics in the general population. *Assessment, 5,* 171-180.

Chlebowski, R. T., Aiello, E., & McTiernan, A. (2002). Weight loss in breast cancer patient management. *J Clin Oncol, 20,* 1128-1143.

Consedine, N. S., Magai, C., Krivoshekova, Y. S., Ryzewicz, L., & Neuget, A. I. (2004). Fear, anxiety, worry, and breast cancer screening behavior: A critical review, *Cancer Epidemiol Biomarkers Prev, 13,* 501-510.

Consedine, N. S., Magai, C., & Neuget, A. I. (2004). The contribution of emotional characteristics to breast cancer screening among women from six ethnic groups. *Prev Med, 38,* 64-77.

Cornell University, Program on Breast Cancer and Environmental Risk Factors in New York State (BCERF). (2003, April). *Breast cancer in women from different racial/ethnic groups* (Fact sheet #47). New York: Barbour S. Warren.

Coups, E.J., & Ostroff, J.S. (2005). A population-based estimate of the prevalence of behavioral risk factors among adult cancer survivors and noncancer controls. *Prev Med, 40,* 702-11.

Cox, R. H., Parker, G. G., Watson, A. C., Robinson, S. H., Simonson, C. J., Elledge, J. C., et al. (1995). Dietary cancer risk of low-income women and change with intervention. *Journal of the American Dietetic Association, 95,* 1031-1034.

Demark-Wahnefried, W., Peterson, B., McBride, C., Lipkus, I., & Clipp, E. (2000). Current health behaviors and readiness to pursue life-style changes among men and women diagnosed with early stage prostate and breast carcinomas. *Cancer, 88,* 674-84.

Demark-Wahnefried, W., Schildkraut, J. M., Iselin, C. E., Conlisk, E., Kavee, A., Aldrich, T. E., et al. (1998). Treatment options, selection, and satisfaction among African American and White men with prostate carcinoma in North Carolina. *Cancer, 83,* 320-30.

Devine, D., Parker, P.A., Fouladi, R.T., & Cohen, L. (2003). The association between social support, intrusive thoughts, avoidance, and adjustment following an experimental cancer treatment. *Psycho-Oncology, 12,* 453-462.

Diefenbach, M. A., Miller, S. M., & Daly, M. B. (1999). Specific worry about breast cancer predicts mammography use in women at risk for breast and ovarian cancer. *Health Psychol, 1,* 532-536.

Diefenbach, M. A., Schnoll, R. A., Miller, S. M., & Brower, L. (2000). Genetic testing for prostate cancer. *Cancer Practice, 8,* 82-86.

Drescher, C., Holt, S. K., Andersen, M.R., Anderson, G., & Urban, N. (2000). Reported ovarian cancer screening among a population-based sample in Washington State. *Obstet Gynecol, 96,* 70-74.

Emmons, K. M., Stoddard, A. M., Gutheil, C., Gonzalez Suarez, E., Lobb, R., & Fletcher, R. (2003). Cancer prevention for working class, multi-ethnic populations through health centers: the healthy directions study. *Cancer Causes and Control, 14,* 727-37.

Farley, T. A., & Flannery, J. T. (1989). Late-stage diagnosis of breast cancer in women of lower socioeconomic status: public health implications. *Am J Public Health, 79, 1508-12.*

Forshee, R. A., Storey, M. L., & Ritenbaugh, C. (2003). Breast cancer risk and lifestyle differences among premenopausal and postmenopausal African-American women and white women. *Cancer, 97(Suppl. 1),* 280-288.

Friedman, L. C., Webb, J. A., Weinberg, A. D., Lane, M., Cooper, P., & Woodruff, A. (1995). Breast cancer screening: Racial/ethnic differences in behaviors and beliefs. *J Cancer Educ, 10,* 213-216.

Goodwin, P.J., Ennis, M., Bordeleau, L.J., Pritchard, K.I., Trudeau, M.E., Koo, J., et al. (2004). Health-related quality of life and psychosocial status in breast cancer prognosis: Analysis of multiple variables. *Journal of Clinical Oncology, 22,* 4184-4192.

