PSYCHOSOCIAL ADJUSTMENT DURING THE
POST-RADIATION TREATMENT TRANSITION

by

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For the degree of Doctor of Philosophy

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Dedication

This dissertation is dedicated to my parents, Orie and Catherine Mazanec.
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Psychosocial Adjustment During the Post-Radiation Treatment Transition

Abstract

by

SUSAN ROSE MAZANEC

The immediate post-radiation treatment transition, the period from the last week of active treatment to one to three months after treatment, is a vulnerable time for patients. The patient is often not prepared to cope with the physical, emotional, and social demands during the transition. The purpose of this study was to determine predictors of psychosocial adjustment during the post-radiation treatment transition, to explore the role of cognitive appraisal in predicting psychosocial adjustment, and to evaluate the influence of self-efficacy for coping and social support on adjustment. The conceptual framework for this study was based on Folkman and Lazarus’s stress, appraisal and coping theory. A predictive correlational design tested the relationship between stress appraisal and psychosocial adjustment in a convenience sample of 80 patients with stage 0, I, II, or III breast, lung, and prostate cancer who were receiving radiation therapy at an NCI-designated Comprehensive Cancer Center. Two weeks prior to the completion of treatment, subjects completed standardized instruments to assess cognitive appraisal, symptom distress, uncertainty, social support, self-efficacy for coping, and comorbidity. Subjects completed the Psychosocial Adjustment to Illness Scale – Self-Report version one-month after radiation therapy. The analysis consisted of descriptive statistics and a series of hierarchical multiple regressions. The results indicated that although most
patients were doing well during the transition, vulnerability for poor adjustment was
categorized by young age and high amounts of threat appraisal, harm/loss appraisal,
uncertainty, and symptom distress. Cognitive appraisal of health was not a significant
explanatory variable for psychosocial adjustment when controlling for uncertainty, cancer
stage, age, and symptom distress. Rather, symptom distress was identified as the only
significant predictor of adjustment. Further analyses identified psychological symptom
distress, not physical symptom distress, as the significant factor in predicating
psychosocial adjustment. Social support and self-efficacy for coping did not moderate the
relationship between cognitive appraisal and psychosocial adjustment. The study
findings will aid the development of assessment and intervention tools. The radiation
oncology nurse may facilitate adjustment during the transition by routine comprehensive
assessment of symptom distress and early intervention to reduce physical and
psychological symptoms.
Chapter I

Introduction

Patients undergoing radiation therapy are especially vulnerable during the immediate post-treatment transition, the period from the last week of active treatment to one to three months after treatment. They often are not prepared to cope with the physical, emotional, and social demands during this post-treatment transition into a phase of cancer survivorship. The literature indicates that patients deal with persistent and unpredictable treatment side effects, fatigue, nutritional problems, anxiety, uncertainty and emotional distress after the completion of radiation treatment. These problems are compounded by the reduced access to health care professionals and lack of resources for psychosocial support during the immediate post-treatment cancer period (Arnold, 1999; Institute of Medicine & National Research Council, 2006; Lethborg, Kissane, Burns & Snyder, 2000). Despite the potentially turbulent course of the post-radiation treatment transition, it is rarely described in the literature and there are few empirical reports describing characteristics of patients at high risk for a difficult transition.

Background and Significance

The course of cancer survivorship for a patient and family begins at the moment of diagnosis (National Cancer Institute, 2006). As the patient nears the end of active cancer treatment, a transition occurs to the post-treatment survivorship phase. This time frame has been described in the literature as the initial period of “reentry,” during which the patient is confronted with physical, emotional and social adaptive tasks (Stanton et al., 2005). Informal observation by the investigator has identified several characteristics of this phase. First, the duration of the post-radiation treatment transition is the time
period from the last week of active treatment to the time when the acute side effects from treatment subside, usually one to three months. Second, the transition is a time of opposing emotions and experiences for the patient. For example, the patient may be overjoyed with having survived cancer treatment, but is fearful of the uncertainty of the future. Treatment side effects persist and are often characterized by periods of quiescence and exacerbation. While coping with the physical side effects of treatment, the patient also must work through psychosocial adjustment. And yet, during this transition, the patients’ very intense, daily contact with the healthcare team during their weeks of radiation treatment ends abruptly at the completion of treatment. Contact remains disrupted until the first follow-up visit four to six weeks later. Lastly, the transition is an opportunity for nurses to identify and intervene with patients who are at high risk for physical, emotional and social problems during the immediate post-treatment phase. The goal is to promote effective adjustment and achievement of improved quality of life during this transition into a new phase of cancer survivorship.

Evidence suggests that a key factor in psychosocial adjustment is cognitive appraisal. Stress appraisal of cancer has been found to be predictive of psychological adjustment to breast cancer two to six months after diagnosis (Gallagher, Parle, & Cairns, 2002), affective mood in patients receiving chemotherapy (Munkres, Oberst, & Hughes, 1992), and mood dysfunction in patients undergoing radiation therapy (Oberst, Hughes, Chang, & McCubbin, 1991). No studies were found that explored the relationship between cognitive appraisal and psychosocial adjustment during the immediate post-radiation treatment transition. In addition, very little is known about predictors of cognitive appraisal during radiation therapy. Factors such as symptom distress,
uncertainty, comorbidities, stage of cancer, and personal factors may influence cognitive
appraisal of the transition.

The immediate post-radiation treatment transition is important to study because of
the large number of patients with cancer who will receive radiation treatment. The
American Cancer Society (2009) estimates that 1,479,350 Americans will be diagnosed
with cancer this year and approximately two-thirds of these patients will receive radiation
therapy at some point during their cancer experience (American Society for Therapeutic
Radiology and Oncology, 2004).

In addition to these statistics that highlight the volume of patients with cancer,
two recent reports from the Institute of Medicine support the need for further study of
psychosocial adjustment in patients with cancer. First, the significance of the post-cancer
treatment transition is emphasized in the Institute of Medicine’s report entitled From
Cancer Patient to Cancer Survivor: Lost in Transition (Institute of Medicine & National
Research Council, 2006). The report underscores the physical, psychological and social
 needs of the more than 10.5 million cancer survivors in the United States. Although the
report does not address the post-radiation treatment transition specifically, it does outline
recommendations for proactive and coordinated care at the end of cancer treatment to
improve the quality of life of cancer survivors. These include the creation of a
“survivorship care plan” for each patient ending treatment. This care plan provides
patients with summaries of their treatment and informs them of future follow-up,
preventative, and supportive care that is needed.

The second Institute of Medicine report, Cancer Care for the Whole Patient:
Meeting Psychosocial Health Needs, focuses on barriers and gaps in meeting the
significant psychosocial needs of patients and caregivers and strategies for integrating psychosocial health services into cancer care (Institute of Medicine, 2007). Numerous research recommendations are made in the report, including further development of screening tools to identify patients with psychosocial problems and interventions to promote psychosocial health. A comprehensive perspective on psychosocial care is presented as the report discusses psychosocial problems and needs within the context of survivorship, mental illness, comorbidities and caregiving.

Despite the Institute of Medicine’s (2006; 2007) recent emphasis on psychosocial care and post-cancer treatment survivorship, there have been few studies of the post-radiation treatment transition. This research contributes to: (a) the description of the patient’s experience post-radiation, (2) our understanding of cognitive appraisal and its importance in psychosocial adjustment after cancer treatment, and (3) the evaluation of the influence of self-efficacy and social support on adjustment. This study of factors that predict psychosocial adjustment during the post-treatment transition provides valuable information for the development of assessment and intervention tools for the healthcare team.

This study advances radiation oncology nursing clinical practice and enhances the ability of nurse educators to describe the cancer experience in a more comprehensive manner. The expertise of the nursing discipline in patient education, symptom management and supportive counseling positions radiation oncology nurses to play a key role in preparing patients for the end of treatment transition and in assisting them with successfully meeting the demands of this period. Identification of patients at high risk for poor adjustment will enable the radiation oncology nurse to intervene, promoting
effective adjustment and achievement of improved quality of life. If this study can confirm the pivotal role of cognitive appraisal in psychosocial adjustment and if we can confirm that self-efficacy and social support are powerful moderators, then interventions can be targeted towards these key factors during the transition.

Purpose

The purpose of this study was to examine predictors of psychosocial adjustment during the immediate post-radiation treatment transition in patients with breast, colorectal, lung and prostate cancer who have completed their primary treatment for their cancer. The research questions were:

1. What are the intrapersonal and emotional characteristics of psychosocial adjustment in patients with breast, colon, prostate, and lung cancer during the post-radiation treatment transition?

2. What is the relationship of symptom distress, uncertainty, medical factors (comorbidity, cancer stage), and personal factors (age, gender, race/ethnicity, and education) with cognitive appraisal of health at two weeks prior to ending radiation treatment?

3. What is the predictive relationship between cognitive appraisal of health at two weeks prior to ending radiation treatment and psychosocial adjustment during the post-radiation treatment transition?

4. Does social support moderate the relationship between cognitive appraisal of health and psychosocial adjustment during the post-radiation treatment transition?
5. Does self-efficacy for coping moderate the relationship between cognitive appraisal of health and psychosocial adjustment during the post-radiation treatment transition?

Theoretical and Conceptual Framework

The conceptual framework for this study was based on Lazarus and Folkman’s stress, appraisal and coping theory, which views the individual’s cognitive appraisal of a threat as the central factor in determining how the individual responds (Lazarus & Folkman, 1984). This theory is considered a “transactional” model because it not only depicts the individual as a mediator between the environmental stimuli and the response, but also highlights the dynamic and reciprocal interactions between the person and the environment (Derogatis & Coons, 1993; Lazarus & Folkman, 1984). The cognitive and physiologic characteristics of the individual integrate with the environment to form a “transactional variable” or appraisal (Lazarus & Folkman, 1984, p. 294). Thus, according to this theory, appraisal is a unique, dynamic and relational process that is occurring constantly between the person and environment (Lazarus & Folkman, 1984). The concept of cognitive appraisal was further refined by Lazarus in his later theory of emotion to emphasize that it is a highly personal evaluation of the meaning of a situation for one’s well-being (Lazarus, 1991).

Cognitive appraisal consists of primary and secondary appraisal (Lazarus & Folkman, 1984; Folkman, Lazarus, Dunkel-schetter, DeLongis & Gruen, 1986). Primary appraisal refers to the individual’s assessment of what is at stake during an encounter related to one’s well-being and is categorized as irrelevant, benign-positive, or stressful. A primary appraisal of an encounter that is irrelevant is of no consequence to the
Benign-positive appraisal refers to an assessment that the encounter will provide some good or benefit in terms of well-being. Stressful appraisals of an encounter are further categorized into those that are viewed as harm/loss, threat, or challenge. Harm/loss stress appraisals refer to the perception that damage has already occurred to the individual. A threat appraisal, which may occur with a harm/loss appraisal, is the perception of a potential harm. A challenge appraisal is the awareness that there is an opportunity for growth and mastery. To summarize, there are five types of primary appraisal: irrelevant, benign-positive, harm/loss, threat, and challenge.

Secondary appraisal refers to the individual’s assessment of what can be done to effectively prevent harm, mitigate the threat, or enhance opportunities for benefit (Folkman, et al., 1986). It is an assessment of one’s capacity to cope with a situation, including what should be done, whether one can enact the coping strategy, and how the consequences of the coping strategy should be evaluated. In the model proposed by Lazarus and Folkman (1984), cognitive appraisal precedes a coping response, which then leads to adaptation.

Personal and environmental factors, described as “causal antecedents” in the model by Lazarus and Folkman (1984), work together to influence cognitive appraisal. Commitments (choices, values, and goals), beliefs about personal control, and existential beliefs are significant personal factors that affect appraisal (Lazarus & Folkman, 1984). Characteristics of the situation that influence appraisal include the novelty, predictability, and uncertainty of the situation. Also the imminence and duration of an event, as well as the uncertainty about when it will occur (temporal uncertainty) influence appraisal (Lazarus & Folkman, 1984).
According to Lazarus and Folkman (1984), coping occurs when an individual appraises that he or she does not have the resources to manage the demands in a specific situation. Coping is viewed as a highly contextual and dynamic process utilizing both cognitive and behavioral efforts to regulate emotions (emotion-focused coping) or to manage the source of stress (problem-focused coping) (Folkman, et al., 1986; Lazarus, 1993). As the individual copes, reappraisal occurs with possible modification of coping. Immediate outcomes of both the appraisal and coping processes include physiologic changes and emotional responses. Long-term effects are health or illness, well-being, and social functioning. Thus, in this model, cognitive appraisal plays a significant and direct role in determining one’s health and quality of life.

Consistent with Lazarus and Folkman’ theory, it was posited that the patient’s appraisal of his/her health during the post-radiation treatment transition is pivotal in determining coping and adaptive responses. The appraisal is dynamic and interactional and is influenced by personal and environmental antecedents of symptom distress, uncertainty, age, sex, race/ethnicity, education, cancer stage, and co-morbidities. Although Lazarus and Folkman labeled cognitive appraisal as a “mediating process” between the antecedents and immediate effects, appraisal was not examined statistically as a mediator in this study. Rather, moderators, which were not identified in the theoretical model, were explored for their effects. It was posited that social support and self-efficacy for coping moderate the relationship between cognitive appraisal and psychosocial adjustment. The conceptual and empirical structure of the study is shown in Figure 1.
Figure 1. Conceptual-empirical structure derived from Lazarus and Folkman’s Theory of Stress, Appraisal and Coping.

Theoretical Definitions

Post-Radiation Treatment Transition

The concept of transition includes both the process of movement from one state to another, and the individual’s response to the experience (Chick & Meleis, 1986). The types, patterns, and properties of transitions are depicted in the middle-range theory of transitions posited by Meleis, Sawyer, Im, Messias, & Schumacher (2000). Transitions normally occur throughout one’s life as a result of developmental, social, cultural, or illness-related changes during which the individual is vulnerable. A person may
experience multiple, sequential, overlapping, or related transitions. The theorists identified five core features of a transition: (a) awareness by the individual that a transition is occurring, (b) some degree of engagement in the transition by the individual, (c) existence of change and a subjective feeling of being different, (d) a time span with potentially unspecific boundaries, and (e) “critical points” within the transition characterized by increased vulnerability (Meleis et al., 2000, p. 21). Of significance in this theory is the notion that movement towards a “healthy transition” can be facilitated or inhibited by personal factors such as the meaning attributed to the transition, cultural beliefs, socioeconomic status, knowledge; community resources; and societal views of stigmatization or marginalization. Lastly, patterns of response to a transition are described in the theory as both process and outcome indicators (Meleis et al., 2000). Process indicators are those patterns that indicate if the transition is progressing towards a state of health, such as expressions of confidence or coping behaviors (Meleis et al., 2000). A sense of mastery of the changes induced by the transition and an identity that integrates the transition are outcome indicators of achieving a healthy transition (Meleis et al., 2000). Nursing practice is critical at all phases of the transition and is targeted at assessing the characteristics of the transition, enhancing, modifying or mitigating facilitators and inhibitors, and monitoring patterns of response. Although this middle-range theory is meant to explicate many different kinds of transitions, qualitative research involving the transitions of family caregivers during chemotherapy treatment informed the construction of this theory (Schumacher, 1994). In that study, the completion of cancer treatment was described as a “critical period” for both caregivers and patients and was characterized by feelings of ambivalence, uncertainty, and anxiety.
The major transitions along the cancer trajectory include initial diagnosis, treatment, survivorship, relapse, and end-of-life. Much of the literature describes the concept of transition globally. For example, Ferrell and Dow (1996) present “transition to a different life” as one of three themes extrapolated from approximately 700 narratives from cancer survivors. Physical changes, emotional loss, surviving a life-threatening illness, and redefining what can be controlled were characteristics of the transition. Brennan (2001) proposed the Social-Cognitive Transition Model to explain the psychological and social processes needed to meet demand of the transition of a cancer diagnosis. According to Brennan (2001, p.8), each person has a “cognitive map” which is a large, complex group of assumptions about how the world operates. The transition of a cancer diagnosis threatens these assumptions and requires changes to one’s cognitive map, which may lead to both positive and negative transitions. A positive transition might include personal growth and clarity or redefining of goals. Despair, hopelessness, and depression would characterize a negative transition. Both Ferrell and Dow (1996) and Brennan (2001) describe transitions along the cancer trajectory as highly personal.

Completion of cancer treatment is one of many transitions along the cancer trajectory. For this study, the post-radiation treatment transition was theoretically defined as the period from the last week of active treatment to one to three months after treatment, during which the patient moves from very close observation by the oncology team to one of less frequent contact. The transition is also a complex, unique process, during which the patient continually appraises his or her health as influenced by personal and environmental factors and in response to physical, social and emotional adaptive tasks.
**Psychosocial Adjustment**

Psychosocial adjustment has been defined by Brennan (2001, p. 2) as “the processes of adaptation that occur over time as the individual manages, learns from and accommodates the multitude of changes which have been precipitated by changed circumstances in their lives.” Brennan (2001) stresses several key points about psychosocial adjustment that may be applied to the context of the post-radiation treatment transition. First, psychosocial adjustment is not limited to a specific time period such as the completion of cancer treatment, but rather is an ongoing process. Second, it is more than the outcome of a coping process, as it includes both psychological and behavioral adaptive processes made by an individual and his/her social network in response to stress. Lastly, it is a dynamic and reflexive process between the individual and his/her environment and occurs within a social context.

Psychosocial adjustment during the immediate post-cancer treatment period has been described as occurring within the emotional, physical, interpersonal, and practical domains (Stanton et al., 2005). It is a multi-dimensional concept that is closely tied to performance of social roles (Derogatis, 1986). Individuals who have completed cancer treatment are confronted with reintegrating or renegotiating social roles at many levels including marital, family, occupational, and community (Holland & Reznik, 2005). This resumption of roles is often difficult during the post-radiation treatment transition due to persistent treatment side effects and fatigue. Often, the family’s or work colleagues’ expectations for recovery and return to social roles do not match the expectations or experiences of the patient.
Psychosocial adjustment may also refer to the process of attaining emotional or psychological well-being. Cancer survivors have been found to confront issues related to emotional distress (Cappiello, Cunningham, Knobf, & Erdos, 2007), uncertainty (Dow & Lafferty, 2000; Lauver, Connolly-Nelson, & Vang, 2007), hopelessness (Moore, Chamberlain, & Khuri, 2004), sexuality (Dow & Lafferty, 2000) and post-traumatic distress (Smith, Zimmerman, Williams, Preisser, & Clipp, 2008; Meeske, Ruccione, Globe, & Stuber, 2001). Opportunities for personal growth and hopefulness may also be expressed by cancer survivors (Cordova, Cunningham, Carlson, & Andrykowski, 2001; Luoma & Hakamies-Blomqvist, 2004).

Psychosocial adjustment is closely related to the concept of quality of life. Quality of life is a multidimensional, subjective, and dynamic construct reflecting an individual’s satisfaction with physical, social, emotional, functional, and spiritual dimensions of life as impacted by one’s health (King et al., 1997; Dow, Ferrell, Haberman, & Eaton, 1999; Varricchio, 2006). It is an umbrella concept that encompasses the domains of psychosocial adjustment. Psychosocial adjustment, as an adaptive process, is perhaps a pathway toward achieving quality of life. An individual’s perception of well-being in the psychosocial domains of health, vocation, family, sexuality, interpersonal relationships, and emotions contributes to his/her quality of life.

In this study, psychosocial adjustment was defined as an adaptation process in which the individual uses cognitive and behavioral resources in response to the physical, emotional, functional, and spiritual demands during the post-radiation treatment transition (Brennan, 2001; Stanton et al., 2005). It is a dynamic, multidimensional phenomenon, in which the individual makes a conscious effort to reduce emotional
distress and assimilate the experience of cancer into his/her daily roles. Consistent with Lazarus and Folkman (1984), it was posited that cognitive appraisal of one’s health during the transition would play a key role in psychosocial adjustment.

_Cognitive Appraisal_

Cognitive appraisal was conceptually defined as an individual’s evaluation of the significance of the post-radiation treatment transition as it impacts one’s health. It is a dynamic and interactional process that is influenced by symptom distress, uncertainty, characteristics of the individual, and factors associated with cancer.

Cognitive appraisal has been shown to be predictive of various outcomes in cancer populations. Stress appraisal of cancer has been found to be predictive of psychological adjustment to breast cancer two to six months after diagnosis (Gallagher et al., 2002), affective mood in patients receiving chemotherapy (Munkres et al., 1992), and mood dysfunction in patients undergoing radiation therapy (Oberst et al., 1991). Appraisal has also been found to partially mediate the relationship between symptom distress and affective mood (Munkres et al., 1992), and between symptom distress and quality of life (Northouse et al., 1999). No studies were found that explored the relationship between appraisal and psychosocial adjustment during the immediate post-radiation treatment transition.

Although it is well known that numerous antecedent factors influence appraisal, including those related to the illness and personal factors (Lazarus & Folkman, 1984), very little is known about predictors of cognitive appraisal during radiation therapy. In the one older study found addressing appraisal during radiation therapy, self-care burden and family hardness were predictive of appraisal in patients with varying diagnoses.
Another study, which explored appraisal in long-term cancer survivors, found that stress appraisal was associated with family distress, young age, and being White (Bowman, Deimling, Smerglia, Sage, & Kahana, 2003). Neither study focused on the post-radiation treatment transition.

**Symptom Distress**

Although there is a lack of consensus in defining symptom distress, it is generally viewed as a multidimensional phenomenon, in which the patient subjectively attributes meaning to the symptom causing a negative affective response, such as anguish (Goodell & Nail, 2005; McClement, Woodgate, & Degner, 1997). Lenz, Pugh, Milligan, Gift and Suppe (1997) define symptom distress in their middle-range theory of unpleasant symptoms as the degree to which a patient is bothered by the symptom. Symptom distress is an integral component of the symptom experience and is distinct from symptom intensity, frequency, and duration (Rhodes, McDaniel, Homan, Johnson, & Madsen, 2000).

Patients undergoing radiation therapy typically experience multiple side effects, often presenting as symptom clusters (Honea, Brant, & Beck, 2007). These side effects are both regional and general in nature. For example, a patient receiving radiation for prostate cancer is likely to experience several side effects related to pelvis radiation (dysuria, urinary frequency, skin irritation) as well as a general feeling of fatigue. Side effects tend to develop gradually throughout the weeks of treatment and persist for several weeks or months post-treatment. Symptom distress has been described as a significant problem for patients receiving radiation therapy for lung cancer (Kuo & Ma, 2002; Sarna & Brecht, 1997), breast cancer (Knobf & Sun, 2005), and prostate cancer.
Distress related to persistent fatigue within the month following radiation treatment was noted in patients with cancer of the lung (Borthwick, Knowles, McNamara, O’Dea, & Stroner, 2003) and breast (Graydon, 1994). Symptom distress may persist long after treatment is completed. Physical and psychological symptoms have been identified as distressing problems for cancer patients who are within the first twelve months of completing treatment (Cheng, Thompson, Ling & Chan, 2005).

Symptom distress directly affects the cancer patient’s coping strategies (Kuo & Ma, 2002) and quality of life (McMillan & Small, 2002; Northouse et al., 2002; Yan & Sellick, 2004; Byar, Berger, Bakken, & Cetak, 2006). It has been found to predict survival in patients with lung cancer (Degner & Sloan, 1995) and various types of cancers (Chang et al., 1998).

In this study, symptom distress was viewed as a personal antecedent factor of cognitive appraisal during the post-radiation treatment transition. There are few studies of the relationship between cognitive appraisal and symptom distress. Symptom distress, along with economic status and having recurrent cancer, predicted appraisal of cancer treatment in a study of patients receiving chemotherapy (Munkres et al., 1992). In another study, cognitive appraisal partially mediated the relationship between symptom distress and quality of life (Northouse et al., 1999). In contrast, symptom distress did not interact with appraisal in influencing quality of life in a study of women with recurrent breast cancer (Northhouse et al., 2002). Given these conflicting results, further studies are needed of the relationship between symptom distress and appraisal.
Uncertainty

Uncertainty is defined as the “inability to determine the meaning of illness-related events” (Mishel, 1988, p. 225). Illness uncertainty among cancer survivors is well described as a persistent cause of emotional distress after cancer treatment (Gill et al., 2004; Mast, 1998) and research has focused on interventions to alleviate uncertainty in patients with breast (Mishel et al., 2005) and prostate cancer (Mishel et al., 2003; Mishel et al., 2002).

According to Mishel’s middle-range theory of uncertainty in illness, inconsistent symptom patterns, unfamiliar events, lack of congruence between expected and actual events, limited cognitive capacity to process information, and lack of resources to assist in understanding events causes uncertainty and the subsequent inability to form a cognitive structure needed for recognition and classification of a stressful event (Mishel, 1981). The individual, influenced by personality and knowledge, then forms an appraisal of the uncertainty as a danger or an opportunity (Mishel, 1988). This view of uncertainty as an antecedent of appraisal is consistent with Lazarus and Folkman’s view of event and temporal uncertainty as situational factors influencing appraisal (Lazarus & Folkman, 1984). Lazarus (1991) also acknowledged hope as a potential positive outcome of uncertainty.

Like symptom distress, the precise relationship between uncertainty and cognitive appraisal has received less study. Age and uncertainty significantly predicted harm and threat appraisal in 71 breast cancer survivors (Wonghongkul, Moore, Musil, Schneider, & Deimling, 2000). Other studies have found that uncertainty, when coupled with harm or danger appraisal, is predictive of quality of life in women with breast cancer three years
post-diagnosis (Wonghongkul, Dechaprom, Phumivichuvate, & Lasawatkul, 2006), women being treated for gynecologic cancer (Padilla, Mishel, & Grant, 1992), and older men who have opted to practice “watchful waiting” as a treatment option for prostate cancer (Wallace, 2003). Uncertainty and its impact on cognitive appraisal are virtually unstudied in patients ending radiation oncology, a time that is likely to be fraught with uncertainty.

Self-Efficacy for Coping

Self-efficacy, considered a core determinant of behavior, refers to an individual’s belief that he or she is capable of performing a behavior in a particular situation (efficacy expectations) to produce a specific outcome (outcome expectations) (Bandura, 1977b). Self-efficacy relates to personal convictions, not personality traits or the skills that one possesses (Bandura, 1997b). It is described by Lazarus (1984) as an important component of secondary appraisal, which also includes an assessment of what can be done to reduce a threat and how the consequences of the proposed coping strategy should be evaluated. In a stressful encounter, efficacy expectations, in conjunction with an assessment of what is at stake (primary appraisal), determines coping (Lazarus, 1984).

Self-efficacy for coping is defined as confidence in one’s ability to apply a coping strategy to achieve goals (Merluzzi, Nairn, Hedge, Sanchez, & Dunn, 2001). This study proposed that self-efficacy for coping would act as a moderator to influence the relationship between cognitive appraisal and psychosocial adjustment during the post-radiation treatment transition. Unlike Lazarus’ theory, self-efficacy for coping was viewed in this study as the primary component of secondary appraisal directly influencing the individual’s behavior in implementing coping strategies to deal with a
stressful encounter. It was thought that the evaluative component of secondary appraisal is dependent on an individual’s self-efficacy beliefs, in that an individual is unlikely to consider coping strategies for which he/she has low self-efficacy.

Self-efficacy is an important construct to study because it is a key element in achieving quality of life (Henderson, 2003). Although there were no studies found of the moderating role of self-efficacy, interventional studies aimed at increasing self-efficacy in patients undergoing radiation therapy were found (Dunn, Steginga, Rose, Scott, & Allison, 2004; Bennenbroek et al., 2003; Scheier et al., 2005). One study demonstrated that patients were able to increase their self-efficacy with an educational intervention (Bennenbroek, et al., 2003).

Bandura (1977b) describes four sources from which a person learns self-efficacy. Performance accomplishment is the most powerful source because it refers to personal mastery of skills that, with repeated successes, may enhance one’s ability to cope when confronted with similar situations (Bandura, 1977b, Strecher, DeVellis, Becker, & Rosenstock, 1986). Vicarious experience is a source that offers learning by watching others perform the behavior. This source encourages modeling, which is particularly successful in learning behaviors when there is similarity to the model and there are clear positive outcomes (Bandura, 1977b). The third source of self-efficacy is verbal persuasion or the use of suggestion to convince someone that they have the capabilities to perform in a situation. The last source is emotional and physiological arousal, which can have a negative effect on perceived self-efficacy if the person is feeling tense or anxious (Bandura, 1977b).
Self-efficacy may function as mediator or moderator. Self-efficacy was shown to mediate the relationship between age and psychosocial adjustment to cancer (Martinez Sanchez, 1996) and between social support and psychosocial adjustment in women with breast cancer (Kennedy, 1997). Quality of life studies have also explored the mediator and moderator roles of self-efficacy. Self-efficacy was found to moderate the relationship between cancer-related distress and mental health-related quality of life in adults at risk for hereditary cancer (Carlsson, Bjorvatn, Engebretsen, Berglund, Natvig, 2004). In a different study, self-efficacy mediated the relationship between quality of life and perceived stress (Kreitler, Peleg, & Ehrenfeld, 2007), personal and disease-related characteristics (Champion, et al., 2007), and a psychoeducational intervention in women with breast cancer within two months of completing chemotherapy and radiation treatment (Scheier, et al., 2005). Knowledge of the role of self-efficacy in moderating the relationship between cognitive appraisal and psychosocial adjustment will be needed to develop targeted interventions.

Social Support

Social support may be a key factor in patient outcomes during the post-radiation treatment transition, as it has been shown to be significantly associated with positive mood in women with metastatic breast cancer (Koopman, Hermanson, Diamond, Angell & Spiegel, 1998), improved quality of life in breast cancer survivors (Lewis et al., 2001; Manning-Walsh, 2005), and positive psychosocial adjustment to breast cancer (Budin, 1998; Holland & Holahan, 2003). Although the bulk of the social support literature is specific to women with breast cancer, in other populations social support was positively related to cognitive processing of their experience in men with prostate cancer (Roberts,
Lepore & Helgeson, 2006) and mental health and self-esteem in testicular cancer survivors (Tuinman, Hoekstra, Fleer, Sleijfer, & Hoekstra-Weebers, 2006).

There is not a single definition of social support. Shumaker and Brownell (1984, p. 13) defined social support as “an exchange of resources between at least two individuals perceived by the provider or the recipient to be intended to enhance the well-being of the recipient.” This definition reflects the three common characteristics found in a review of 33 instruments used to measure social support (O’Reilly, 1988). Support is interactive, involves specific behaviors, and results in a positive effect on well-being.

There are several theoretical perspectives that help to further define social support and differentiate it from related concepts. The first is the structural perspective of support which includes the concepts of social integration and network. Antonucci (2001) places the concept of social networks within the broader construct of “social relations” and defines social network as the number and characteristics of people with whom an individual has relationships. Social network is typically described in the literature as the structure of a person’s interpersonal relationships, whereas social support is the function or quality of the network relationships (Langford, Bowsher, Maloney, & Lillis, 1997). However, Thoits (1982) intertwines the concept of social support with structure in the term “social support system,” which refers to the subset of supportive people within an individual’s social network. Social integration, another term that is closely related to social network, is the degree to which an individual engages in social activities and relationships (Brissette, Cohen, & Seeman, 2000). It is postulated that social integration influences health and wellness through the development of role identities and sense of purpose and meaning in life (Thoits, 1983).
Another theoretical perspective defines social support in terms of its functions. Langford and colleagues (1997) define the four attributes of social support as: emotional, instrumental, informational, and appraisal. Emotional support refers to expression of concern, love, caring and empathy. Instrumental support refers to the provision of material aid, goods, or services. Informational support is the provision of advice, guidance or information aimed at problem-solving. Appraisal support is similar to what Antonucci (2001) refers to as affirmation or the acknowledgement of one’s values or perspective. Each of these attributes can be viewed in terms of perceived or received support. Perceived support is the belief that support is available if needed; received support, also called enacted support, is the actual support given (Keeling, Price, Jones, & Harding, 1996). Perceived social support has been conceptualized as a cognitive personality variable, with low levels hypothesized to be linked to psychological distress (Lakey & Cassady, 1990).

Lastly, theoretical models describe the two processes by which social support influences health outcomes. The main-effect model proposes that social relationships directly effect psychological and physical health, irrespective of the presence or absence of stressors (Cohen, Gottlieb, & Underwood, 2000). This model is related to the structural perspective of support in that embeddedness or integration into a social network is fundamental to positive outcomes. The buffering model, as described by Cohen & Wills (1985), posits that social support acts at two points along the stressor-illness continuum either indirectly or directly in buffering the effects of stress. First, social support may function by influencing the appraisal of a stressful event, thereby increasing the individual’s coping ability. Second, social support may act after the
A stressful event occurs by lessening or eliminating the stress-related reaction. The stress-buffering effects have been associated more often with functional social support (Cohen & Wills, 1985).

In this study, the phenomenon of interest was the psychosocial adjustment of patients who had received weeks of rigorous treatment for a life threatening illness and were transitioning to a new phase of survivorship. The multiple physical, social, and emotional demands during this period were likely stressful. Thus, social support was viewed mainly as having a buffering role during the transition, acting directly on cognitive appraisal. The main-effect model, which is focused on social relationships and integration into a social network, was not viewed as the primary process by which social support functions during the post-radiation treatment transition.

Explicitly stated conceptual definitions of social support are lacking in the cancer literature. In a qualitative study of women with breast cancer, supportive relationships are conceptualized as “giving attention to the patient” (Lugton, 1997, p.1185). Northouse (1988, p. 91) defined social support as “a characteristic of the social situation that buffers the effect of stress on the health of the individual.” Consistent with O’Reilly’s (1988) observation that support is interactive, behavioral, and results in a positive effect on well-being, social support during the post-radiation treatment transition was conceptually defined by this author as an interaction between two individuals that is perceived to be helpful by the intended recipient. The supportive interaction may consist of emotional, instrumental, informational, and appraisal elements.

Operational definitions are varied in empirical studies of patients with cancer with most reflecting a mix of the following: emotional and functional support (Manning-
Walsh, 2005); satisfaction with support (Friedman et al., 2006); network size (Northouse, 1988; Koopman et al., 1998); social relations (Holland & Holahan, 2003); perceived support (Northouse, 1988; Budin, 1988; Lewis et al., 2001); and received support (Schwarzer, Luszczynska, Boehmer, Taubert, & Knoll, 2006). Marital status is used in some studies as a proxy for social support. For example, marital status and attendance at weekly religious service was used as operational measures in a study of social support in older women with breast cancer (Silliman, Dukes, Sullivan & Kaplan, 1998). For this research, social support was operationally defined as one’s perception of helping relationships.

Applying the stress-buffering model (Cohen & Wills, 1985), it was postulated that perceived social support may act by moderating the relationship between appraisal of illness and psychosocial adjustment during the post-radiation treatment transition. Social support has been found to moderate the relationship between intrusive thoughts about cancer and quality of life in breast cancer survivors (Lewis et al., 2001). There were no studies found of social support and its interaction with cognitive appraisal specifically during the post-radiation treatment transition. Confirmation of the role of social support in appraisal during the transition would suggest the need to design screening tools to identify patients at high risk for poor adjustment and further identify targets for interventions.
Assumptions

The following assumptions underlay this study:

1. Individuals are in constant, dynamic, reflexive relationship with the environment and respond to that relationship through cognitive processes, which are influenced by both personal and environmental factors.

2. Transitions throughout the cancer trajectory of diagnosis, treatment, and survivorship or end-of-life care are potentially stressful events with threats to the patient’s physical, psychological, emotional, social, functional and spiritual health.

3. Patients are social beings and through appraisal and coping processes will desire and work to achieve psychosocial adjustment during the post-radiation treatment transition.

Summary

The post-radiation treatment transition is a vulnerable time for the patients who are not prepared to cope with the many physical, social, and emotional demands that are common during this period. The purpose of this study was to examine predictors of psychosocial adjustment during the transition. It was postulated by the author that the post-radiation treatment transition consists of multiple inter-related concepts including psychosocial adjustment, cognitive appraisal, symptom distress, uncertainty, self-efficacy and social support. The discussion of these concepts will continue in the next section of this paper, which focuses on the empirical literature supporting the relationships outlined in this study.
Chapter II

Review of the Literature

The purpose of this chapter is to summarize and critique the scientific literature of psychosocial adjustment and cognitive appraisal within the context of the post-radiation treatment transition. The empirical literature describing the relationships between cognitive appraisal and symptom distress, uncertainty, social support, and self-efficacy for coping will also be reviewed. Lastly, limitations and gaps in research will be identified with specific attention to the post-radiation treatment transition.

The immediate post-radiation treatment transition, the period from the last week of active treatment to one to three months after treatment, is a vulnerable time for patients. The patient is often not prepared to cope with the physical, emotional, and social demands during this transition into a new phase of cancer survivorship. The purpose of this study was to determine predictors of psychosocial adjustment during the immediate post-radiation treatment transition in patients with breast, colorectal, lung and prostate cancer who have completed their primary treatment. It was posited that cognitive appraisal of health just prior to completing radiation treatments would predict psychosocial adjustment one month after treatment. Appraisal was viewed as a dynamic process, influenced by symptom distress, uncertainty, age, sex, race/ethnicity, education, cancer stage, and comorbidities. Further, it was thought that social support and self-efficacy for coping would moderate the relationship between cognitive appraisal of health and psychosocial adjustment. The CINAHL, PubMed, and PsychInfo databases were searched to identify the empirical literature related to these concepts. The reference list
of each article was also reviewed to find other research relevant to the post-radiation treatment transition.

Post-Radiation Treatment Transition

Knowledge about the specific challenges encountered by patients during the post-radiation therapy treatment transition can be attained from five longitudinal studies (Deshields, et al., 2005; Rose & Yates, 2001; John, 2001; Langendijk et al., 2001; Klee, Thranov, & Machin, 2000) and one qualitative study (Wells, 1998) that have explored this time period in selected populations. Two of the studies, both from the nursing literature, were theoretical, using the Roy Adaptation Model (John, 2001) and the Ferrell Model of Quality of Life (Rose & Yates, 2001) as conceptual frameworks. Conceptual definitions of quality of life were outlined in these studies (John, 2001; Rose & Yates, 2001) but missing in the other studies, indicating a possible gap in conceptual explanations of phenomenon related to the post-radiation treatment transition. All of the longitudinal studies measured quality of life at time intervals that encompassed the post-radiation treatment transition as was defined in the current study. There was some consistency in the quality of life measures used, with three studies using the Functional Assessment of Cancer Therapy (FACT) (John, 2001; Rose & Yates, 2001, Deshields et al., 2005) and two using the European Organization for Research and Treatment of Cancer (EORTC) Quality of Life Questionnaire (QLQ) – C30 (Langendijk et al., 2001; Klee et al., 2000).

Although studies have generally confirmed that quality of life scores are low at the end of radiation therapy (Deshields et al., 2005; Rose & Yates, 2001; Dow & Lafferty, 2000), there have been mixed findings regarding the pattern of improvement in
quality of life in the month after radiation therapy. Deshields et al. (2005) found that quality of life scores for women who had received radiation therapy for breast cancer improved rapidly by two weeks after treatment and continued to improve at 4-6 weeks, 3 months and 6 months post-treatment (N = 94). Similarly, Rose and Yates (2001) found significant improvement in the total score for quality of life one month after the completion of radiation therapy for head and neck cancer (N = 58). However, improvements in physical and functional well-being were minimal during this time period. In contrast, improvement in quality of life after radiation therapy was not noted in a longitudinal study of 118 women who had completed radiation therapy for advanced stage cervical cancer (Klee et al., 2000). The subjects’ quality of life was lowest at 1 to 3 months after treatment and remained lower than the 236 healthy controls over 24 months. It is likely that patterns of improvement in quality of life during the post radiation treatment transition are contingent on medical and treatment factors including type and stage of cancer, radiation field and dose, and side effects.

Changes in quality of life during and after radiation therapy were assessed in two longitudinal studies of patients with lung cancer (Johns, 2001; Langendijk et al., 2001). Both studies found that quality of life, particularly the domains of physical and role functioning, deteriorated during radiation therapy due to increased symptoms. However, John (2001) noted that physical and functional quality of life improved at one month after completion of treatment and was at a higher level than pre-treatment quality of life. Functional well-being remained significantly high at four months post-treatment. These findings were not supported by Langendikk et al. (2001) who observed significant gradual declines in physical and functional quality of life six to 12 months after radiation
therapy. Only social functioning improved six weeks after completing treatment.