Gram, I. T., & Slenker, S. E. (1992). Cancer anxiety and attitudes toward mammography among screening attenders, nonattenders, and women never invited. *American J Public Health, 82,* 249-251.

Greene, G. W., Rossi, S. R., Reed, G. R., Willey, C., & Prochaska, J. O. (1994). Stages of change for reducing dietary fat to 30% of energy or less. *Journal Am Diet Assoc, 94,* 1105-1110.

Gregorio, D.I., Emrich, L. J., Graham, S., Marshall, J.R., & Nemoto, T. (1985). Dietary fat consumption and survival among women with breast cancer. *J Natl Cancer Inst, 75,* 37-41.

Guidry, J.J., Mathews-Juarez, P., Copeland, V.A. (2003). Barriers to breast cancer control for African-American women. *Cancer, 97m* 318-23.

Hargreaves, M. K., Baquet, C., & Gamshadzahi, A. (1989). Diet, nutritional status, and cancer risk in American blacks. *Nutr Cancer, 12,* 1-28.

Hargreaves, M.K., Schlundt, D.G., & Buchowski, M.S. (2002). Contextual factors influencing the eating behaviours of African American women: a focus group investigation. *Ethn Health, 7,* 133-47.

Holm, L. E., Nordevang, E., Hjalmar, M. L., Lidbrink, E., Callmer, E., & Nilsson, B. (1993). Treatment failure and dietary habits in women with breast cancer. *J Natl Cancer Inst, 85,* 32-36.

Horowitz, M., Wilner, N., & Alvarez, W. (1979). Impact of Event Scale: a measure of subjective stress. *Psychosom Med, 41,* 209-18.

Howard, D. L., Penchansky, R., & Brown, M. B. (1998). Disaggregating the effects of race on breast cancer survival. *Fam Med, 30,* 228-35.

Jain, M., Miller, A. B., & To, T. (1994). Premorbid diet and the prognosis of women with breast cancer. *J Natl Cancer Inst*, 86, 1390-1397.

Janis, I. L., & Feshbach, S. (1953). Fear arousing communications. *J Abnorm Soc Psychol, 48,* 78-92.

Kash, K. M., Holland, J. C., Halper, M. S., & Miller, D. G. (1992). Psychological distress and surveillance behaviors of women with a family history of breast cancer. *J Natl Cancer Inst, 84,* 24-30.

Kristal, A. R., Shattuck, A. L., Bowen, D. J., Sponzo, R. W., & Nixon, D. W. (1997). Feasibility of using volunteer research staff to deliver and evaluate a low-fat dietary intervention: The American Cancer Society Breast Cancer Dietary Intervention Project. *Cancer Epidemiology, Biomarkers & Prevention, 6,* 459-467.

Kyogoku, S., Hirohata, T., Nomura, Y, Shigematsu, T., Takeshita, S., & Hirohata, I. (1992). Diet and prognosis of breast cancer. *Nutr Cancer*, *17,* 271-77.

Lannin, D. R., Mathews, H. F., Mitchell, J., Swanson, M. S., Swanson, F. H., & Edwards, M. S. (1998). Influence of socioeconomic and cultural factors on racial differences in late-stage presentation of breast cancer. *JAMA, 279,* 1801-1807.

Lerman, C., Daly, M., Sands, C., Lustbader, E., Heggan, T., & Goldstein, L., et al. (1993). Mammography adherence and psychological distress among women at risk for breast cancer. *J Natl Cancer Inst, 85,* 1074-1080.

Lerman, C., Hughes, C., Croyle, R. T., Main, D., Durham, C., Snyder, C., et al. (2000). Prophylactic surgery decisions and surveillance practices one year following BRCA1/2 testing. *Prev Med, 31,* 75-80.

Lerman, C., Kash, K., & Stefanek, M. (1994). Younger women at increased risk for breast cancer: Perceived risk, psychological well-being, and surveillance behavior. *J Natl Cancer Inst Monogr, 16,* 171-176.

Lerman, C., Rimer, B., Trock, B., Balshem, A., & Engstrom, P. F. (1990). Factors associated with repeat adherence to breast cancer screening. *Prev Med, 19,* 279-290.