Differences in the results may be explained by the fact that John (2001) studied a small sample (N = 23) of stage III lung cancer patients who had received five different treatment regimens, while Langendijk et al. (2001) included only stage III patients receiving radiotherapy alone (N = 164).

The longitudinal studies reviewed indicate that despite improvements in quality of life and physical health in the month after radiation treatment, emotional health, particularly depression, remains a significant problem for many patients. In a study of 94 women with breast cancer, who were interviewed at five time points beginning at the last day of radiation treatment and then at 2 weeks, 4-6 weeks, 3 months, and 6 months post-treatment, approximately a quarter of the women had mood scores indicative of clinical depression at each time point. (Deshields et al., 2005). Although scores for depressed mood at the last treatment, which were significantly elevated over normative scores for adults, improved rapidly during the initial two weeks after treatment, transient symptoms of depression during the six months after completing treatment for breast cancer were noted in some patients (Deshields et al., 2005).

In contrast to the study by Deshields et al. (2005), studies of patients with other diagnoses indicate no improvement in depression in the month after radiation treatment. Scores for depression and anxiety remained elevated and did not change one month after treatment in a smaller longitudinal study of 58 patients receiving radiation therapy for head and neck cancer (Rose & Yates, 2001). The investigators attribute these findings to persistent side effects in the month after treatment. The intense and distressing first month of recovery from radiation therapy for head and neck cancer was further
confirmed in a qualitative study using a diary and interview method (Wells, 1998). Uncertainty, symptom distress, physical changes, loss of function, and loss of self-integrity were common themes in the data.

The persistence of psychological problems after treatment was also described in a longitudinal study of quality of life in 118 women who had completed radiation therapy for advanced stage cervical cancer (Klee et al., 2000). The assessments at one month after treatment were characterized by the highest scores for depression and worry, both of which improved over time but remained elevated over 236 healthy control scores throughout the study period. Additionally, the need to talk with someone about their illness and for assistance with daily activities was also highest at one month post-treatment. Unfortunately, the investigators did not report the statistical significance of the changes in scores over time, making conclusions about the post-radiation treatment transition in this study tentative.

In summary, these descriptive, longitudinal studies support the concept of the post-radiation treatment as a vulnerable period for patients. Patients may experience persistent treatment side effects and depression in the month post-treatment. In general, these studies describe a pattern of physical and functional recovery with some improvement in quality of life during the first month after radiation therapy. However, quality of life may not improve during the post-radiation treatment transition for some patients and conclusions about patterns of improvement in quality of life are difficult to make due to the small simple sizes in two of theses studies (Rose & Yates, 2001; Johns, 2001). Further studies are needed to describe characteristics of the transition and identify factors that influence psychosocial adjustment.
Psychosocial Adjustment

There were no studies found that looked comprehensively at psychosocial adjustment during the immediate post-radiation treatment transition. A significant component of psychosocial adjustment is the process of attaining emotional or psychological well-being. The longitudinal study described above by Deshields et al. (2005) explored psychological adjustment in 94 breast cancer patients during the transition from the last day of radiation therapy to six months post-treatment. Although the authors noted heightened depression at the end of treatment, it reduced significantly two weeks after treatment. These findings were supported by a cross-sectional study that explored functioning, emotional distress, and symptoms in 53 breast cancer patients who were 4 to 12 weeks post-radiation therapy after a breast-conserving surgery (Graydon, 1994). The women reported minimal disruptions in their usual activities related to emotional, social, recreational, occupational and domestic functioning; minimal emotional distress; and low symptom distress. However, all measures indicated that fatigue and insomnia remained significant problems for the women post-radiation therapy.

Further evidence indicating that patients with breast cancer have few adjustment problems in the immediate period after radiation therapy can be found in another study of 23 breast cancer patients who were less than 45 years old and were receiving radiation therapy after breast-conserving surgery (Dow & Lafferty, 2000). Psychosocial adjustment, quality of life, and adaptation to survivorship were measured at the first, third, and fifth week of treatment and six months after completion of radiation therapy. Scores for overall psychosocial adjustment and the social adjustment subscale improved
steadily during treatment and at six months post-treatment. Problems with sexual adjustment increased during treatment but improved by six months post-treatment. As expected, overall quality of life declined during treatment, but improved by six months after treatment. Only satisfaction with social quality of life remained low at six months. Although measures of adaptation to survivorship also improved over the time periods, the investigators noted a curvilinear pattern in levels of patient reports of worry. Worry scores, which were elevated at the beginning of treatment, improved dramatically during treatment, but rose steadily at 6 months post-radiation therapy. The investigators attribute this finding to less daily contact with the oncology team, uncertainty about the future and fears of recurrence (Dow & Lafferty, 2000).

Predictors of psychosocial adjustment during radiation therapy were studied in a longitudinal study of 55 patients with mixed diagnoses (Christman, 1990). Patients completed measures of uncertainty, hope, control in health care, symptom severity and psychosocial adjustment at their first, fifteenth, or last radiation treatment. Feelings of uncertainty, hopelessness, and symptom severity significantly predicted problems in psychosocial adjustment at the last treatment and accounted for 18, 11, and 7 percent, respectively, of explained variance. Of note in this study is that type and stage of cancer did not significantly predict psychosocial adjustment at the last radiation treatment, lending support to the decision to test patients with mixed diagnoses in the current study.

In summary, there is a lack of studies exploring psychosocial adjustment during the post-radiation treatment transition. Most studies of adjustment after radiation treatment have studied depression, physical side effects, or quality of life in women with breast cancer and have focused on longer intervals, such as 3, 6, or 12 months post-
treatment. Knowledge about depression and quality of life enhance our understanding of the post-radiation treatment transition, but do not provide a comprehensive view of the specific emotional, social and intrapersonal challenges that patients may face during this time period. No studies were found of predictors of psychosocial adjustment during the transition and information about adjustment experiences of other populations is lacking. Studies are warranted to describe characteristics of the transition and identify factors that predict psychosocial adjustment, so that targeted interventions can be designed and tested in future studies.

Cognitive Appraisal and Psychosocial Adjustment

Cognitive appraisal is an individual’s evaluation of a situation in terms of its relevance to his/her well-being (Lazarus, 1991). Appraisal has been shown to be predictive of various outcomes in patients with cancer. A primary threat appraisal, in conjunction with low self-efficacy to cope with cancer and prior psychological functioning, significantly predicted poor psychological functioning in 195 women six months after their diagnosis of breast cancer (Gallagher et al., 2002). This association, however, was weak with appraisal having the least influence of the independent variables on the dependent variable ($\beta = -0.16, p < .05$) and explained only 2% of the variance in psychological functioning. In contrast, cognitive appraisal had a stronger influence on psychological functioning in another cross-sectional study of 60 patients with mixed diagnoses undergoing chemotherapy (Munkres et al., 1992). In this study, three independent variables, appraisal, the patient’s perception of the seriousness of their illness, and symptom distress, predicted 36% of the variance in affective mood, with appraisal explaining the greatest amount of variance (22%). Similarly, cognitive appraisal
explained 38% of the variance in mood in a sample of 72 adults with mixed diagnoses undergoing radiation therapy (Oberst et al., 1991). In this study, appraisal had the most influence on mood ($\beta = .61, p < .001$) over symptom distress, family hardiness, self-care burden due to the illness and universal self-care burden, all of which were also significant explanatory variables. In another study of men with prostate cancer, harm or loss stress appraisal was a significant predictor of both poor physical ($\beta = -.32, p < .001$) and mental health ($\beta = -.44, p < .001$) (Ahmad, Musil, Zauszniewski, & Resnick, 2005).

The conflicting results between the first study (Gallagher et al., 2002) and the other three (Munkres et al., 1992; Oberst et al., 1991; Ahmad et al., 2005) may be explained by the different measures used and the timing of the measurements. Gallagher et al. (2002, p. 369) used a single item to assess appraisal in patients who were six months post-diagnosis: “How much of a worry is the breast cancer and all the concerns it brings to you in the last month?” The Appraisal of Illness Scale (Oberst et al., 1991), which has 27 items to assess threat, loss, financial burden, and general stressfulness, was used in two studies with patients who were undergoing treatment (Munkres et al., 1992; Oberst et al., 1991). Similarly, in the study by Ahmad et al. (2005), a multi-item tool, the Cognitive Appraisal of Health Scale (Kessler, 1998), was used to assess stress appraisal. In comparison to single-item measures, perhaps the use of tools with multiple items that assess stress related to chronic illness, provided a multi-dimensional assessment of stress appraisal and strengthened the predictive ability of the scale.

Appraisal has been found to function as mediator. It was found to partially mediate the effect of symptom distress on mood in patients undergoing chemotherapy (Munkres et al., 1992) and radiation therapy (Oberst et al., 1991), as well as on quality of
life in breast cancer survivors (Northouse et al., 1999). Appraisal also fully mediated the effect of universal self-care burden on mood in patients undergoing radiation therapy (Oberst et al., 1991). Universal self-care burden are those tasks related to daily activities, such as social and household activities, errands, communication, physical activity, personal care, communication, and finances (Oberst et al., 1991). Appraisal was also found to mediate the relationship between current concerns (other than those related to cancer) and quality of life in a study of 98 African American breast cancer survivors (Northouse et al., 1999). Danger appraisal mediated the relationship between illness uncertainty and quality of life in 21 men who opted to undergo watchful waiting for prostate cancer (Wallace, 2003). It is likely that appraisal plays a pivotal role in psychosocial adjustment during the post-radiation treatment transition, and thus further exploration of the factors influencing cognitive appraisal is needed.

Factors Influencing Cognitive Appraisal

In this study, it was posited that cognitive appraisal of health just prior to completing radiation treatment would be influenced by antecedent factors of uncertainty, symptom distress, medical factors (cancer stage and co-morbidities) and person factors (age, sex, race/ethnicity, and education). Only one older study was found that explored predictors of appraisal in patients undergoing radiation therapy (Oberst et al., 1991). In this study of 72 patients with varying diagnoses, 42% of the variance in appraisal was predicted by both universal self-care burden (self-care demands related to basic human physical and social needs) and family hardiness (family’s ability to adapt to hardship and change), with symptom distress scores explaining an additional 5% of the variance. Age
and illness-related self-care burden, which reflects self-care tasks related to treatment, were not found to be significant explanatory variables.

These results were not supported in the study by Munkres et al. (1992) that explored similar concepts in a sample of 60 patients, with mixed diagnoses, who were undergoing chemotherapy for their initial cancer (N = 28) or for recurrence (N = 32). In that study, universal self-care burden and family hardiness did not predict appraisal. Forty-nine percent of the variance in appraisal was predicted by economic status, symptom distress, and recurrence (Munkres et al., 1992). The researchers offered two explanations for these results. First, a moderate correlation was found between economic status and universal care burden \((r = -.41, p < .001)\), indicating that they were measuring to some degree the same phenomenon resulting in less demonstration of the individual effects of universal self-care burden in the regression model. Second, the researchers proposed that patients with recurrence were more focused on symptoms and less concerned with social or family self-care issues (Munkres et al., 1992). However, in another study exploring predictors of appraisal in 321 long-term survivors (3 to 34 years post-treatment) of breast, colorectal, and prostate cancer, the patient’s perception of family distress had the most influence on appraisal \((\beta = .32, p < .001)\), followed by age \((\beta = -.19, p < .001)\), race \((\beta = -.15, p < .01)\) and family involvement in treatment choice \((\beta = .11, p < .05)\) (Bowman et al., 2003). A stressful appraisal was associated with increased family distress, young age, and White race.

These studies support the perspective that cognitive appraisal is a complex, dynamic process that is influenced by numerous personal and situational antecedent factors. It is likely that each new transition along the cancer trajectory (diagnosis,
treatment, survivorship, relapse, and end-of-life) has common situational factors that combine with unique, personal antecedent factors, to form an individual’s appraisal of a situation. This study explored the influence of two common experiences of patients completing cancer treatment, symptom distress and uncertainty, on cognitive appraisal during the post-radiation treatment transition. In addition, medical factors (cancer stage and co-morbidities) and person factors (age, sex, race/ethnicity, and education) were studied for their relationships to cognitive appraisal.

Symptom Distress and Cognitive Appraisal

Symptom distress, defined as a subjective phenomenon in which the patient attributes meaning to a symptom causing a negative emotional response (Goodell & Nail, 2005; McClement et al., 1997), was viewed in this study as a personal antecedent factor of cognitive appraisal during the post-radiation treatment transition. Consistent with Lazarus and Folkman’s (1984) conceptualizations of how personal factors influence appraisal, symptom distress may influence appraisal by functioning as a measure of well-being for the patient or by shaping and enhancing a patient’s understanding of his or her experience. There are few studies of the relationship between cognitive appraisal and symptom distress, and the results are conflicting in those studies. Symptom distress, economic status, and having recurrent cancer explained 49% of the variance in appraisal in 60 patients undergoing chemotherapy (Munkres et al., 1992). In another study of breast cancer survivors, the direct effects of symptom distress on quality of life were strong, being only partially mediated by appraisal (Northouse et al., 1999). Yet, in another study of 189 patients with recurrent breast cancer, appraisal had no mediation
effect on symptom distress; rather symptom distress directly affected quality of life (Northouse et al., 2002).

Although these studies used the same instrument to measure appraisal, different operational definition of symptom distress were used. Also, conceptual definitions of symptom distress were lacking, leading to lack of clarity about the exact phenomenon being studied. Symptom distress was operationally defined as the “degree of discomfort” associated with a symptom and 10 symptoms were measured using a visual analog scale in the study by Munkres et al. (1992, p.1203). In the other two studies (Northouse et al., 1999, p. 453; Northouse et al., 2002), symptom distress was operationally defined as the “extent” to which the patient was experiencing 13 symptoms, with response options of “no trouble,” “some,” or “a lot.” Conclusions about the relationship between symptom distress and appraisal are difficult to make due to the lack of consistency in tools used to measure symptom distress.

Uncertainty and Cognitive Appraisal

Uncertainty, conceptualized by Mishel (1988) as the inability to makes sense of one’s experiences during illness, was considered in this study to be another personal antecedent factor influencing cognitive appraisal during the post-radiation treatment transition. Although uncertainty has been found to be a significant predictor of psychosocial adjustment during radiation therapy (Christman, 1990), no studies were found that explored the precise relationship between uncertainty and cognitive appraisal during the post-radiation treatment transition. However, the role of illness uncertainty in stress appraisal was examined in a study of 71 breast cancer survivors who were five to ten years since diagnosis (Wonghongkul et al., 2000). Uncertainty had the most influence
on the dependent variable in hierarchical regression models testing age, education, uncertainty, and hope as predictor variables of threat appraisal ($\beta = .356, p < .05$) and harm appraisal ($\beta = .330, p < .05$). Age also was a significant explanatory variable for threat appraisal ($\beta = -.279, p < .05$) and harm appraisal ($\beta = -.294, p < .05$). These results provide empirical evidence for the clinical observations of the researcher that uncertainty is a persistent issue for cancer survivors as they reach the traditional five and ten year markers of survival. Although the results support the predictive relationship between uncertainty and appraisal in long-term cancer survivors, it remains to be seen whether this relationship exists during the immediate post-radiation treatment transition. The current study explored a likely potential mechanism through which uncertainty contributes to adjustment during the post-radiation treatment transition, by influencing cognitive appraisal of health.

In other studies, uncertainty has been examined for its direct and indirect effects on outcome variables such as quality of life. In a small study ($N = 21$) of men who opted to undergo watchful waiting for prostate cancer (Wallace, 2003), illness uncertainty explained 36% of the variance in quality of life. The explained variance increased to 60% when uncertainty was coupled with danger appraisal. Danger appraisal was found to mediate the effects of illness uncertainty on quality of life in this sample. Similarly, ambiguity about illness/wellness state was found to be a significant explanatory variable ($\beta = -.25, p < .05$) in stepwise regression models exploring the predictive variables of mood, danger focused appraisal, uncertainty and mastery on quality of life in 100 women receiving treatment for gynecologic cancer (Padilla et al., 1992). These variables accounted for 57% of the variance in the total quality of life score in this sample, with
uncertainty contributing 5%. Mediating variables were not explored in the study by Padilla et al. (1992). Similarly, in another study of 150 breast cancer survivors, who were more than three years post-diagnosis, survival time, uncertainty, and harm appraisal explained 21.8% of the variance in quality of life scores (Wonghongkul et al., 2006). Of the three independent variables in this study, uncertainty had the most influence on quality of life ($\beta = -.307, p < .001$).

In contrast to these findings, uncertainty did not have a direct path to quality of life, nor was it found to function as a mediator between person, social/family, and illness/treatment predictors and quality of life, in a study using structural equation modeling (Northouse et al., 2002). The fact that the sample in this study consisted of 189 women with recurrent breast cancer, 45% of whom had multiple recurrences, likely explains why the results of this study differ from the other studies’ results. Uncertainty regarding illness is probably less of an issue in patients who have already experienced a recurrence of cancer. Thus, the conflicting results in these studies that explored the relationship of uncertainty to quality of life is likely due differences in the sample populations. Also, although the investigators in these studies used the same measurement tool, the Mishel Uncertainty in Illness Scale (Mishel, 1981), three used the shorter community version of the tool (Northouse et al., 2002; Wallace, 2003; Wonghongkul et al., 2006), which may contribute to the differences in results.

**Self-Efficacy and Cognitive Appraisal**

Self-efficacy for coping, defined as the confidence in one’s ability to apply a coping strategy to achieve goals (Meluzzi et al., 2001), was viewed in this study as functioning as a moderator of the relationship between appraisal of illness and
psychosocial adjustment during the post-radiation treatment transition. Although there were no studies found of this relationship, two studies have explored the role of self-efficacy as a mediator between independent variables and psychosocial adjustment. Self-efficacy was shown to fully mediate the relationship between age and psychosocial adjustment in 144 patients with mixed diagnoses (Martinez Sanchez, 1996). Partial mediation by self-efficacy of the relationship between social support and psychosocial adjustment was found in two studies (Martinez Sanchez, 1996; Kennedy, 1997). Another study did assess the relationship of self-efficacy and appraisal in influencing quality of life in women with recurrent breast cancer (Northouse et al., 2002). In this study, self-efficacy, conceptually defined as the confidence to manage the effects of cancer, was found to be a significant explanatory variable for negative appraisal of illness ($\beta = -.40$, $p < .05$). Self-efficacy also exerted a significant direct effect on patient’s mental health-related quality of life ($\beta = .40$, $p < .05$).

Quality of life studies have also explored the direct, mediator, and moderator roles of self-efficacy. Self-efficacy was a significant predictor of multiple aspects of quality of life (sexual, psychological and spiritual functioning), in a study of 132 long-term survivors of ovarian germ cell tumors (Champion et al., 2007). In another study of 60 Israeli cancer patients with mixed diagnoses, self-efficacy was found to have significant direct effects on quality of life, as well as to mediate the relationship between perceived stress and quality of life (Kreitler et al., 2006). And yet, in another study, self-efficacy was found to moderate the relationship between cancer-related distress and quality of life in 121 adults who were at risk to develop hereditary cancer (Carlosson et al., 2004). The results of these studies suggest that self-efficacy may influence health outcomes along
multiple pathways, exerting direct effects or indirect effects by functioning as a moderator or mediator. However, inferences about the role of self-efficacy during the post-radiation treatment transition are difficult to make based on these studies because two of these studies (Kreitler et al., 2006; Carlosson et al., 2004) conceptualized self-efficacy as a general construct, not related to a specific behavior or task such as coping. Also, each study used a different measurement tool to assess self-efficacy, making comparisons between the studies difficult. According to Bandura (1997a), perceived self-efficacy can be assessed on three levels of generality. Measurement of self-efficacy beliefs at the most specific level assesses particular behaviors in a defined situation, providing the strongest explanatory and predictive capability for performance (Bandura, 1997a). The intermediate level assesses self-efficacy for a group of related behaviors in several conditions which have commonalities. Lastly, the global level measures self-efficacy without indicating the behaviors or situational conditions. The aim in this study was to assess perceived self-efficacy with a higher level of specificity by measuring self-efficacy for specific coping behaviors related to cancer treatment.

Social Support and Cognitive Appraisal

Another variable that may influence cognitive appraisal is social support. Social support, as a complex concept with many facets, presents multiple measurement issues for researchers. Clarification of the conceptual definition of social support is often cited in the literature as a primary issue for researchers (Hutchinson, 1999; O’Reilly, 1988). Distinguishing between social support and the related concepts of social network and social integration is critical to all steps of the research process especially outlining the research questions, design, operational definitions and measurement instruments.
Although social networks are a separate entity from social support, there are dimensions and interactions of networks, such as structure and size that may influence support, and thus warrant measurement (O’Reilly, 1988).

There are many considerations for choosing a social support measure. One consideration is the generality versus specificity of the measure, such as whether to focus on types of functional support or general support. Although Wills and Shinar (2000) recommend use of functional support measures when studying specific stressors or populations, structural measures aimed at evaluating the social network of a particular population may be more appropriate with interventional research.

Another decision is whether to measure perceived or received support, or both. Measures of received support are not always correlated with those of perceived support (Uchino, 2004). For example, an individual may have a low perception of support, yet have received a great deal of social support, and vice-versa. The quality and sources of support, in addition to the high level of stress experienced by the individual have been cited as potential reasons for this disparity (Uchino, 2004). Perceived support is viewed to be more significant than received support in measuring health outcomes and coping (Uchino, 2004; Antonucci, 2001), yet received support may be important to measure as it may play an indirect role in perceptions of support (Lakey & Cassady, 1990). Also the role of professional versus personal support and its impact on perceived support may be another area for evaluation.

Lastly, the reciprocal nature of social support is another conceptual clarification that should be made for the research model. Shinn, Lehmann and Wong (1984) advocate for a research model that reflects the complexities of both the determinants and
consequences of social support. Moving beyond what they refer to as an oversimplification of social support research models, they suggest that the “fit” of social support between the recipient and action should be evaluated across five dimensions: amount, timing, source, structure, and function. In addition the potentially deleterious effects of other variables on social support, such as the stressor, distress, personal characteristics, and the environment should be examined.

In this study, social support was operationally defined as one’s perception of helping relationships. Social support during the post-radiation treatment transition is important to study because correlational studies in the cancer literature have confirmed its relationship to patient outcomes. Social support may influence quality of life during the transition. The positive relationship between social support and quality of life is most evident in studies of women with breast cancer (Sammarco, 2001; Manning-Walsh, 2005; Lewis et al., 2001). In another population, increased social support was significantly related to better role/social functioning and mental health in 89 men with prostate cancer who had undergone surgery or who were currently receiving radiation treatment (Roberts et al., 2006).

Social support is also related to psychological adjustment. Characteristics of the social network, including size, frequency of contact and social embeddedness, were significantly and positively associated with mental health in a cross-sectional study of 259 long-term female colorectal cancer survivors (Sapp et al., 2003). In another cross-sectional study that measured both the size of the social network and quality of social ties, women with advanced breast cancer who had high stress were found to have less mood disturbance if their social network was large (Koopman et al., 1998).
Although perceived social support is also associated with psychosocial adjustment, the magnitude of the relationship was found to vary in the studies reviewed. Holland and Holahan (2003) found a strong significant correlation between perceived social support and psychological well-being in a cross-sectional study of 56 women diagnosed with breast cancer within the previous 26 months ($r = .65, p < .001$). Yet, Budin (1998) found a significant but weak squared zero-order correlation between perceived social support and psychosocial adjustment in 101 unmarried breast cancer patients six weeks after surgery ($r^2 = .08, p < .01$). In this study, of which 27% of the women were receiving radiation therapy and 49% were undergoing chemotherapy, symptom distress was highly related to psychosocial adjustment ($r^2 = .54, p < .001$). Perhaps the sample characteristics and measurement tools account for the difference in magnitude of relationship found in these two studies. Perceived social support was also found to be predictive of psychosocial adjustment in a study of 50 women who had had a modified radical mastectomy and were assessed at three and 30 days post-operatively (Northouse, 1988). At both time points, social support was a significant explanatory variable for psychosocial adjustment, with higher levels of social support associated with fewer adjustment problems.

Although no studies were found of social support and its interaction with cognitive appraisal specifically during the post-radiation treatment transition, several studies have examined the mechanism by which social support influences health outcomes, such as quality of life and psychosocial adjustment. Supporting the stress-buffering model, social support was found to moderate the relationship between intrusive thoughts about cancer and quality of life in a subgroup of 64 breast cancer survivors.
(Lewis et al., 2001). Women who rated their social support as low were also found to have a negative relationship between intrusive thoughts and quality of life. Family hardiness, a concept which may be closely related to social support, was found to moderate the relationship between stress appraisal and mood in patients undergoing radiation therapy (Oberst et al., 1991).

Yet, in another study, the mediating effects of social support have been evaluated. Perceived emotional and instrumental support from family and friends was found to partially mediate the inverse relationship between symptom distress and quality of life in 100 breast cancer patients who had undergone surgery within the last 24 months (Manning-Walsh, 2005). The mechanism by which social support mediated, although modestly, the relationship between symptom distress and quality of life in this study is perplexing. Perhaps social support acted by altering the appraisal of symptom distress, which was not measured in this study. This explanation would be consistent with the buffering model of social support. Clarification of the role of social support and its interaction with appraisal during the post-radiation treatment transition is needed. Confirmation of the moderating role of social support would suggest the need to identify patients at high risk for poor adjustment and further identify targets for intervention.

Population of Interest

The population of interest in this study was patients with breast, colorectal, lung, or prostate cancer who were completing curative radiation therapy and were in the post-radiation treatment transition, the period from the last week of active treatment to one to three months after treatment. These diagnoses were selected in order to have a sufficiently large sample and to represent a variety of ages and genders, while limiting to
some extent the less common treatment protocols and symptoms associated with cancers such as brain, head and neck, and bone. This research was conducted in the Radiation Therapy Department of the Ireland Cancer Center of University Hospitals, part of the Case Comprehensive Cancer Center, a National Cancer Institute-designated Comprehensive Cancer Center. This hospital was chosen because it is an academic medical center with a high daily volume of patients, assuring availability of an adequate sample over six months of recruitment.

Summary

Several conclusions can be made from this review of literature. First, patients completing radiation therapy confront numerous physical, emotional, and social challenges, yet little is known about the patient’s experience and adjustment during the immediate post-radiation transition due to the limited number of studies and the wide variety of sample characteristics, measures, and timing of measures. Second, it is unknown whether cognitive appraisal plays a significant role in predicting psychosocial adjustment in this population, although this relationship has been shown in other populations. Third, while the literature suggests a number of related concepts that may effect appraisal, we must be cautious about making assumptions about the relationships between symptom distress, uncertainty, and cognitive appraisal during the transition due to the limited number of studies and conflicting results. More information is needed about how patients nearing the completion of radiation treatment appraise their situation and what factors are most influential in their appraisal. Fourth, further testing of the moderating effects of self-efficacy and social support on cognitive appraisal is needed.
Chapter III

Research Design and Methods

The purpose of this study was to examine predictors of psychosocial adjustment during the immediate post-radiation treatment transition. This chapter outlines the research methods used in this study, including the design, setting, sample, and procedures. The instruments and statistical analysis will also be discussed.

Research Questions

There were five research questions in this exploratory study of the post-radiation treatment transition:

1. What are the intrapersonal and emotional characteristics of psychosocial adjustment in patients with breast, colon, prostate, and lung cancer during the post-radiation treatment transition?

2. What is the relationship of symptom distress, uncertainty, medical factors (comorbidity, cancer stage), and personal factors (age, gender, race/ethnicity, and education) with cognitive appraisal of health at two weeks prior to ending radiation?

3. What is the predictive relationship between cognitive appraisal of health at two weeks prior to ending radiation treatment and psychosocial adjustment during the post-radiation treatment transition?

4. Does social support moderate the relationship between cognitive appraisal of health and psychosocial adjustment during the post-radiation treatment transition?
5. Does self-efficacy for coping moderate the relationship between cognitive appraisal of health and psychosocial adjustment during the post-radiation treatment transition?

Research Design

This was a prospective cohort study of factors associated with psychosocial adjustment during the post-radiation treatment transition. A predictive correlational design was used to test the relationship between stress appraisal and the outcome variable, psychosocial adjustment. The relationship of uncertainty, symptom distress, cancer stage, comorbidities, age, gender, race/ethnicity, and education with stress appraisal two weeks prior to ending treatment was examined. Finally, social support and self-efficacy were tested as moderators of the relationship between cognitive appraisal and adjustment. The study model is shown in Figure 2.

![Study model diagram]

Figure 2. Study model.

Descriptive correlational designs, with either cross-sectional or longitudinal approaches, have been used in studies of variables that influence psychosocial adjustment in patients with cancer. Cross-sectional correlational designs have been used to explore
psychosocial adjustment in newly diagnosed patients with lung cancer (Klemm, 1994) and breast cancer patients who had completed radiation therapy (Graydon, 1994). Christman (1990) used a correlational design, with a longitudinal approach, to explore predictors of problems in psychosocial adjustment in patients undergoing radiation therapy. In other studies, a correlational design with cross-sectional sampling has been used to describe the relationship between appraisal and various health-related outcomes, including quality of life (Northouse et al., 1999), mood during cancer treatment (Oberst et al., 1991; Munkres et al., 1992), psychological distress (Gallagher et al., 2002), and mental and physical health status (Ahmad et al., 2005).

Knowledge about the post-radiation treatment transition has also been attained through studies using longitudinal designs with repeated measures. These studies have described changes in quality of life and/or psychosocial adjustment during radiation therapy and through the post-radiation treatment transition in patients with breast cancer (Dow & Lafferty, 2000; Deshields et al., 2005), cervical cancer (Klee et al., 2000), lung cancer (John, 2001; Langendijk et al., 2001), and head and neck cancer (Rose & Yates, 2001).

A predictive correlational design was appropriate for this study because the phenomenon of interest was the relationship of cognitive appraisal of health at the end of radiation therapy to psychosocial adjustment one month after completion of radiation therapy. A prospective, rather than cross-sectional approach, was used because the aim was to identify predictors (antecedents) of an outcome (psychosocial adjustment) that occurs at a future time. This design has several advantages. It is an efficient, flexible method to test complex relationships between multiple variables that cannot be
manipulated by the researcher and provides a foundation for future interventional research by generating hypotheses (Lobiondo-Wood, 2002; Walker, 2005). The primary disadvantage of a correlational study is the inability to determine causality between the independent and dependent variables due to the lack of control, manipulation of the independent variable, and randomization (Lobiondo-Wood, 2002). In this study, however, the goal was to examine a potential predictive, not causal, relationship between the independent variable (cognitive appraisal of health) and the dependent variable (psychosocial adjustment).

**Threats to Internal Validity**

Internal validity relates to inferences that can be made about a causal relationship between the independent and dependent variables within the conditions of a specific study (Shadish, Cook, & Campbell, 2002). In this study, internal validity refers to the extent to which it can be inferred that cognitive appraisal of health at two weeks prior to ending radiation treatment is predictive of psychosocial adjustment at one month post-radiation treatment. Threats to internal validity include history, maturation, testing, instrumentation, mortality, selection, regression, and ambiguous temporal precedence (LoBiondo-Wood, 2002; Shadish et al., 2002). Each will be considered for their relevance to this study.

**History** refers to events that may occur during the study that may have an effect on the dependent variable (LoBiondo-Wood, 2002). In this study, the threat of history may have occurred if a patient developed new symptoms that were suspicious of cancer recurrence during the month after radiation treatment and prior to completing the outcome survey. The measurement of psychosocial adjustment may have been
confounded by the patient’s experiences in confronting the challenge of a potential recurrence. Another example of a history-related threat was the possibility that a patient experienced a major loss, such as a death of a significant other, prior to the one-month outcome measure. Psychosocial adjustment, especially within the emotional domain, would have likely been effected. The threat of history was minimized in this study by the short interval between the first set of measures (two weeks prior to completing radiation therapy) and the outcome measurement (one month post-radiation treatment).

*Maturation* refers to normal developmental, psychological, and physical changes that occur within a subject over time (LoBiondo-Wood, 2002). These natural changes become a threat if they cause or influence the outcome under investigation. This threat was unlikely in this study due to the short time interval (six weeks) between measures.

The threat of *testing* refers to the influence of a pretest on the posttest score (LoBiondo-Wood, 2002; Shadish et al., 2002). This threat was not an issue in this study because the measures at time one were different from the outcome measure at time two. Hypothetically, this threat might have occurred in this study if the psychosocial adjustment survey was administered during radiation treatment as well as one month post-treatment. A patient might have become more aware of the concept of psychosocial adjustment and actively instituted practices, such as joining a support group, to improve his/her adjustment post-radiation treatment.

*Instrumentation* threats refer to changes in a measurement instrument, observers, or scorers during the study that lead to changes in the outcome (LoBiondo-Wood, 2002; Shadish et al., 2002). This threat might have become manifested in this study, if over the course of the study an abbreviated version of a survey tool was substituted for the
original version. Another example of the potential threat of instrumentation is if the researcher improves in interview skills during the study, leading her to record more accurate data. This threat was minimized in this study by avoiding switching instruments during the study and maintaining protocols for data collection.

The threat of experimental mortality, also known as attrition, refers to the differential loss of subjects during a study (LoBiondo-Wood, 2002; Shadish et al., 2002). This threat may have been an issue in this study if patients from one particular group, such as patients who are experiencing severe treatment side effects, dropped out of the study or failed to complete the outcome measure, resulting in potentially skewed conclusions about the predictive relationship between cognitive appraisal and psychosocial adjustment during the transition. This threat was reduced by the short, overall time frame between measures (six weeks). In addition the study was monitored monthly to detect any differential loss of subjects by comparing the descriptive statistics of the dropouts (age, gender, race/ethnicity, education, diagnosis, and stage) to those who remained in the study. Research procedures were reviewed if a pattern was noted.

The threat of selection bias refers to the differences in groups of subjects at the beginning of a study and is particularly a threat in quasi-experimental designs when random assignment is not used to determine treatment groups (Shadish et al., 2002). In this study, which was a non-experimental design, this threat might have become manifest as a differential selection of subjects for participation in the study. This threat was minimized by adhering to the eligibility and ineligibility criteria outlined in the study protocol.
Statistical regression, also known as regression to the mean, occurs when subjects are selected for a treatment based on extreme scores or characteristics (Shadish et al., 2002). The subjects’ extreme scores on one measure naturally regress to the mean on a second measure. This tendency can be confused with a treatment effect in studies with a pretest-posttest design. Statistical regression may also occur with simultaneous measures that are correlated (Shadish et al., 2002). In this study, statistical regression might have become manifest if extreme threat appraisal scores of a group of patients regressed to the mean score on the psychosocial adjustment measure one month after radiation treatment. It may also have occurred if a subject’s extreme scores on one subscale of the psychosocial adjustment instrument regressed to the means on the other subscales.

Statistical regression was minimized in this study by following the eligibility and ineligibility criteria outlined in the study protocol. The threat was also reduced because subjects were not identified for participation in the study based on any selection score such as elevated symptom distress or multiple comorbidities.

The threat of ambiguous temporal precedence refers to confusion about the direction of causality between two variables and occurs most often in correlational studies with cross-sectional designs (Shadish et al., 2002; Higgins & Straub, 2006). This threat was unlikely in this study, which was a predictive correlational design, because the measurement of the independent variable preceded the measurement of the outcome variable.

Threats to External Validity

External validity refers to the degree to which the findings of a study can be generalized to other people, settings, and times (Lobiondo-Wood, 2002). Shadish and
colleagues (2002, p. 83) further define external validity from the perspective of the targets of generalizability, as the extent to which “a causal relationship holds (1) over variations in persons, settings, treatments, and outcomes that were in the experiment and (2) for persons, settings, treatments and outcomes that were not in the experiment.” The first target in this definition refers to the sample population; the second target refers to the concept of generalizing “across populations” and both require a representative sample (Ferguson, 2004, p.17). Threats to external validity are described in terms of interactions between (1) subject selection and treatment, (2) setting and treatment, (3) history and treatment, and (4) multiple treatments (Ferguson, 2004, Higgins & Straub, 2006).

The threat of an interaction between subject selection and treatment refers to the issue of having an unrepresentative sample in which the sample does not reflect the population to which the researcher wants to generalize. Threats to external validity in this study included the use of a convenience sample, which may have introduced bias and not assured a representative sample. This threat was minimized by adhering to the sampling procedure and inclusion/exclusion criteria. Also, an unrepresentative sample might have occurred if a large number of patients refused to participate in the study or if a large number of patients dropped out of the study. The short time frame of this study and the low participant burden in terms of time and required activities reduced barriers to participation and encouraged retention of subjects. The refusal rate and demographic characteristics (age, gender) of patients who declined participation in the study were tracked. Descriptive statistics (age, gender, race/ethnicity, education, diagnosis, and stage) of those patients who dropped out of the study were monitored.
Interaction between setting and treatment becomes a threat if the observed relationship or treatment effect occurs in an “artificial” experimental setting (Ferguson, 2004, p. 18). An example of this type of threat is the Hawthorne effect, meaning the patient’s responses are due to his/her, awareness of participating in a study rather than due to the influence of the study protocol or treatment (Lobiondo-Wood, 2002). Similarly, the novelty of an intervention can change the experimental setting in that the subject’s responses are in part due to the newness of an intervention. Also sensitization of a subject by a pretest is another example of modification of the research conditions. In this study, the interaction between setting and treatment might have been exhibited as a Hawthorne effect. For example, as a result of his/her awareness of being in a research study, a patient might have modified his/her responses on the surveys to avoid appearing distressed. The threat from an interaction between setting and treatment is reduced using multiple sites for a study, which allows for variability in settings and lessens the chance that the observed results are only due to the experimental setting (Ferguson, 2004). In this study, the patient was given the option of completing the instrument at home or in the clinic, which may have helped in part to mitigate the Hawthorne effect.

The interaction of history and treatment refers to whether the findings of the study can be generalized to another time period, meaning that the characteristics of the study period are unique (Ferguson, 2004; Higgins & Straub, 2006). For example, consider if during this study, the data were collected during a structural renovation of the radiation department that caused long daily delays in patient treatment schedules. If the researcher determined that the study results were altered due to this unique situation, the generalizability of the results would then be limited.
The interaction of multiple treatments is a type of measurement effect that occurs when treatments are given sequentially to a subject and the outcome is due to the cumulative effects of the treatment, rather than the experimental treatment alone (Ferguson, 2004; Higgins & Straub, 2006). Although this threat was unlikely in this study as the design was not experimental, it may have occurred as a result of the patients taking multiple surveys. The patient’s responses on the final survey in the series at time one, may have been influenced by the previous surveys.

Research Setting

This research was conducted in the Radiation Therapy Department of the Ireland Cancer Center of University Hospitals Case Medical Center, part of the Case Comprehensive Cancer Center, an NCI-designated Comprehensive Cancer Center. This hospital was chosen because it is an academic medical center with a high daily volume of patients, assuring availability of an adequate sample over six months of recruitment.

Sample

The sampling frame was patients with breast, colorectal, lung, or prostate cancer who were undergoing curative radiation therapy. These diagnoses were selected in order to have a sufficiently large sample and to represent a variety of ages and genders, while limiting to some extent the less common treatment protocols and symptoms associated with cancers such as brain, head and neck, and bone. A convenience sample was selected from the radiation therapy department appointment lists.

Inclusion and Exclusion Criteria

Inclusion criteria were: (a) adult patients, age 18 and older, (b) diagnosis of stage 0, I, II, or III breast, colorectal, lung or prostate cancer, (c) undergoing their first course
of radiation therapy, being given with curative (versus palliative) intent as indicated in the medical record, with no further surgery or chemotherapy treatment planned for at least two months after radiation therapy, (d) receiving treatment as an outpatient, (e) cognitively intact, as evidenced by orientation to person, place and time, (f) live in northeastern Ohio, and (g) have a telephone. Exclusion criteria were: (a) hearing impaired to the degree that the patient is unable to hear instructions via the phone, (b) prior radiation therapy for another type of cancer because their adjustment after treatment may be influenced by their previous experiences during the post-radiation treatment transition, and (c) stage IV disease as determined by review of the medical record. Patients with stage IV cancer, indicating metastasis, were excluded due to their poor prognosis and functional status that may have limited their ability to complete the study and because their psychosocial adjustment after radiation therapy may have been greatly influenced by the multiple issues associated with having advanced stage cancer. Patients receiving concurrent chemotherapy or who were being treated for recurrent cancer were excluded because these types of patients are generally in close contact with the medical oncology team during their radiation therapy. This is in contrast to patients receiving curative radiation therapy who are generally in less frequent contact with the medical oncology team.