Lerman, C., & Schwartz, M. (1993). Adherence and psychological adjustment among women at high risk for breast cancer. *Breast Cancer Res Treat, 28,* 145-155.

Lerman, C., Trock, B., & Rimer, B. (1991). Psychological side effects of breast cancer screening. *Health Psychology, 10,* 259-267.

Leventhal, H. (1970). Findings and theory in the study of fear communications. *Advances in Experimental Social Psychology, 5,* 119-186.

Leventhal, H., Leventhal, E., & Cameron, L. (2001). Representations, procedures, and affect in Illness Self-Regulation: A perceptual-cognitive model. In A. Baum, T. Revenson, & J. Singer (Eds.), *Handbook of Health Psychology* (pp.19-47).

Lindberg, N. M., & Wellisch, D. (2001). Anxiety and compliance among women at high risk for breast cancer. *Ann Behav Med, 23,* 298-303.

Lobell, M., Bay, R. C., Rhoads, K. V. L., & Keske, B. (1998). Barriers to cancer screening in Mexican-American women. *Mayo Clin Proc, 73,* 301-308.

Mandelblatt, J., Andrews, H., Kerner, J., Zauber, A. & Burnett, W. (1991). Determinants of late stage diagnosis of breast and cervical cancer: the impact of age, race, social class, and hospital type. *Am J Public Health, 81,* 646-9.

Maskarinec, G., Murphy, S., Shumay, D. M., & Kakai, H. (2001). Dietary changes among cancer survivors. *European Journal of Cancer Care, 10,* 12-20.

Maunsell, E., Drolet, M., Brisson, J., Robert, J., & Deschenes, L. (2002). Dietary change after breast cancer: Extent, predictors, and relation with psychological distress. *Journal of Clinical Oncology, 20,* 1017-1025.

McBride, C. M., Clipp, E., Peterson, B. L., Lipkus, I. M., & Demark-Wahnefried, W. (2000). Psychological impact of diagnosis and risk reduction among cancer survivors. *Psycho-Oncology, 9,* 418-427.

McBride, C.M., Pollak, K.I., Garst, J., Keefe, F., Lyna, P., Fish, L., et al. (2003). Distress and motivation for smoking cessation among lung cancer patients' relatives who smoke. *J Cancer Educ, 18,* 150-156.

McCaul, K. D, Branstetter, A. D., O'Donnell, S. M., Jacobson, K., & Quinlan K. B. (1998). A descriptive study of breast cancer worry. *J Behav Med 21,* 565-578.

McCaul, K. D., Branstetter, A. D., Schroeder, D. M., & Glasgow, R. E. (1996). What is the relationship between breast cancer risk and mammography screening? A meta-analytic review. *Health Psychol, 15,* 1-8.

McCaul, K. D., Reid, P.A., Rathge, R. W., & Martinson, B. (1996). Does concern about breast cancer inhibit or promote breast cancer screening? *Basic Appl Soc Psych, 18,* 183-194.

McCaul, K. D., Schroeder, D. M., & Reid, P. A. (1996). Breast cancer worry and screening: Some prospective data. *Health Psychol 15,* 430-433.

McClelland, J. W., Demark-Wahnefried, W., David Mustian, R., Cowan, A. T. & Campbell, M. K. (1998). Fruit and vegetable consumption of rural African Americans: Baseline survey results of the black churches united for better health 5 a day project. *Nutrition and Cancer, 30,* 148-157.

Miller, L. Y. & Hailey, B. J. (1994). Cancer anxiety and breast cancer screening in African-American women: a preliminary study. *Womens health Issues, 4,* 170-176.

Mullens, A. B., McCaul, K. D., Erickson, S. C., & Sandgren, A. K. (2004). Coping after cancer: Risk perceptions, worry, and health behaviors among colorectal cancer survivors. *Psycho-Oncology, 13,* 367-376.

National Coalition of Cancer Survivorship 2004, NCCS Home, About NCCS. Retrieved July 27, 2005, from http://www.canceradvocacy.org/about.

Newman, L. A., Mason, J., Cote, D., Vin, Y., Carolin, K., Bouwman, D., et al. (2002). African-American ethnicity, socioeconomic status, and breast cancer survival. *Cancer, 94,* 2844-54.