**Sample Size/Power Analysis**

There were no studies found that explored the relationship between appraisal and psychosocial adjustment during the post-radiation treatment transition on which to base a power analysis. However, three studies were identified that used multiple regression analyses to explore the relationship between appraisal and mood or psychological
distress, both of which reflect psychological and emotional adjustment. Because emotional and psychological adjustment play a major role in overall psychosocial adjustment, these studies were thought to represent the phenomenon of interest in the current study (psychosocial adjustment) and were used for the sample size calculation and power analysis. The effect sizes ($f^2$) by study were .61 (Oberst et al., 1991), .47 (Munkres et al., 1992), and .04 (Gallagher et al., 2002). One explanation for the wide variation in effect sizes is that two of the studies (Oberst et al., 1991; Munkres et al., 1992) used the same instrument to measure stress appraisal, the Appraisal of Illness Scale (Oberst et al., 1991). This 27-item scale is comprehensive and identifies four types of stress appraisal. In contrast, the study by Gallagher and colleagues (2002) used a single item to measure stress appraisal. Thus, the multi-item instrument may have been more sensitive in identifying a relationship between appraisal and the outcome measure than the single item. Given the varying samples in these studies, it was most reasonable to set the effect size for the present study at .15, which is considered a medium effect size for multiple regression analyses (Cohen, 1992). Also, selecting a conservative effect size made it less likely that an inadequate sample size would be obtained, which would result in the study being under-powered.

Alpha was set at .05 because this was an exploratory study with small potential for harm and a 5 percent chance of mistakenly claiming a relationship when there is not (Type I error) was acceptable. A Type I error in this study would mean that the researcher reported that cognitive appraisal of health predicted psychosocial adjustment during the post-radiation treatment transition, when in fact there was no relationship. One clinical implication of Type I error is that interventions might be introduced to modify the
predictor variable, yet show little improvement in psychosocial adjustment. This would likely result in misuse of financial resources and time for both the staff and patient.

Power was set at .90 because a 10 percent chance of incorrectly declaring no relationship (Type II error) was acceptable to the investigator. This was a descriptive study with little chance of serious harm if a relationship between cognitive appraisal of health and psychosocial adjustment was not identified, when in fact there was a relationship. A clinical implication of Type II error is that interventions are not implemented to improve psychosocial adjustment or they are developed with an inappropriate target for modification. Again, a Type II error may result in misuse of financial resources and time for both the staff and patient.

Using research question three, with four independent variables (harm/loss, benign/irrelevant, threat, and challenge appraisal), a required sample size of 108 subjects was calculated using G-Power (Faul, Erdfelder, Lang, & Buchner, 2007). In addition, this calculation was verified using the formula from Cohen and Cohen (1983, p.117), \[ n^* = \frac{L}{f^2} + k + 1 \]

where \( n^* \) is the sample size needed; \( L \) is a constant specified for a specific alpha level, power, and number of predictors; \( f^2 \) is the effect size; and \( k \) is the number of independent variables.

Given the study’s short time period, loss of subjects to follow-up was not anticipated. However, some drop outs were expected. An attrition rate of 18.5% was reported in a pilot study of the implementation of a psychosocial data registry that enrolled 216 patients with mixed cancer diagnoses and stages and was conducted at the same location of the current study (A. Lipson, personal communication, April 15, 2008). This finding reflected the rate of attrition during the first three months after enrollment.
and included 40 patients who died (19), dropped out (6), were lost to follow-up (7), or who were too sick to participate (8). Because the current study was of shorter duration (six weeks) and excluded patients with stage IV disease, it was unlikely that patients would die during the study. Therefore the investigator allowed for an attrition rate of 10%, based on 9.7% rate in the study described above when attrition due to deaths were excluded from the calculation. The number of subjects to be recruited in the current study was 119.

Procedures for Conducting Research

Medical and nursing staffs in the radiation oncology departments were introduced to the study and trained in the inclusion and exclusion criteria. The treatment schedule was reviewed jointly by the research nurse and clinic nurse on a weekly basis to identify potential subjects who were within two weeks of ending radiation treatment. After receiving permission from the radiation oncologist, potential subjects were approached, the study was explained, and consent was sought.

The first meeting between the subject and nurse researcher occurred approximately two weeks prior to the completion of treatment. The following activities occurred at that meeting in the clinic: (a) the study was explained with an opportunity for the patient to ask questions, (b) informed written consent was obtained, (c) a structured interview by the nurse researcher was completed to obtain demographic information, (d) instructions regarding the instruments were given, and (e) the instruments were administered. Subjects had the option of completing the instruments independently in a private area of the clinic, having the nurse researcher interview them in the clinic, or completing the instruments at home and returning them via mail to the nurse researcher.
Instruments were administered in random order. Approximately 30 minutes was needed to complete the full interview.

The second contact with the subject occurred approximately one-month after radiation treatment was complete. Subjects were called by the investigator and asked to schedule time to complete the Psychosocial Adjustment to Illness Scale – Self-Report version (PAIS-SR) (Derogatis, 1986), either (a) during their follow-up visit in the clinic at which time the investigator would meet with the subject, (b) at home and returned via mail, or (c) on the phone as an interview. Approximately 20 to 25 minutes was needed to complete the PAIS-SR (Derogatis, 2007). The PAIS-SR was mailed with a return envelope to those patients preferring to complete the survey at home. If the subject preferred to complete the PAIS-SR as a telephone interview, a scheduled time was mutually agreed upon.

For subjects completing the instrument at home, if the survey was not returned within 10 days, the researcher contacted the subject via telephone and offered the option of completing the PAIS-SR on the phone. If a subject declined to complete the PAIS-SR, the investigator (a) explored reasons for his/her refusal, (b) answered any questions, (c) offered to contact the patient at another time within the next few days so that the patient could think about continuing to participate in the study, and (d) thanked the patient for his/her participation to this point and accepted his/her wish to drop out of the study. Completion of the PAIS-SR should have taken place by six weeks after radiation treatment. Surveys administered or received in the mail after that time point were deemed late and considered for removal from the analysis. Upon completion of the
PAIS-SR, subjects were given a $10 gift card in appreciation of their participation in the study.

Protection of Human Subjects

Approval for this study was obtained from the IRB of the Case Comprehensive Cancer Center. The nurse researcher met with the patient in a private room or area of the radiation therapy department at a mutually convenient time to explain the study, describe procedures and answer questions. The patient was assured that his/her decision to participate or not participate in the study was optional. The nurse researcher described confidentiality of the patient’s records and how the patient’s privacy would be maintained during the data collection procedures. The risks and benefits of the study were explained. The patient was informed of the option to withdraw from the study at any time. The patient was given an opportunity to ask questions and was given a copy of the consent form. After all questions were answered and the patient agreed to participate in the study, written informed consent was obtained by the nurse researcher.

There was a slight chance that the subject would become distressed while completing the surveys because the items explored potentially sensitive issues related to relationships, prognosis, physical symptoms, communication, coping, sexuality, and emotions. If this occurred, the nurse researcher provided emotional support and offered to refer the subject to an oncology social worker or nurse.

The confidentiality of the data was protected in a number of ways. Each subject was given a unique identification number. The identification numbers were placed on each tool. A master list of the participants with their assigned identification numbers was maintained by the principal investigator and stored in a locked cabinet in an office in the
school of nursing. The raw data were kept in a password protected computer file by the principal investigator. Data sheets and original consent forms were kept separately in a locked file cabinet in the principal investigator’s office.

Instruments

*Psychosocial Adjustment*

Psychosocial adjustment is conceptually defined as an adaptation process in which the individual uses cognitive and behavioral resources in response to the physical, emotional, functional and spiritual demands precipitated by changes in his/her environment (Brennan, 2001). It was objectively measured using the Psychosocial Adjustment to Illness Scale – Self-Report version (PAIS-SR), which consists of 46 items designed to measure seven domains of psychosocial adjustment: health care orientation, vocational environment, domestic environment, sexual relationships, extended family relationships, social environment, and psychological distress (Derogatis, 1986). Health care orientation assesses the subject’s “health care posture,” which refers to one’s attitudes toward health care providers and treatment, as well as one’s expectancies for treatment and the adequacy of the information received (Derogatis & Derogatis, 1990, p. 8). The vocational domain includes six questions related to the work, school or vocational environment. Disruptions in the family environment are assessed through eight questions that address issues related to relationships, household duties, communication, and finances. Sexual interest, quality of sexual relationships, and issues of sexual functioning are addressed in the section on sexual relationships. The section on the extended family relationships focuses on communication and interactions with family members outside the subject’s household. Interest and participation in leisure and social activities are
assessed though six questions about the social environment. Lastly, psychological
distress is assessed through seven items that explore the subject’s feelings of anxiety,
depression, hostility, guilt, worry, self-esteem, and body image. The PAIS-SR has been
used in studies of cancer patients (Christman, 1990; Klemm, 1994; Dow & Lafferty,
2000; Schnoll, Harlow, & Brower, 2000).

Subjects were instructed to answer each of the 46 items by placing a check mark
in the box near the answer that best describes their experience. The responses vary for
each question but all follow a four point (0 to 3) scale. The scale is reversed on even
numbered items to reduce response bias, thus requiring that those items be reflected by
subtracting each score from three prior to summation (Derogatis & Derogatis, 1990).
The raw scores were then summed for each of the seven domains, ranging from 0 to 21,
with higher scores reflecting poorer psychosocial adjustment. Each of the seven domain
scores were converted to a standardized t-score using a normative table devised from 114
patients with mixed cancer diagnoses and treatments. Then, the seven standardized
t-scores were summed to provide a PAIS-SR total score (Derogatis & Derogatis, 1990).
The conversion of raw scores to standardized scores allowed for comparison of the
sample to a normative group and permitted comparisons between the domains (Derogatis

The Chronbach alpha coefficient for the entire PAIS-SR scale was .93 in a study
of 502 cancer patients, indicating excellent internal consistency (Merluzzi & Sanchez,
1997). The reported alpha coefficients for the original subscales were: healthcare
orientation (.50), vocational environment (.84), domestic environment (.74), sexual
relationship (.84), extended family (.51), social environment (.83), and psychological
distress (.87). Factor analysis supported the delineation of the original seven subscales with some improvement in the original coefficients: healthcare orientation (.61), job and household environment (.85), partner/family relationships (.70), sexual relationship (.92), help from others (.63), social/leisure activities (.87), and psychological distress (.87) (Merluzzi & Sanchez, 1997). These results of the factor analysis demonstrate that the items on the original PAIS-SR consistently reflect seven conceptual domains of psychosocial adjustment.

The PAIS-SR’s construct validity was also supported in the study of 502 cancer patients (Merluzzi & Sanchez, 1997). Each of the seven factors had significant positive correlations with the Mental Health Index, ranging from .33 to .71, with the factor related to emotional distress having the highest correlation. This finding demonstrates a strong focus on mental health in all of the subscales of the PAIS-SR, (Merluzzi & Sanchez, 1997). The factor measuring adjustment related to sexual relationship was significantly negatively correlated with the Sickness Impact Profile ($r = -0.40, p < 0.01$) and stage of cancer ($r = -0.33, p < .01$), indicating good divergent validity. The social/leisure factor was significantly negatively correlated with the Sickness Impact Profile ($r = -0.49, p < 0.01$) and positively correlated with the Karnofsky Performance Status ($r = 0.40, p < .01$), indicating good divergent validity and convergent validity, respectfully. All of the seven factors had significant positive correlations with the Cancer Behavior Inventory, an instrument which measures self-efficacy for coping, ranging from .48 (psychological distress) to .26 (partner and family), supporting validity of the PAIS-SR (Merluzzi & Sanchez, 1997).
In this study, the PAIS-SR was given in one of three methods: self-administration, face-to-face with the researcher, or by telephone with the researcher. Although the reliability and validity information for the PAIS-SR is for the self-administration method, support for using the PAIS-SR in a face-to-face or telephone interview can be gained from the PAIS. The PAIS is a semi-structured interview used to assess psychosocial adjustment within the same seven domains and with the same 46 items of the PAIS-SR (Derogatis & Derogatis, 1990). Internal consistency of the PAIS was tested in a sample of 89 lung cancer patients with alpha coefficients reported for each subscale: healthcare orientation (.83), vocational environment (.87), domestic environment (.68), sexual relationship (.93), extended family (.12), social environment (.93), and psychological distress (.81) (Derogatis & Derogatis, 1990). The extended family subscale has been revised since the reporting of these alpha coefficients (Derogatis & Derogatis, 1990). The PAIS has good internal consistency and its domains are identical to the PAIS-SR, thus, it is appropriate to use the PAIS-SR in face-to-face or telephone interview format.

The Chronbach alpha coefficient for the entire PAIS-SR scale in this study was .94. The alpha coefficients for the subscales were: healthcare orientation (.63), vocational environment (.78), domestic environment (.81), sexual relationship (.85), extended family relationships (.69), social environment (.85), and psychological distress (.90).

Cognitive Appraisal

Cognitive appraisal is conceptually defined as an individual’s evaluation of a situation in terms of its relevance to his/her well-being (Lazarus, 1991). Cognitive appraisal consists of primary and secondary appraisal (Lazarus & Folkman, 1984;
Primary appraisal is an assessment of what is at stake during an encounter and secondary appraisal refers to the individual’s assessment of what can be done to effectively prevent harm, mitigate the threat, or enhance opportunities for benefit (Folkman, et al., 1986). Primary appraisal was measured using 23 items from the Cognitive Appraisal of Health Scale (CAHS), a self-report tool aimed at assessing primary appraisal with four separate scales: threat, challenge, benign/irrelevant, and harm/loss (Kessler, 1998). Five additional items measuring secondary appraisal were dropped because it is the least well developed part of the tool and because the measures of self-efficacy for coping and social support would provide more in-depth information about secondary appraisal.

Participants were asked to rate their agreement with statements using a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Scores were summed for each scale; higher scores indicated agreement with the type of appraisal measured. For example, if the participant’s total score on the 5-item threat scale was 23, the researcher would conclude that there is a strong threat dimension in the participant’s primary appraisal. The ranges of possible scores were: threat scale, 5 to 25; challenge scale, 6 to 30; harm/loss scale, 8 to 40; and benign/irrelevant scale, 4 to 20.

The psychometric properties of the CAHS were tested in a non-probability sample of 201 women with breast cancer (Kessler, 1998). The participant’s mean time since diagnosis was 3.77 years with a standard deviation of 3.72. Almost three quarters of the sample had not reached the five year survival mark and almost 46% were receiving some form of cancer treatment. Participants self-administered the CAHS at home.
consistency (theta coefficients), for the primary appraisal subscales were threat (.85), challenge (.76), benign/irrelevant (.78), and harm/loss (.88) (Kessler, 1998).

Construct validity of the CAHS was initially supported through principal component analysis, which is a procedure used to reduce the number of observed variables into a smaller set of variables when developing an instrument (Hatcher, 1994). The principal component analysis specified four factors or primary appraisal (harm/loss, benign/irrelevant, threat, and challenge) (Kessler, 1998). Construct validity was further evaluated by examining the correlations between the primary appraisal scales. The results showed that all of the primary scales were significantly correlated with one another, with correlations ranging from .49 to .68 (Kessler, 1998). Some of the correlations were as predicted. For example, benign/irrelevant appraisal were negatively associated with threat appraisals ($r = -.64, p < .001$). However, Kessler (1989) raised the issue that the moderate intercorrelations between the primary appraisal scales indicated that some scales were possibly measuring the same construct. For example, the harm/loss appraisal scale was positively associated with threat appraisals ($r = .68, p < .001$), possibly indicating a single construct of negative appraisal (Kessler, 1989).

Support for concurrent validity of the CAHS was not as strong as indicated by significant, but weak correlations between time since diagnosis of breast cancer and the primary appraisal scales (Kessler, 1998). Differences in appraisals were found between groups of women at different time points since diagnosis and these findings were consistent with clinical observations made by Kessler (1998). Women who were more than 10 years since diagnosis were significantly different from women who were newly diagnosed in expression of benign/irrelevant appraisals. Also, women who were within
the key survival markers of 5 to 10 years from diagnosis, reported more stress appraisals than women who were newly diagnosed or more than 10 years since diagnosis (Kessler, 1998). The context of time since diagnosis and the related patterns of primary appraisal was an appropriate way to assess concurrent validity of the CAHS, although the resulting correlations were weak.

There were no studies found that reported how the CAHS performed when administered in different formats. In this study, the researcher recorded whether the CAHS was administered during an interview or self-administered by the patient. Results were checked for any differences between the groups by comparison of mean scores on the CAHS scales.

The Chronbach alpha coefficients for the CAHS scales in this study were: threat appraisal (.72), challenge appraisal (.68), harm/loss appraisal (.86), and benign/irrelevant appraisal (.74).

**Uncertainty**

Uncertainty is conceptually defined as the inability to make sense of one’s experiences during illness (Mishel, 1988) and was viewed as an antecedent of cognitive appraisal in this research study. Uncertainty was measured by the Mishel Uncertainty in Illness Scale – Community Form (MUIS-C), which is an abbreviated version of the original MUIS (Mishel, 1981). Items pertaining to communication with healthcare professionals and inpatient treatment, which can be found on the original MUIS, are excluded on the MUIS-C version. The MUIS-C is a self-report measure of attitudes and perceptions of illness for non-hospitalized adults and consists of 23 items that are rated on a five point Likert scale, ranging from strongly disagree (1) to strongly agree (5).
Scores were summed, providing a total score ranging from 23 – 115. High MUIS-C scores indicate greater uncertainty regarding the participant’s current illness.

The MUIS-C has been used extensively in studies of patients with cancer (Wonghongkul et al., 2000; Sammarco, 2001; Wallace, 2003; Wonghongkul et al., 2006). The alpha coefficient for the MUIS-C scale in three cancer studies were .89, .87, and .53 (Mishel, 1997). Also, because the items on the MUIS-C are very similar to those on the original MUIS, psychometric properties of the MUIS can be applied to the MUIS-C. Two factors (ambiguity and unpredictability) comprising the MUIS have shown good internal consistency with reported alphas from .64 to .91 (Mishel, 1981). Construct validity of the MUIS was demonstrated in a study of 253 medical and surgical patients. Patients who were undergoing diagnostic procedures had significantly higher uncertainty scores (Mishel, 1981). Convergent validity of the MUIS was supported in another study by Mishel (1981) of 100 hospitalized medical patients that showed perceived uncertainty strongly correlated with stress, as measured by the Hospital Stress Events Scale ($r = .35$, $p < .001$). The Chronbach alpha coefficient for the MUIS-C in this study was .90.

Although the MUIS-C is designed for self-administration, Mishel (1997) recommends that the researcher introduces the scale by giving an example of how to respond to an item. Psychometric properties for the MUIS-C used in different formats (interview or self-administered) have not been reported. In this study, the researcher tracked how the MUIS-C was administered and differences between groups were examined by comparing mean total scores.
Symptom Distress

Symptom distress is conceptually defined as the degree to which a patient is bothered by a symptom (Lenz et al., 1997). In this study, symptom distress was measured using the Memorial Symptom Assessment Scale Short Form (MSAS-SF), which is a list of 32 physical and psychologic symptoms (Chang, Hwang, Feuerman, Kasimis, & Thaler, 2000). For physical symptoms, patients were first asked to identify if the symptom was present during the past week. If it was not present a zero was recorded. If a symptom was present, the subject was asked to rate the distress or bother associated with that symptom. The distress was rated on a five point Likert scale consisting of 0.8 or “not at all,” 1.6 or “a little bit,” 2.4 or “somewhat,” 3.2 or “quite a bit,” and 4.0 “very much.” For psychological symptoms, patients were first asked to check if the symptom occurred during the past week and then indicate how often it occurred. The frequency of psychological symptoms was rated on a four point Likert scale, ranging from 1 or “rarely,” to 4 or “almost constantly.”

Scoring of the MSAS-SF is based on three subscales: the Global Distress Index (GDI), the Physical Symptom subscale (PHYS), and the Psychological Symptom subscale (PSYCH) (Chang et al., 2000). The Global Distress Index (GDI) is a measure of overall symptom distress and is calculated by the average frequency of four psychological symptoms (feeling sad, worrying, feeling irritable, and feeling nervous) and the average distress associated with six symptoms (lack of energy, pain, appetite loss, drowsiness, constipation, and dry mouth). The Physical Symptom subscale (PHYS) is the average of 12 physical distress scores (appetite loss, lack of energy, pain, drowsiness, constipation, dry mouth, nausea, vomiting, taste changes, weight loss, bloating, and
dizziness. The Psychological Symptom subscale (PSYCH) is the average frequency and distress of six psychologic symptoms (feeling sad, worrying, feeling irritable, difficulty sleeping, difficulty concentrating, and feeling nervous) (Chang et al., 2000). Higher subscale scores indicate higher distress. In addition to the subscale scores, the total MSAS score is calculated as the average of the 32 symptom scores. The possible total score range is 0 to 4.00, with a higher score indicating greater symptom distress.

Internal reliability of the MSAS-SF subscales was reported by Chang et al. (2000) with Chronbach alpha coefficients of 0.80 for GDI, 0.82 for PHYS, and 0.76 for PSYCH. Criterion validity was determined in a study of 299 cancer patients with mixed diagnoses, in which the MSAS-SF subscales correlated with Functional Assessment Cancer Therapy (FACT) subscales: PHYS and FACT physical well-being subscale, \( r = -.74, p < .001 \); PSYCH and FACT emotional well-being subscale, \( r = -.68, p < .001 \); GDI and FACT summary scale, \( r = -.70, p < .001 \) (Chang et al., 2000). Convergent validity of the MSAS-SF was supported when the subscales showed very clear variation in scores based on the categories of both the Karnofsky performance status (KPS) scores and extent of disease (Chang et al., 2000). Groups of patients with local, regional or metastatic disease were significantly different from one another on all subscales and the total score of the MSAS-SF, with patients in the metastatic group having the most symptom distress (Chang et al., 2000). Likewise, groups of patients with varying KPS scores (20-50, 60-70, 80, and 90-100) were significantly different from one another on all subscales and the total score of the MSAS-SF, with patients in the lowest KPS group having the highest symptom distress (Chang et al., 2000).
The Chronbach alpha coefficient for the total MSAS-SF scale in this study was .85. The alpha coefficients for the subscales were: 0.80 for GDI, 0.76 for PHYS, and 0.81 for PSYCH.

Reported differences in psychometric properties based on whether the MSAS-SF was self-administered or utilized in an interview were not found. As mentioned previously, the method of administration of all instruments in this study were recorded and evaluated for differences.

*Comorbidity*

In this study, comorbidity was conceptually defined as the co-occurrence of multiple diseases in an individual (Guralnik, 1996). It was viewed as an antecedent personal factor of cognitive appraisal. Comorbidity was assessed using the Charlson Comorbidity Index (CCI), which is a tool used for assessing comorbid conditions in patients (Charlson, Pompei, Ales, & MacKenzie, 1987). The CCI consists of 19 medical conditions, each with an associated weighted value of 1 to 6, with a higher weight indicating a condition with greater relative risk of death (Hall, Ramachandran, Narayan, Jani, & Vijayakumar, 2004). Total scores may range from 0 to 37, with a higher total score reflecting a higher degree of comorbidity and risk of death. In this study, the CCI was completed by the researcher who reviewed the patient’s medical record to identify and confirm the presence of comorbid conditions.

The CCI was originally constructed from a sample of 559 medical patients as a tool to predict one-year mortality (Charlson et al., 1987). Preliminary support for convergent validity was determined when the CCI performed as well as the Kaplan-Feinstein Index in prognostic stratification of 685 breast cancer patients (Charlson et al.,
More recently, both predictive and concurrent validity of the CCI were supported in a retrospective study of 88 patients with head and neck cancer who had undergone curative treatment (Singh et al., 1997). The CCI was successful in predicting survival; the median survival of patients was reduced from 38.7 to 12.3 months in patients with a higher CCI stage. Also, the CCI strongly correlated with the Kaplan-Feinstein Index in accurately describing co-morbidity, \( r_s = .73, p < .001 \) (Singh et al., 1997). This result demonstrated very good concurrent validity for the CCI. The reliability of the CCI is very good, with reported inter-rater correlations of .74 and test-retest correlations of .86 in a study of 203 older cancer patients (Extermann, Overcash, Lyman, Parr, & Balducci, 1998).

**Social Support**

In this study, social support was conceptually defined as one’s perception of helping relationships. For this study, it was postulated that perceived social support may act by moderating the relationship between appraisal of illness and psychosocial adjustment during the post-radiation treatment transition. Social support was measured using the Medical Outcomes Social Support Survey (MOS-SSS), which is a 19 item, self-report survey with four support subscales: emotional/informational, tangible, affectionate, and positive social interaction (Sherbourne & Stewart, 1991). For each item, subjects rated how often each type of support was available to them using a five point Likert scale, ranging from 1 or “none of the time” to 5 or “all of the time.” Each subscale score was obtained by calculating the average rating for the items in the subscale. The overall support index was calculated by averaging the 19 items; a higher score indicated more support. Total scores may range from 1 to 5.
Psychometric properties of the MOS-SSS were initially reported on data from 2,987 adult patients diagnosed with hypertension, diabetes, coronary heart disease, and/or depression (Sherbourne & Stewart, 1991). Internal-consistency reliability (Chronbach’s alpha) of the MOS-SSS subscales and overall support index were very good: emotional/informational support (.96), tangible support (.92), affectionate support (.91), positive social interaction (.94), and the overall support index (.97). Divergent validity was greatest for each subscale and the overall support index when correlated with the variable of loneliness, with correlations ranging from -0.53 to -0.69.

In this study, the Chronbach alpha for the MOS-SSS total score was .95. The alphas for the subscales were: emotional/informational support (.92), tangible support (.92), affectionate support (.90), and positive social interaction (.93).

There were no studies found that reported how the MOS-SSS performed when administered in different formats. In this study, the researcher recorded the format used in administering the MOS-SSS and results were checked for any differences between the groups.

_self-Efficacy for Coping_

Self-efficacy for coping was conceptually defined in this study as the confidence in one’s ability to apply a coping strategy to achieve goals (Merluzzi et al., 2001). Self-efficacy was measured using the Cancer Behavior Inventory Long Form (CBI-L) – Version 2.0, which is a 33 item instrument that measures self-efficacy for coping with cancer (Merluzzi et al., 2001). Subjects rated their confidence for seven factors using a nine point Likert scale, ranging from “not at all confident” (1) to “totally confident” (9). The seven factors are: maintenance of activity/independence, finding and understanding
medical information, managing stress, coping with side effects, keeping a positive attitude, regulating emotions, and seeking support. A total score was obtained by summing the subject’s ratings for the items, with a higher score representing higher self-efficacy. Total scores may range from 14 to 126.

Internal consistency of the CBI-L is excellent. It was reported as .94 for the entire instrument in a sample of 280 cancer patients with mixed diagnoses who had been treated with chemotherapy and/or surgery (Merluzzi et al., 2001). In the same study, the test-retest reliability was also good \( (r = .74) \). In this study, the Chronbach alpha was .95.

Validity of the CBI-L was assessed by comparing it to quality of life, another relevant construct to patients with cancer. Initial convergent validity of the CBI-L was supported by moderate positive correlations between six factors of the CBI-L with the Functional Assessment of Cancer Therapy (FACT-G) scales, which is a measure of quality of life in cancer patients. The self-efficacy factors and their related correlations with the FACT-G were: management of activity and independence \( (r = .61, p < .01) \), seeking and understanding medical information \( (r = .31, p < .01) \), stress management \( (r = .35, p < .01) \), coping with treatment–related side-effects \( (r = .53, p < .01) \), accepting cancer and maintaining a positive attitude \( (r = .56, p < .01) \), and seeking support \( (r = .52, p < .01) \) (Merluzzi et al., 2001). Also, the finding that patients with higher self-efficacy scores had higher quality of life than those patients with low self-efficacy scores supported concurrent validity of the CBI (Merluzzi et al., 2001).

The CBI-L generally is self-administered by the subject. Psychometric properties of the CBI-L based on format of administration were not found. In this research, the administration format was tracked and analyzed for differences between groups.
Demographic and Other Variables

Demographic variables were measured for purposes of describing the sample and for evaluating potential relationships to cognitive appraisal and psychosocial adjustment during the post-radiation treatment transition. All subjects were interviewed prior to taking the first set of measures. Demographic variables were measured by self-report and include: age in years; gender (male, female); race/ethnicity (Caucasian, African American, Hispanic, or other); marital status (married, not married); education (less than high school, high school diploma, college, post-graduate, other); employment status (employed, retired, disabled, not employed, other); income ($20,000 or less, $21,000 to $49,000, or $50,000 or greater); and current living arrangement (alone, with others, or other). Cancer type, stage of cancer, months since diagnosis, type of treatments received to date, concurrent treatments, any planned future treatment, and number of radiation treatments received were collected from the medical record.

Data Management and Statistical Analysis

Coded items for each instrument and the demographic sheet were entered into an SPSS data file. Decisions regarding coding of instruments were maintained in a code book. Data were stored in the hard drive of a personal computer and were backed up on a disk. The raw data were stored in a locked file cabinet in the research office of the principal investigator.

Data Screening

The accuracy of the data was checked in two ways. First, the data, which were entered by an assistant, were double checked by the researcher for each case. Next, descriptive statistics, including frequencies, means, standard deviations, skewness, and
kurtosis were run in SPSS for each variable. The investigator inspected the data sheets for out-of-range values and verified them with original data sheets, if necessary.

Missing data codes were also cross-checked with the original data sheet. According to Tabachnik and Fidell (2007, p. 62), assessing the pattern of missing data to determine if data are MCAR (missing completely at random), MAR (missing at random) or MNAR (missing not at random) is crucial, as the generalizability of the study results can be affected with data that are nonrandomly missing. Missing data were examined to determine if they were random or selective and to what variable each datum was related. Patterns of missing data were assessed by first creating a dummy variable that was coded for two groups: those with missing values and those without missing values. A simple independent samples t-test was then conducted to verify if there was a significant difference between the groups, meaning that there was a pattern associated with the missing data (Tabachnick & Fidell, 2007; Mertler & Vannatta, 2005).

The amount of missing data was also considered. The decision to delete an entire case with missing data (listwise deletion) was made after determining that there was only a few random cases with missing data and/or that the missing values were all linked to a few variables that were not critical (Tabachnick & Fidell, 2007). Listwise deletion was not used if the data were MAR or MNAR because bias would have been introduced resulting in misleading regression coefficients (Patrician, 2002).

If missing values were noted throughout the data set, they were imputed prior to data analysis using mean substitution. Missing data on the MUIS-C and four scales of the CAHS were substituted with the individual’s mean score on the instrument. Missing data on the CBI-L, MSAS-SF, MOS-SS, and PAIS-SR were replaced using the subject’s mean
score for the specific factor or subscale related to the missing item. In this study, missing data related to demographics were ignored. As recommended by Tabachnick & Fidell (2007), the multiple regression analyses were conducted first with the imputed data set and then repeated with only complete cases. Results were compared and differences were investigated.

Univariate outliers in the data set were identified by noting values that have a z-score of greater than +3.00 or less than -3.00 (Mertler & Vannatta, 2005) and by visual inspection of box plots and histograms. The outliers were examined for a pattern and potential causes for outliers were considered. Accuracy of the data entry was checked.

Normality of the data was assessed by statistically examining skewness and kurtosis of each variable. Skewness is the degree of symmetry of a distribution around the mean and kurtosis is the degree of peakedness of a distribution (Tabachnick & Fidell, 2007). In a normal distribution, scores for both skewness and kurtosis are zero. If the skewness value is positive, the cases are clustered on the left with a right tail; if the skewness value is negative, the cases are clumped together on the right with a left tail (Field, 2005). For kurtosis, a positive value indicates a peaked distribution with short tails; a negative value indicates a flat distribution with thick tails (Field, 2005).

An initial estimate of how skewed or kurtotic the data were was attained by reviewing the actual values on the SPSS printout for their distance from zero. Then, verification of whether or not the data were normally distributed was made by calculating the 95% confidence intervals for skewness and kurtosis for each variable and noting if the confidence interval encompassed zero, which indicated that sample came from a population where skewness and kurtosis were zero (Corty, 2007). Visual inspection of
the histogram, normal Q-Q plot, detrended Q-Q plot, and boxplot also aided
determination of skewness and kurtosis for each independent and dependent variable.
The Shapiro-Wilk test was also reviewed for a non-significant result, which indicated that
the null hypothesis that the data came from a normally distribution was retained.

Transformation of all of the data for variables that were being compared was
considered to reduce the impact of any outliers and/or skewness and kurtosis on the
results (Tabachnick & Fidell, 2007). The type of transformation selected was based on
the skewness of the original distribution. If necessary, positively skewed data were
transformed by one of several methods beginning with a square root transformation, then
a logarithm transformation or an inverse transformation if the data were severely skewed
(Mertler & Vanatta, 2005). After each transformation the data were rechecked for
skewness and kurtosis. Negatively skewed data were transformed after the data were
reflected by first adding one to the largest score in the distribution to create a new
constant and then subtracting each score from the constant to create a new variable
(Tabachnick & Fidell, 2007; Mertler & Vanatta, 2005). If transformation was necessary,
the data results were reported for both the raw and transformed data.

Once univariate outliers were transformed, the data were then checked for
multivariate outliers, which are a combination of two or more variables that lie at a
distance from the rest of the distribution (Tabachnick & Fidell, 2007). This distance was
assessed for each multivariate outlier using the statistical calculation of Mahalanobis
distance, which is a chi-square distribution. Mahalanobis distance measures “the distance
of cases from the mean(s) of the predictor variable(s)” (Field, 2005, p. 165). A case is
considered an outlier if the chi-square value is greater than the determined chi-square
critical value at the p < .001 level (Tabachnick & Fidell, 2007; Mertler & Vanatta, 2005). Each multivariate outlier was examined to determine the variables associated with the deviant score combination and a decision was made to drop or retain the case.

Regression Diagnostics

Each analysis was assessed for meeting the regression assumptions, as outlined by Pedhazur (1982) and Mertler & Vannatta (2005). First, it is assumed that the independent variables are fixed, meaning that their values are determined from sampling a population and that if the study was replicated the same values for the independent variables would be used.

The second assumption is that the independent and dependent variables are measured without error. Although this assumption is typically violated, the use of good data collection techniques and measures assist in reducing measurement error.

The third assumption is that the relationship between each independent variable and the dependent variable is linear, meaning that the regression of the dependent variable on the independent variables is linear (Pedhazur, 1982). This was assessed by visual examination of the residual plots of standardized residuals versus predicted values. Residual values that are evenly spread around the zero line indicate that the assumption of linearity is met (Mertler & Vannatta, 2005). If this assumption is not met, as evidenced by a curvilinear pattern, transformation of the independent variables or dependent variable is recommended followed by a recheck of the assumptions. As reviewed in the previous section, common transformations include: square root, logarithm or an inverse transformation. Tabachnick & Fidell (2007) recommend including the square of the independent variables in the analysis if the curvilinear pattern
is not corrected with transformation. This assumption is robust to violation, meaning that nonlinear residuals do not invalidate the regression (Tabachnick & Fidell, 2007).

The fourth assumption is that the mean of the residuals for each observation of the dependent variable over multiple replications is zero (Pedhazur, 1982; Mertler & Vannatta, 2005). Whether this assumption is met can be assessed by either of two methods. One method is to verify the presence of a constant in the equation on the SPSS printout in the coefficients table. The other method is to note on the SPSS printout whether the standardized residual has a mean of zero and a standard deviation of approximately one. The assumption of zero mean is not robust to violation. If the assumption is violated, the dependent variable should be transformed in an attempt to correct the violation.

The fifth assumption is that the value of one residual associated with an observation of the dependent variable is independent or not correlated with any other errors associated with other observations of the dependent variable (Pedhazur, 1982). This is a critical assumption and not robust to violation. The Durbin-Watson statistic in the SPSS program identifies issues related to autocorrelation of errors and a value of 1.5 to 2.5 indicates that the assumption was not violated.

The sixth assumption is that the residuals are not correlated with the independent variables (Mertler & Vannatta, 2005). This would indicate that the residuals also predict the outcome variable, making the interpretation of the regression model unreliable (Field, 2005).

The seventh assumption of homoscedasticity implies that the variance of the residuals is constant for all levels of the independent variable (Pedhazur, 1982). This is
visually assessed by plotting the standardized residuals against the predicted dependent variable and checking for an even spread around the zero line. This assumption is robust to violation.

Lastly, the eighth assumption is that the *errors are normally distributed* (Mertler & Vannatta, 2005). Residual normality is assessed by first examining a histogram of residuals (with a curve super-imposed over it) for its approximation to a bell-shaped curve (Field, 2005). Second, a probability plot (P-P), which compares observed to expected residuals, is assessed. The expected residuals on the P-P plot appear as a straight line, representing a normal distribution; the observed residuals appear as points (Field, 2005). The observed residuals are normally distributed if the points lie on the straight line. If this assumption is violated as evidenced by a skewed distribution or non-alignment on the P-P plot, the dependent variable should be transformed. After transformation, the assumptions for the regression analysis should be rechecked.

In addition to the assumptions of the regression analysis, the data were assessed for multicollinearity and influential data points prior to the analysis. Multicollinearity occurs when the independent variables are highly correlated with one another. This was assessed by evaluating the tolerance statistic for each independent variable. A tolerance value of less than .10 indicates that 90 percent of that variable is explained by other independent variables in the equation and that multicollinearity is present (Mertler & Vannatta, 2005). The variance inflation factor (VIF), which is an assessment of the strength of the linear relationship between a specific predictor variable and the other predictors, was also evaluated. A VIF value of greater than 10 indicates that multicollinearity exists (Mertler & Vannatta, 2005). A variable causing multicollinearity
should be removed from the analysis if the concept measured by that variable is theoretically measured by another variable.

The data were assessed for influential data points prior to the regression analysis by examination of the standardized residuals. Data points were considered an outlier on $y$ if the standardized residual had an absolute value greater than 3.0 (Field, 2005). Outliers on $x$ were determined by first calculating the leverage value or threshold using the formula $3(k+1)/n$ (Field, 2005). If the centered leverage value on the SPSS output was greater than the threshold value, an outlier was considered present. Once outliers were identified, the Cook’s distance statistic was then used to determine if the outlier was influential in the regression model. If the Cook’s distance value on the SPSS output was greater than 1.0, the outlier was considered influential (Tabachnick & Fidell, 2007). In this study, influential data points remained in the data set and the regression analysis was conducted with and without the influential data points included. Influential data points may most accurately reflect the diversity and complexity of the sample and removing them may dilute the richness of the data.

Data Analysis

Research Question 1: What are the intrapersonal and emotional characteristics of psychosocial adjustment in patients with breast, colon, prostate, and lung cancer during the post-radiation treatment transition?

Descriptive statistics was used to describe the adjustment of patients. Ranges, means, confidence intervals, medians, and standard deviation scores were reported for the total adjustment score and for each of the seven subscales. Group comparisons were explored, based on demographic variables (sex, race/ethnicity, marital status, and
education level). Bivariate correlations between the independent variables (age, comorbidity, cognitive appraisal, uncertainty, symptom distress, social support, and self-efficacy for coping) and psychosocial adjustment were also evaluated.

Research Question 2: What is the relationship of symptom distress, uncertainty, medical factors (comorbidity, cancer stage), and personal factors (age, gender, race/ethnicity, and education) with cognitive appraisal of health at two weeks prior to ending radiation?

The variables of sex, race/ethnicity, and education are nominal-level data and were measured dichotomously (male = 1 and female = 2, Caucasian = 1 and non-Caucasian = 2, high school education or less and greater than a high school education). Therefore, dummy coding of the variables was not required. Cancer stage (0, I, II, or III) is ordinal data. The variables of symptom distress, uncertainty, and comorbidities score are interval-level data. The variable age is ratio-level data.