Nomura, A. M., Marchand, L. L., Kolonel, L. N., & Hankin, J.H. (1991, Suppl 1). The effect of dietary fat on breast cancer survival among Caucasian and Japanese women in Hawaii. *Breast Cancer Res Treat, 18,* S135-141.

Nordevang, E., Callmer, E., Marmur, A., & Holm, L. E. (1992). Dietary intervention in breast cancer patients: effects on food choice. *European Journal of Clinical Nutrition, 46,* 387-396.

Norton, T.R., Manne, S.L., Rubin, S., Hernandez, E., Carlson, J., Bergman, C., et al. (2005). Ovarian cancer patients' psychological distress: The role of physical impairment, perceived unsupportive family and friend behaviors, perceived control, and self-esteem. *Health Psychology, 24,* 143-152.

Ostroff , J. S., Hay, J. L., Primavera, L. H., Bivona, P., Cruz, G. D., & LeGeros, R. (1999). Motivating smoking cessation among dental patients: smokers' interest in biomarker testing for susceptibility to tobacco-related cancers. *Nicotine & Tobacco Research, 1,* 347-355.

Pierce, J. P., Newman, V. A., Flatt, S. W., Faerber, S., Rock, C. L., & Natarajan, L. (2004). Telephone counseling intervention increases intakes of micronutrient- and phytochemical-rich vegetables, fruit and fiber in breast cancer survivors. *J Nutr, 134,* 452-458.

Pinto, B. M., Eakin, E., & Maruyama, N. C. (2000). Health behavior changes after a cancer diagnosis: What do we know and where do we go from here? *Ann Behav Med, 22,* 38-52.

Pinto, B. M., Maruyama, N. C., Clark, M. M., Cruess, D. G., Park, E., & Roberts, M. (2002). Motivation to modify lifestyle risk behaviors in women treated for breast cancer. *Mayo Clin Proc, 77,* 122-129.

Powe, B. D. (1995). Fatalism among elderly African Americans. *Cancer Nursing, 18,* 385-92.

Prentice, R.L., Caan, B., Chlebowski, R.T., Patterson, R., Kuller, L.H., Ockene, J.K., et al. (2006). Low-fat dietary pattern and risk of invasive breast cancer. The Women's Health Initiative Randomized Controlled Dietary Modification Trial. *JAMA, 295,* 629-642.

Reardon, K. K. & Aydin, C. E. (1993). Changes in lifestyle initiated by breast cancer patients: Who does and who doesn't? *Health Communication, 5,* 263-282.

Rock, C. L., & Demark-Wahnefried, W. (2002). Nutrition and survival after the diagnosis of breast cancer: A review of the evidence. *Journal of Clinical Oncology, 20,* 3302-3316.

Roetzheim, R., G., Pal, N., Tennant, C., Voti, L., Ayanian, J. Z., Schwabe, A., et al. (1999). Effects of health insurance and race on early detection of cancer. *J Natl Cancer Instit, 91,* 1409-15.

Rohan, T. E., Hiller, J. E., & McMichael, A. J. (1993). Dietary factors and survival from breast cancer. *Nutr Cancer, 20,* 167-177.

Salminen, E., Bishop, M., Poussa, T., Drummond, R., & Salminen, S. (2004). Dietary attitudes and changes as well as use of supplements and complementary therapies by Australian and Finnish women following the diagnosis of breast cancer. *European Journal of Clinical Nutrition, 58,* 137-144.

Salminen, E., Heikkila, S., Poussa, T., Lagstrom, H., Saario, R, & Salminen, S. (2002). Female patients tend to alter their diet following the diagnosis of rheumatoid arthritis and breast cancer. *Preventive Medicine, 34,* 529-535.

Saxe, G. A., Rock, C. L., Wicha, M. S., & Schottenfeld, D. (1999). Diet and risk for breast cancer recurrence and survival. *Breast Cancer Research and Treatment, 53,* 241-253.

Schwartz, M. D., Taylor, K. L., & Willard, K. S. (2003). Prospective association between distress and mammography utilization among women with a family history of breast cancer. *J Behav Med 26,* 105-117.

Schwartz, M. D., Taylor, K. L., Willard, K. S. Siegel, J. E., Lamdan, R. M. & Moran, K. (1999). Distress, personality, and mammography utilization among women with a family history of breast cancer. *Health Psychology, 18,* 327-32.

Sherman, A.C., Simonton, S., Adams, D.C., Vural, E., & Hanna, E. (2000). Coping with head and neck cancer during different phases of treatment. *Head & Neck, 22,* 787-793.

Simon, M. S., & Severson, R. K. (1996). Racial differences in survival of female breast cancer in the Detroit Metropolitan area. *Cancer, 77,* 308-14.

Spitz, M. R., Fueger, J. J., Chamberlain, R. M., Goepfert, H., & Newell, G. R. (1990). Cigarette smoking patterns in patients after treatment of upper aerodigestive tract cancers. *J Cancer Education, 5,* 109-13.

Stefanek, M. E., & Wilcox, P. (1991). First-degree relatives of breast cancer patients: Screening practices and provision of risk information. *Cancer Detect Prev, 15,* 379-384.

Sundin, E.C., & Horowitz, M.J. (2002). Impact of Event Scale: Psychometric properties. *British Journal of Psychiatry, 180,* 205-209.

Sutton, S., Bickler, G., Sancho-Aldridge, J., & Saidi, G. (1994). Prospective study of predictors of attendance for breast screening in inner London. *J Epidemiol Community Health, 48,* 65-73.

Tangney, C. C., Young, J. A., Murtaugh, M. A., Cobleigh, M. A., & Oleske, D. M. (2002). Self-reported dietary habits, overall dietary quality and symptomatology of breast cancer survivors: a cross-sectional examination. *Breast Cancer Research and Treatment, 71,* 113-123.

Thompson, B., Coronado, G. D., Solomon, C. C., McClerran, D. F., Newhouser, M., & Feng, Z. (2002). Cancer prevention behaviors and socioeconomic status among Hispanics and non-Hispanic whites in a rural population in the United States. *Cancer Causes Control, 13,* 719-28.

Thomson, C. A., Flatt, S. W., Rock, C. L., Ritenbaugh, C., Newman, V., & Pierce, J. P. (2002). Increased fruit, vegetable and fiber intake and lower fat intake reported among women previously treated for invasive breast cancer. *J Am Diet Assoc, 102,* 801-808.

Vernon, S. W., Tilley, B. C., Neale, A. V., & Steinfeldt, L. (1985). Ethnicity, survival, and delay in seeking treatment for symptoms of breast cancer. *Cancer, 55,* 1563-71.

Wells, B. L., & Horm, J. W. (1992). Stage at diagnosis in breast cancer: race and socioeconomic factors. *Am J Public Health, 82,* 1383-5.

Wells, B.L., & Horm, J.W. (1998). Targeting the underserved for breast and cervical cancer screening: the utility of ecological analysis using the National Health Interview Survey. *Am J Public Health, 88,* 1484-9.

Wilcox, S., Ainsworth, B. E., LaMonte, M. J., & DuBose, K. D. (2002). Worry regarding major diseases among older African-American, Native-American and Caucasian women. *Women Health, 36,* 83-99.

Wilkinson, G. S., Edgerton, F., Wallace, H. J., Reese, P., Patterson, J, & Delay, P. R. (1979). Delay, stage of disease, and survival from breast cancer. *J Chronic Dis, 32,* 365-73.

Winkleby, M. A., Albright, C. L., Howard-Pitney, B., Lin, J., & Fortmann, S. P. (1994). Hispanic/white differences in dietary fat intake among low educated adults and children. *Preventive Medicine, 23,* 465-473.

Winters, B. L., Mitchell, D. C., Smiciklas-Wright , H., Grosvenor, M. B., Liu, W., & Blackburn, G. L. (2004). Dietary patterns in women treated for breast cancer who successfully reduce fat intake: The Women's Intervention Nutrition Study (WINS). *J Am Diet Assoc, 104,* 551-559.

Zhang, S., Folsom, A. R., Sellers, T. A., Kushi, L.H., & Potter, J.D. (1995). Better breast cancer survival for postmenopausal women who are less over-weight and eat less fat. The Iowa Women's Health Study. *Cancer, 76,* 275-83.