Four regressions addressed this research question. The dependent variable (the CAHS scale of threat, challenge, harm/loss, or benign/irrelevant) was simultaneously regressed on the independent variables (symptom distress, uncertainty, cancer stage, comorbidities, age, sex, race/ethnicity, and education). Data were evaluated for violation of regression assumptions. Multicollinearity, influential data points and outliers were examined. Adjusted $R^2$ and the standardized regression weights ($\beta$) were evaluated for significance. An alpha of .05 was set for all analyses.

Research Question 3: What is the predictive relationship between cognitive appraisal of health at two weeks prior to ending radiation treatment and psychosocial adjustment during the post-radiation treatment transition?
This question was answered by one hierarchical regression in which the dependent variable, psychosocial adjustment, was regressed on control variables and the four types of cognitive appraisal. Selection of the control variables for the regression was guided by theory, prior research, and examination of bivariate correlations between the independent variables and psychosocial adjustment. In the first step of the regression, the control variables were entered (cancer stage, age, and scores for uncertainty and symptom distress). Next, the four scales of primary appraisal (harm/loss, benign/irrelevant, threat, and challenge) were entered into the second step of the regression to determine if appraisal significantly contributed to the model. Data were evaluated for violation of regression assumptions. Multicollinearity, influential data points, and outliers were examined. Adjusted $R^2$ and the standardized regression weights ($\beta$) were evaluated for significance.

**Research Question 4: Does social support moderate the relationship between cognitive appraisal of health and psychosocial adjustment during the post-radiation treatment transition?**

The moderating effect of social support on the relationship between cognitive appraisal and psychosocial adjustment (total score of the PAIS-SR) was assessed for each of the four scales of the CAHS (threat, challenge, harm/loss, and benign/irrelevant). A hierarchical multiple regression was conducted for each analysis to determine if the moderator affected the direction and/or strength of the relationship independent and outcome variables (Bennett, 2000). The statistical model, which illustrates the three paths in the regression, is shown in Figure 3.
First, prior to running the multiple regression analysis, the independent variables (social support total score and each of the CAHS scales) were centered to reduce the problem of multicollinearity, which is a high correlation between the independent and moderator variables. Multicollinearity is statistically introduced when the interaction term is created and can impact the regression analysis (Aiken & West, 1991; Lindley & Walker, 1993; Tabachnick & Fidell, 2007). Following the centering procedure outlined by Aiken and West (1991), the independent variable (appraisal type) and moderating variable (social support) were first converted into z-scores. Then the z-score of the independent variable (appraisal type) was multiplied by the z-score of the moderating variable (social support). Lastly, this product was converted to a z-score to create the interaction term for the analysis.

In the first step of the hierarchical multiple regression, the independent variable (scale of the CAHS) and the moderator variable (social support) were entered into the
regression model. In the second step, the interaction term was entered to test the moderation effect. If the interaction term in the second step of the regression was statistically significant, a moderator effect was present. This was determined by reviewing the \( t \)-score on the coefficient table on the SPSS output.

**Research Question 5:** Does self-efficacy for coping moderate the relationship between cognitive appraisal of health and psychosocial adjustment during the post-radiation treatment transition?

The moderating effect of self-efficacy for coping on the relationship between cognitive appraisal and psychosocial adjustment (total score of the PAIS-SR) was assessed for each of the four scales of the CAHS (threat, challenge, harm/loss, and benign/irrelevant). Similar to the previous research question, a hierarchical multiple regression was conducted. The statistical model, which illustrates the three paths in the regression, is shown in Figure 4.

First, prior to running the multiple regression analysis, the independent variables (self-efficacy for coping total score and each of the CAHS scales) were centered by converting the independent variable (appraisal type) and moderating variable (self-efficacy for coping) into \( z \)-scores. Then the \( z \)-score of the independent variable (appraisal type) was multiplied by the \( z \)-score of the moderating variable (self-efficacy for coping). This product was then converted into a \( z \)-score to create the interaction term.

In the first step of the hierarchical multiple regression, the independent variable (scale of the CAHS) and the moderator variable (self-efficacy for coping) were entered into the regression model. In the second step, the interaction term was entered to test the moderation effect. A moderator effect was present if the interaction term in the second
step of the regression was statistically significant. This was determined by reviewing the $t$-score on the coefficient table on the SPSS output.

![Diagram](image)

Figure 4. Model to test the moderating effect of self-efficacy for coping.

Summary

In summary, this was a prospective cohort study of factors associated with psychosocial adjustment during the post-radiation treatment transition. A predictive correlational design was used to test the relationship between stress appraisal and the outcome variable, psychosocial adjustment. The estimated sample size of patients with breast, colorectal, lung or prostate cancer was 119. Subjects completed the following surveys two weeks prior to the completion of treatment: the Cognitive Appraisal of Health Scale, Memorial Symptom Assessment Scale Short Form, Mishel Uncertainty in Illness Scale – Community Form, Charlson Comorbidity Index, Cancer Behavior Inventory Long Form, and Medical Outcomes Social Support Survey. Subjects
completed the Psychosocial Adjustment to Illness Scale – Self-Report version
approximately one-month after radiation therapy was completed. The analysis included
descriptive statistics with group comparisons based on demographic variables as well as a
series of multiple regression analyses. The moderator roles of social support and self-
efficacy were examined through a hierarchical regression.
Chapter IV

Results

The purpose of this exploratory study was to examine predictors of psychosocial adjustment during the immediate post-radiation treatment transition. A predictive correlational design was used to test the relationship between stress appraisal and psychosocial adjustment. Potential subjects, who were identified through the radiation treatment schedule, met with the investigator in the clinic approximately two weeks prior to completing radiation treatment. After obtaining informed consent, patients completed the Cognitive Appraisal of Health Scale (CAHS), Memorial Symptom Assessment Scale Short Form (MSAS-SF), Mishel Uncertainty in Illness Scale – Community Form (MUIS-C), Charlson Comorbidity Index (CCI), Cancer Behavior Inventory Long Form (CBI), and Medical Outcomes Social Support Survey (MOS-SSS). Subjects completed the Psychosocial Adjustment to Illness Scale – Self-Report version (PAIS-SR) approximately one-month after radiation treatment. The research questions were:

1. What are the intrapersonal and emotional characteristics of psychosocial adjustment in patients with breast, colon, prostate, and lung cancer during the post-radiation treatment transition?

2. What is the relationship between symptom distress, uncertainty, medical factors (comorbidity, cancer stage), and personal factors (age, gender, race/ethnicity, and education) and cognitive appraisal of health at two weeks prior to ending radiation treatment?
3. What is the predictive relationship between cognitive appraisal of health at two weeks prior to ending radiation treatment and psychosocial adjustment during the post-radiation treatment transition?

4. Does social support moderate the relationship between cognitive appraisal of health and psychosocial adjustment during the post-radiation treatment transition?

5. Does self-efficacy for coping moderate the relationship between cognitive appraisal of health and psychosocial adjustment during the post-radiation treatment transition?

This chapter presents the results of the study and includes a description of the intrapersonal and emotional characteristics of psychosocial adjustment, factors influencing cognitive appraisal, and predictors of psychosocial adjustment.

Pre-Analysis Data Screening

The accuracy of the data file was verified in several ways. First, the data, which were entered by an assistant, were double checked by the researcher for each case. Second, frequencies for all variables were explored for out-of-range data or for unusual values. Lastly, patterns of correlations with the outcome variable were checked for inflated or deflated values. None were found.

Outliers

Univariate outliers for the independent and dependent variables in the data set were identified by noting values that had a z-score of greater than 3.00 or less than -3.00 (Mertler & Vannatta, 2005) and by visual inspection of box plots and histograms. One case was found to be an extreme outlier (absolute z-score = 3.26) for the total score of the PAIS-SR. This case was retained because statistical tests ran with and without the case.
showed no difference in results and it was not found to be an influential outlier for the regression analyses. Regarding the independent variables, there were no univariate outliers found for the total scores for threat appraisal, harm/loss appraisal, benign appraisal, and uncertainty. There were a limited number of outliers found on the other variables: comorbidity (two cases with absolute $z$-score = 4.15), challenge appraisal (one case with absolute $z$-score = 3.15), symptom distress (one case with absolute $z$-score = 3.63), social support (one case with absolute $z$-score = 3.12) and self-efficacy for coping (one case with absolute $z$-score = 3.30). After verifying that there were no errors in data entry, these cases were retained in the sample.

Following the procedure outlined by Mertler and Vannatta (2005), multivariate outliers were assessed using Mahalanobis distance. This technique incorporates the independent and dependent variables into a simultaneous regression (psychosocial adjustment, self-efficacy for coping, social support, symptom distress, uncertainty, comorbidity, threat appraisal, challenge appraisal, harm/loss appraisal, and benign irrelevant appraisal). Each case’s variable for Mahalanobis distance was compared to a calculated critical value to determine if it was a multivariate outlier. There were no multivariate outliers found. Further outlier assessments occurred as a component of regression diagnostics and are described later in this chapter.

**Missing Data**

The amount and distribution of missing data on the PAIS-SR were checked using several methods. First, a dummy variable with two groups was created for those cases with and without items missing on the PAIS-SR. Thirty-one of the 73 participants (42.47%) who completed the PAIS-SR had at least one item missing on the instrument.
Second, using an Excel spreadsheet of the missing items per domain for each subject, two patterns of missing data were noted. Subjects who were retired did not complete the vocational subscale and subjects who were not married or partnered did not respond to the subscale focused on sexual relationships. Further patterns in missing data were explored by conducting independent-samples \( t \)-tests to check for significant mean differences for the independent variables between those subjects who had missing data on the PAIS-SR and those who did not. There was not a statistically significant difference in appraisal, uncertainty, social support or self-efficacy between groups with and without missing data. However there was a statistically significant difference in total symptom distress score between the groups, \( t(68.195) = 2.23, p < .05, d = .53 \). Subjects with missing data on the PAIS-SR had significantly less symptom distress than those who did not have missing data. Although this suggested that these data were not missing at random, Tabachnick and Fidell (2007, p. 63), recommend that cases with missing values should be preserved when the effect size is “substantial,” even though a statistically significant difference was found on one of the independent variables. Thus, due to the medium effect size for the difference in symptom distress, subjects with missing data on the PAIS-SR were retained.

Missing values on the PAIS-SR that were deemed not applicable to the participant because of retirement or marital status were assigned a score of zero per the PAIS-SR manual instructions (Derogatis & Derogatis, 1990). Other items that appeared to be randomly skipped by the participant were imputed using the individual’s mean score for that particular subscale. Two subjects, who had missing data for more than 50% of a
subscale, were retained in the final sample because results from regression analyses with and without them were equivalent.

The amount of missing data on the CAHS was minimal. Of the 80 subjects, 4 (5%) were missing an item on the challenge scale, 3 (3.75%) were missing an item on the benign/irrelevant scale, 1 (1.25%) was missing an item on the threat scale and 1 (1.25%) skipped an item on the harm/loss scale. These data were missing at random because they did not appear to be linked to another specific variable. Missing data were imputed using the individual’s mean score for that particular appraisal scale.

Ten out of the 80 subjects (12.5%) had at least one item missing on the MUIS-C. A pattern to the missing data on the MUIS-C was noted in that 7 out of these 10 patients skipped the question “It is unclear how bad my pain will be.” This item was deemed not applicable to the participant and thus scored as a zero per instructions in the scoring manual (Mishel, 1997). The remaining three subjects had at least 60% of the items completed overall and were therefore retained in the sample. Mean substitution, using the individual’s mean score for the entire instrument, was applied in these three cases that had data missing randomly.

Fifteen out of 80 subjects (18.75%) were missing at least one item on the CBI. There was no pattern to the missing data. Although no subjects were missing more than 60% of the items overall, there were three instances between two subjects where greater than 60% of the items in a particular factor were missing. In this particular study, the overall score for the CBI was used in the statistical analyses rather than scores for the seven factors of the instrument. Therefore, these subjects were retained in the sample. Missing data were imputed using the individual’s mean score for the factor.
Two out of 80 cases had missing data on the MOS-SSS and one of these cases had 58% of the items missing. In this study, social support was hypothesized to moderate the relationship between appraisal and psychosocial adjustment. This case, which was missing three entire subscales of the MOS-SSS, was retained in the sample because the results of the moderation analyses for research question four were equivalent with and without the case. For this case, missing data were imputed using the individual’s mean score for the total instrument. Correlations between social support (total score and subscales) and psychosocial adjustment were then checked with both the imputed items and with this case deleted from the data set. Correlations were unchanged in magnitude and significance, thus supporting retention of this case. For the other case, which was missing only one item on the entire scale, mean substitution using the individual’s mean of the particular social support subscale was used.

The only demographic variable with missing data was socioeconomic status. Three of 80 subjects (3.75%), one of whom was a dropout at time two, did not respond to that question. These cases were retained in the study. Lastly, there were no missing data on the MSAS-SF or the CCI.

Normality of Variables

Table 1 displays the 95% confidence intervals for skewness and kurtosis for the dependent and independent variables. The $p$-value for the Shapiro-Wilk statistic is also presented. There were several variables with problems with normalcy. All others were acceptable because the 95% confidence intervals for skewness and kurtosis encompassed zero.
Table 1.

*Normality of Dependent and Independent Variables (N = 80)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>95% CI Skewness</th>
<th>95% CI Kurtosis</th>
<th>Shapiro-Wilk Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment^a</td>
<td>.11 to 1.21</td>
<td>-.37 to 1.80</td>
<td>.055</td>
</tr>
<tr>
<td>Threat Appraisal</td>
<td>-.39 to .67</td>
<td>-1.81 to .27</td>
<td>.072</td>
</tr>
<tr>
<td>Challenge Appraisal</td>
<td>-1.33 to -.27</td>
<td>-.34 to 1.75</td>
<td>.004</td>
</tr>
<tr>
<td>Harm/Loss Appraisal</td>
<td>.26 to 1.31</td>
<td>-.93 to 1.15</td>
<td>.001</td>
</tr>
<tr>
<td>Benign Appraisal</td>
<td>-.42 to .63</td>
<td>-1.62 to .46</td>
<td>.311</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>-.81 to .25</td>
<td>-1.19 to .90</td>
<td>.041</td>
</tr>
<tr>
<td>Symptom Distress</td>
<td>.53 to 1.58</td>
<td>.30 to 2.38</td>
<td>.000</td>
</tr>
<tr>
<td>Self-Efficacy for Coping</td>
<td>-1.53 to -.47</td>
<td>-.28 to 1.80</td>
<td>.000</td>
</tr>
<tr>
<td>Social Support</td>
<td>-1.51 to -.45</td>
<td>-.69 to 1.40</td>
<td>.000</td>
</tr>
<tr>
<td>Comorbidity</td>
<td>1.93 to 2.98</td>
<td>5.47 to 7.56</td>
<td>.000</td>
</tr>
</tbody>
</table>

^a n = 73 due to missing data.

The total score of the PAIS-SR, the dependent variable, had close approximation to a normal distribution with slight positive skewness and normal kurtosis. Although the 95% confidence interval for skewness did not contain the value of zero, the lower border was very close to zero. Further factors supported the normality of this sample. The *p*-value for the Shapiro-Wilk statistic was .055, a non-significant result. In addition, there was no s-shape curve pattern to the normal Q-Q plot of the PAIS-SR total score, indicating no skewness in the distribution.

The distributions for challenge appraisal and harm/loss appraisal had negative skewness and positive skewness, respectively. These variables were not transformed.
because in both cases the skewness was not severe, as determined by the visual appearance of the distribution, the proximity of the confidence interval to zero, and the lack of a distinct s-shaped curve on the normal Q-Q plots. Also, the sample size was greater than 50, lessening the concern about violating the assumption of normal distribution.

The distribution for the total symptom distress score had positive skewness, positive kurtosis, and a significant p-value for the Shapiro-Wilk statistic. However, there was evidence that the skewness and kurtosis were not severe and thus transformation of this variable was not warranted. Although the confidence intervals did not encompass zero, the lower boundaries were close to zero. Also the normal Q-Q plot did not show a distinct s-shape, nor did it have cases consistently above or below the straight diagonal line that represents expected values in a normal distribution. Lastly, the detrended normal Q-Q plot showed that deviation scores were clustered close to the horizontal zero line, indicating that skewness was not severe.

Negative skewness was found in the distribution for self-efficacy for coping. However, the variable was not transformed because of the proximity of the confidence interval to zero and the lack of patterns in the normal Q-Q plot and detrended normal Q-Q plot indicated that the skewness was not severe.

The distribution for the total social support score showed negative skewness. Violation of the assumption of normal distribution was also confirmed by an s-shape curve on the normal Q-Q plot. However, this variable was not transformed because the sample size was greater than 50 and because the upper boundary of the confidence interval was proximal to zero.
The independent variable, comorbidity, was not normally distributed as evidenced by positive skewness, severe kurtosis, a significant Shapiro-Wilk statistic and problematic patterns on the normal Q-Q plot and detrended normal Q-Q plot. This variable was retained because (a) it is conceptually a significant predictor of appraisal and (b) the results of the analyses for research question two were the same with and without the variable of comorbidity in the regression equation.

Sample

Enrollment into the study occurred from August 2008 to February 2009, during which time the investigator assessed 126 patients for eligibility for the study (Figure 5). Of these patients, 18 did not meet inclusion criteria, 13 were missed by the investigator, 13 refused to participate, and 82 consented for the study. Of these 82 patients, two dropped out of the study prior to completing the time one instruments, leaving a sample of 80. Seven subjects did not complete the time two instrument, resulting in a final sample of 73 for the regression analyses.

The refusal rate for this study was 14%. Patients who refused participation were predominantly female African Americans with breast cancer. The mean age of patients who refused was 66.23 years, which was slightly older than the mean age of participants (62.28). Lack of interest in the study was cited as the reason for refusal in 77% of the patients.

The attrition rate for this study was 11%. Two subjects cited family crises as the reason for withdrawing from the study prior to completing the time one surveys. The other seven subjects passively withdrew by not returning the time two surveys. The nine subjects who dropped out of the study had a mean age of 64.44 and were characterized by
being non-Caucasian (88.9%), married (66.7%) and not employed (66.6%). Most also had a high school education or less (88.9%) and were earning less than $20,000 per year (62.5%). Four of the subjects had breast cancer and five had prostate cancer. Most had stage II disease (66.7%). When comparing the dropouts to those subjects who remained
in the study, statistically significant differences were found for race, $\chi^2 (1, N = 82) = 11.92, p < .01$; education, $\chi^2 (1, N = 82) = 3.84, p = .05$; and income, $\chi^2 (1, N = 82) = 5.96, p < .05$. Dropouts were more likely to be non-Caucasian, have a high school education or less, and earn $20,000 or less per year.

Demographic Characteristics of the Sample

Table 2 presents the demographic characteristics of the 80 subjects who enrolled in the study. Most were female (58.8%), Caucasian (65%), married (63.8%), and living with others (82.5%). Although the mean age of the entire sample was 62.28 years, women with breast cancer were generally younger ($M = 55.91, SD = 12.23$) than those patients with prostate cancer ($M = 70.25, SD = 8.80$), or lung cancer ($M = 72.67, SD = 3.22$). This difference in age between patients with breast cancer and those not having breast cancer was statistically significant, $t(77.05) = 6.28, p < .001$.

Medical Characteristics of the Sample

Three cancer diagnoses were represented in this sample: breast cancer (56.3%), lung cancer (3.8%), and prostate cancer (40.0%). No patients with colorectal cancer were enrolled because they were receiving concurrent chemotherapy and thus did not meet the eligibility criteria. Time since diagnosis ranged from 69 to 5031 days ($M = 354.86, SD = 656.58, Mdn = 207.00$). Seven subjects with prostate cancer had extreme values for the variable, time since diagnosis, that were likely a result of the treatment option of watchful waiting after a positive prostate biopsy. The mean number of days since diagnosis was 205.09 days ($SD = 63.72, Mdn = 207.00$) for women with breast cancer, 144.67 days ($SD = 96.03, Mdn = 106.00$) for patients with lung cancer, and 585.19 days ($SD = 1000.33, Mdn = 201.00$) for men with prostate cancer.
Table 2.

*Sample Characteristics (N = 80)*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n (%)</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td>62.28 (12.92)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>33 (41.3)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>47 (58.8)</td>
<td></td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>52 (65.0)</td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>27 (33.8)</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>1 (1.3)</td>
<td></td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>51 (63.8)</td>
<td></td>
</tr>
<tr>
<td>Not married</td>
<td>29 (36.3)</td>
<td></td>
</tr>
<tr>
<td><strong>Employment Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>31 (38.8)</td>
<td></td>
</tr>
<tr>
<td>Retired</td>
<td>40 (50.0)</td>
<td></td>
</tr>
<tr>
<td>Not Employed</td>
<td>8 (10.0)</td>
<td></td>
</tr>
<tr>
<td>Disabled</td>
<td>1 (1.3)</td>
<td></td>
</tr>
<tr>
<td><strong>Annual Household Income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$20,000 or less</td>
<td>17 (22.1)</td>
<td></td>
</tr>
<tr>
<td>$21,000 to $49,999</td>
<td>27 (35.1)</td>
<td></td>
</tr>
<tr>
<td>$50,000 or greater</td>
<td>33 (42.9)</td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School or less</td>
<td>46 (57.5)</td>
<td></td>
</tr>
<tr>
<td>Post High School</td>
<td>34 (42.5)</td>
<td></td>
</tr>
</tbody>
</table>

*a n = 77 due to missing data.*
As shown in Table 3, 68 subjects (85%) had received treatment prior to the radiation therapy. Of the 45 women with breast cancer who had received prior treatment, 55.6% of them had received both surgery and chemotherapy and 40% had had surgery. In contrast, of the 22 men with prostate cancer who had reported prior treatment, 68.2% had received hormonal therapy. One patient with lung cancer had undergone prior surgical treatment.

Twelve of the 80 subjects (15%) were receiving hormonal therapy during the radiation treatment and 40 (50%) indicated that they would receive hormonal therapy after completing the radiation treatment. The number of radiation treatments received ranged from 25 to 46 (\(M = 35.70, SD = 6.94\)). Two patients (2.5%) were enrolled in a clinical trial. Most patients (57.5%) were receiving their treatment at the medical center rather than the two satellite facilities (42.5%).

Sample Characteristics Related to Administration of Surveys

It was intended that time one surveys would be administered when a subject had 7 to 10 treatments remaining. The mean number of treatments remaining was 9.46 (\(SD = 3.32\)) at time one. There were several extreme outliers for this variable including two patients who returned their time one surveys two days after completing their treatment and one patient who completed the time one surveys with 23 treatment days remaining. These outliers were likely due to disruptions in the planned treatment course, where the course of treatment was either shortened or lengthened. Thus, the cases with outliers were retained in the study.

Forty-five subjects (56.3%) completed the time one surveys during a face-to-face interview; 33 (41.3%) returned surveys via mail; and 2 (2.5%) self-administered the
Table 3.

**Clinical Characteristics of Sample (N = 80)**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of Cancer</strong></td>
<td></td>
</tr>
<tr>
<td>Breast</td>
<td>45 (56.3)</td>
</tr>
<tr>
<td>Lung</td>
<td>3 (3.8)</td>
</tr>
<tr>
<td>Prostate</td>
<td>32 (40.0)</td>
</tr>
<tr>
<td><strong>Stage of Disease</strong></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>6 (7.5)</td>
</tr>
<tr>
<td>I</td>
<td>24 (30.0)</td>
</tr>
<tr>
<td>II</td>
<td>40 (50.0)</td>
</tr>
<tr>
<td>III</td>
<td>10 (12.5)</td>
</tr>
<tr>
<td><strong>Prior Treatment</strong></td>
<td></td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>1 (1.3)</td>
</tr>
<tr>
<td>Surgery</td>
<td>23 (28.8)</td>
</tr>
<tr>
<td>Hormone Therapy</td>
<td>15 (18.8)</td>
</tr>
<tr>
<td>Surgery &amp; Chemotherapy</td>
<td>25 (31.3)</td>
</tr>
<tr>
<td>Surgery &amp; Hormone Therapy</td>
<td>4 (5.0)</td>
</tr>
<tr>
<td>None</td>
<td>12 (15.0)</td>
</tr>
</tbody>
</table>

surveys in the clinic. After recoding this variable into two categories (interview format versus mail/self-administered format), a series of independent-samples $t$-tests were conducted to identify differences in mean scores for the independent variables based on
data collection format. There were no statistically significant differences in mean scores for threat appraisal, challenge appraisal, harm/loss appraisal, uncertainty, symptom distress, social support, and self-efficacy for coping between subjects participating in face-to-face interviews and those who did not. The mean score for benign/irrelevant appraisal was slightly higher in the face-to-face interview group \((M = 11.93, SD = 3.69)\) than the mail/self-administered group \((M = 10.30, SD = 3.47)\) and this difference was statistically significant, \(t(78) = 2.02, p = .05\).

The PAIS-SR was administered at time two, approximately 4 to 6 weeks after radiation therapy. The number of days since completing radiation treatment at the time the PAIS-SR survey was completed ranged from 23 to 86, with a mean of 33.36 \((SD = 10.26, Mdn = 30.00)\). Only one patient completed the PAIS-SR during a telephone interview with the researcher; 72 subjects (99% of the sample) completed the survey at home and returned it via mail.

**Sample Characteristics Related to Independent Variables**

The independent variables are described in Table 4. Scores for threat appraisal, harm/loss appraisal, benign/irrelevant appraisal, and uncertainty were in the low to mid-range of possible scores. However, the score for challenge appraisal was toward the higher range for that variable, meaning that subjects in this study had a high amount of challenge appraisal. Scores for social support were also high in this sample. The precision of the mean estimates for challenge appraisal and social support is high, given the narrow confidence intervals.

Symptom distress, which had a skewed distribution, had a median score of .54 and a range of .03 to 2.27. The scores for the MSAS subscales were also low:
psychological symptom subscale ($Mdn = .67$), physical symptom subscale ($Mdn = .50$) and global distress index ($Mdn = .81$). The mean number of symptoms reported per subject was 7.66 ($SD = 4.06$, $Mdn = 6.50$). The most prevalent symptoms were lack of energy (63.8%), changes in skin (55%), pain (52.5%), worrying (52.5%), feeling drowsy (52.5%), and feeling sad (50%). The most distressing symptoms were lack of energy ($M = 1.63$, $SD = 1.41$, $Mdn = 1.60$), pain ($M = 1.21$, $SD = 1.29$, $Mdn = 1.60$), worrying ($M = 1.21$, $SD = 1.31$, $Mdn = 1.00$), problems with sexual interest or activity ($M = 1.16$, $SD = 1.42$, $Mdn = 0$), and difficulty sleeping ($M = 1.13$, $SD = 1.47$, $Mdn = 0$).

The sample exhibited high self-efficacy for coping. The range of scores was 126 to 297, with a median score of 257. The narrow confidence interval indicates that the mean found in this study is precise.

Table 4.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (SD)</th>
<th>95% Confidence Interval</th>
<th>Possible Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threat Appraisal</td>
<td>11.57 (3.59)</td>
<td>10.77 – 12.37</td>
<td>5 – 25</td>
</tr>
<tr>
<td>Challenge Appraisal</td>
<td>23.44 (3.63)</td>
<td>22.63 – 24.24</td>
<td>6 – 30</td>
</tr>
<tr>
<td>Harm/Loss Appraisal</td>
<td>17.40 (6.08)</td>
<td>16.05 – 18.76</td>
<td>8 – 40</td>
</tr>
<tr>
<td>Benign Appraisal</td>
<td>11.22 (3.66)</td>
<td>10.40 – 12.03</td>
<td>4 – 20</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>48.79 (11.72)</td>
<td>46.18 – 51.40</td>
<td>23 – 115</td>
</tr>
<tr>
<td>Symptom Distress (total)</td>
<td>.64 (.45)</td>
<td>.54 - .74</td>
<td>0 – 4</td>
</tr>
<tr>
<td>Self-Efficacy for Coping</td>
<td>246.35 (36.70)</td>
<td>238.08 – 254.62</td>
<td>33 - 297</td>
</tr>
<tr>
<td>Social Support (total)</td>
<td>4.22 (.76)</td>
<td>4.04 – 4.38</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Comorbidity</td>
<td>.31 (.648)</td>
<td>.17 - .46</td>
<td>0 – 37</td>
</tr>
</tbody>
</table>
The variable, comorbidity, which was a skewed distribution, had a median score of zero. Although there were two outliers identified for this variable, their scores (3.00) were still very low. These results indicate one of two possibilities. The sample had very few comorbid conditions to report or the instrument was not sensitive enough to measure the less severe comorbid conditions of the subjects in this study.

**Power Analysis**

The post-hoc power analysis was based on the main research question that explored the predictive relationship between cognitive appraisal of health and psychosocial adjustment. Although the hypothesized effect size for this study was a medium effect size of .15, the actual observed effect size was large ($f^2 = 1.09$). Given the sample size of 73 for the multiple regression analyses, the achieved power with eight predictors and alpha set at .05 was calculated to be 1.0 (Faul et al, 2007). This means that the sample size provided sufficient power to correctly reject the null hypothesis that a relationship did not exist between the predictor variables and dependent variable.

**Summary**

To summarize, the sample in this study consisted predominantly of women with breast cancer and men with prostate cancer. Most were Caucasian, married, and not working. The mean age of the sample was 62.28 years. Fifty percent of the sample was more than 200 days since diagnosis and most of them had received prior treatment for their cancer. Of the four types of cognitive appraisal, subjects were strongest in challenge appraisal. The sample did not exhibit high uncertainty, symptom distress, or comorbid conditions. The subjects had strong social support and were confident in their ability to cope with cancer. The sample size provided sufficient power to detect a
statistically significant relationship between the independent variables and the outcome variable (psychosocial adjustment). In the next section of this chapter, the results pertinent to each research question will be presented.

Research Question One

What are the intrapersonal and emotional characteristics of psychosocial adjustment in patients with breast, colon, prostate, and lung cancer during the post-radiation treatment transition?

The intent of this research question was to explore psychosocial adjustment by (a) describing mean scores for psychosocial adjustment and the seven subscales in this sample, (b) defining differences in adjustment by demographic variables, and (c) identifying key independent variables that are associated with psychosocial adjustment.

Psychosocial Adjustment Scores

The total PAIS-SR score and the area $t$-scores for the subscales can be found in Table 5. Higher scores indicate poorer adjustment. In this sample, there were greater adjustment problems in the areas of extended family relationships, sexual relationships, and the vocational environment. The domains with lower than average $t$-scores, indicating fewer problems with adjustment, were the domestic environment, psychological distress, health care environment, and social environment. Total Scores for the PAIS-SR ranged from 264.00 to 515.00 with a mean total score of 349.58 ($SD = 50.75$, $Mdn = 346.00$). This total score was translated into an area $t$-score of 50, placing the mean score for this sample in the 50th centile of the normative population.

A series of independent-samples $t$-tests were conducted to identify differences in psychosocial adjustment scores based on categorical demographic variables. The
Table 5.

*Mean Area t-Scores for Psychosocial Adjustment (N = 73)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean Percentile Rank (SD)</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAIS-SR Total Score&lt;sup&gt;a&lt;/sup&gt;</td>
<td>349.58 (50.75)</td>
<td>337.73 – 361.42</td>
</tr>
<tr>
<td>Health Care Orientation&lt;sup&gt;b&lt;/sup&gt;</td>
<td>47.16 (11.11)</td>
<td>44.57 – 49.76</td>
</tr>
<tr>
<td>Vocational Environment</td>
<td>52.78 (5.83)</td>
<td>51.42 – 54.14</td>
</tr>
<tr>
<td>Domestic Environment</td>
<td>48.78 (10.58)</td>
<td>46.31 – 51.25</td>
</tr>
<tr>
<td>Sexual Relationships</td>
<td>54.07 (10.11)</td>
<td>51.71 – 56.43</td>
</tr>
<tr>
<td>Extended Family Relationships</td>
<td>54.26 (9.51)</td>
<td>52.04 – 56.48</td>
</tr>
<tr>
<td>Social Environment</td>
<td>44.44 (12.61)</td>
<td>41.50 – 47.38</td>
</tr>
<tr>
<td>Psychological Distress</td>
<td>48.08 (10.90)</td>
<td>45.54 – 50.63</td>
</tr>
</tbody>
</table>

<sup>a</sup>Total score derived by adding all subscale *t*-scores.

<sup>b</sup>All subscale scores use a *t*-distribution (*M* = 50, *SD* = 10).

Assumptions of the independent-samples *t*-test were met for each of the analyses. The results are shown in Table 6. There were no statistically significant differences in total scores for the PAIS-SR based on any demographic variable, diagnostic group, or cancer stage categories, *H*(3) = 2.86, *p* = .41.

**Correlations**

An examination of the relationships between key continuous independent variables and psychosocial adjustment was then conducted to further describe the sample. The assumptions of the Pearson product moment correlation were met. Results of the correlation analyses can be found in Table 7.
Table 6.

*Group Means and Independent Samples t-Test for PAIS-SR Total Score (N = 73)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (SD)</th>
<th>Mean Difference</th>
<th>95% Confidence Interval of the Difference</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>341.73 (47.50)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>355.05 (52.75)</td>
<td>13.31</td>
<td>-37.35 to 10.72</td>
<td>.273</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Caucasian</td>
<td>341.86 (48.11)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>352.90 (51.96)</td>
<td>-11.04</td>
<td>-36.90 to 14.82</td>
<td>.398</td>
</tr>
<tr>
<td><strong>Education Level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HS or Less</td>
<td>342.48 (56.48)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greater than HS</td>
<td>358.18 (42.06)</td>
<td>-15.71</td>
<td>-39.38 to 7.97</td>
<td>.190</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Married</td>
<td>354.44 (58.66)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>346.72 (45.94)</td>
<td>7.73</td>
<td>-16.91 to 32.37</td>
<td>.534</td>
</tr>
<tr>
<td><strong>Cancer Type</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast</td>
<td>355.85 (53.90)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lung or Prostate(^a)</td>
<td>341.53 (45.99)</td>
<td>-14.32</td>
<td>-38.12 to 9.48</td>
<td>.552</td>
</tr>
</tbody>
</table>

*Note.* HS = high school.

\(^a\)Due to the unequal number of subjects in the three diagnostic categories (breast cancer = 41, lung cancer = 3, prostate cancer = 29), diagnostic categories were collapsed into two groups.

All of the independent variables had statistically significant relationships with the dependent variable. Age, challenge appraisal, benign/irrelevant appraisal, self-efficacy
for coping, and social support had significant inverse relationships with psychosocial adjustment. Better psychosocial adjustment was associated with older age and higher scores for challenge appraisal, benign/irrelevant appraisal, self-efficacy, and social support. Large effect sizes were found for self-efficacy for coping ($r^2 = .35$) and benign/irrelevant appraisal ($r^2 = .34$). Self-efficacy for coping and benign irrelevant appraisal accounted for 35.05% and 33.99%, respectively, of the variability in psychosocial adjustment. Social support and challenge appraisal had medium effect sizes with an $r^2$ of .12 and .14, respectively.

Table 7.

*Correlations Between PAIS-SR Total Score and Independent Variables (N = 73)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>$r$</th>
<th>95% CI</th>
<th>$p$</th>
<th>Power$^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-.281</td>
<td>-.478 to -.050</td>
<td>.016</td>
<td>.55</td>
</tr>
<tr>
<td>Threat Appraisal</td>
<td>.448</td>
<td>.245 to .617</td>
<td>.000</td>
<td>.97</td>
</tr>
<tr>
<td>Challenge Appraisal</td>
<td>-.373</td>
<td>-.558 to -.159</td>
<td>.001</td>
<td>.84</td>
</tr>
<tr>
<td>Harm/Loss Appraisal</td>
<td>.558</td>
<td>.380 to .696</td>
<td>.000</td>
<td>.97</td>
</tr>
<tr>
<td>Benign/Irrelevant</td>
<td>-.583</td>
<td>-.716 to -.405</td>
<td>.000</td>
<td>.97</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>.420</td>
<td>.207 to .592</td>
<td>.000</td>
<td>.93</td>
</tr>
<tr>
<td>Symptom Distress</td>
<td>.677</td>
<td>.530 to .786</td>
<td>.000</td>
<td>.97</td>
</tr>
<tr>
<td>Social Support</td>
<td>-.348</td>
<td>-.537 to -.129</td>
<td>.003</td>
<td>.84</td>
</tr>
<tr>
<td>Self-Efficacy for Coping</td>
<td>-.592</td>
<td>-.726 to -.422</td>
<td>.000</td>
<td>.97</td>
</tr>
<tr>
<td>Comorbidity</td>
<td>-.254</td>
<td>-.454 to -.030</td>
<td>.030</td>
<td>.45</td>
</tr>
</tbody>
</table>

$^a$Observed power was calculated conservatively using a sample size of 70, alpha of .05 and the observed $r$ value (Corty, 2007).
A statistically significant, direct linear relationship was found between psychosocial adjustment and threat appraisal, harm/loss appraisal, uncertainty, and symptom distress. Poorer adjustment was associated with higher scores for threat and harm/loss appraisal, greater uncertainty, and higher symptom distress. Of all the independent variables, symptom distress had the strongest relationship with psychosocial adjustment. The 95% confidence interval for $r$, indicates that the weakest this relationship could be in the population is .530 and the strongest is as high as .786. A large effect size for this relationship was found; 45.83% of the variance in psychosocial adjustment can be explained by knowing the individual’s symptom distress score. Harm/loss appraisal also had a large effect size, $r^2 = .31$. A medium to large effect size was noted for both uncertainty ($r^2 = .17$) and threat appraisal ($r^2 = .20$).

Two additional observations about these correlations are worth noting. First, the 95% confidence interval around $r$ for the variable age was -.478 to -.050. The upper boundary of this confidence interval is close to zero indicating a weak relationship. The effect size for this correlation was between small and medium; 8% of the variance in adjustment can be explained by knowing the subject’s age.

The second observation, which was unexpected and counterintuitive, was the statistically significant, inverse linear relationship between psychosocial adjustment and comorbidity score. Lower scores on the CCI were associated with higher scores for psychosocial adjustment, indicating poorer adjustment. The proximity of the upper boundary of the confidence interval to zero indicates that the relationship between comorbidity and adjustment is weak. The direction of this relationship was unchanged when the correlation analysis was repeated with two outliers removed.
Additionally, the variable time since diagnosis, which had a mean of 354.86 (\(Mdn = 207.00\)), was not significantly correlated with the total score for psychosocial adjustment or any of the independent variables (self-efficacy for coping, social support, symptom distress, uncertainty, and the four appraisal scales). Therefore, time since diagnosis was not used as a control variable in the regression analyses.

Summary

The mean total score for psychosocial adjustment for this sample was in the 50\(^{th}\) centile of the normative population. Mean scores for the seven domains of health care orientation, vocational environment, domestic environment, sexual relationships, extended family relationships, social environment, and psychological distress were found to fall between the 44\(^{th}\) to 54\(^{th}\) centile of the normative population. Better psychosocial adjustment was significantly associated with older age and higher scores for challenge appraisal, benign/irrelevant appraisal, social support, and self-efficacy for coping.

Research Question Two

What is the relationship between symptom distress, uncertainty, medical factors (comorbidity, cancer stage), and personal factors (age, gender, race/ethnicity, and education) and cognitive appraisal of health at two weeks prior to ending radiation treatment?

This research question was answered with four simultaneous regressions. The dependent variable (the CAHS scale of threat, challenge, harm/loss, or benign/irrelevant) was simultaneously regressed on the independent variables described in the study model (symptom distress, uncertainty, cancer stage, comorbidities, age, sex, race/ethnicity, and education).
Regression Diagnostics

For each of the regressions, regression diagnostics were conducted to evaluate the assumptions for regression and the presence of multicollinearity and influential data points. All of the assumptions, except the theoretical assumption of measurement without error, were met for each regression. The assumption that the independent variables are fixed was met, in that the values of $x$ were selected from a determined sample. Visual examination of the residual plots of standardized residuals versus predicted values indicated that the assumption of linear relationship was met. The assumption of zero mean was met as there was a constant in the equation and the mean and standard deviation of the standardized residuals were zero and approximately one, respectively. The assumption of independence was also met because the Durbin-Watson score was between 1.50 and 2.50. Residual normality was assured by (a) frequencies of standard residuals less than 3 standard deviations from the mean, (b) a histogram of the residuals that appeared normal, and (c) a P-P plot distribution in which the regression line coincided with the straight line that represents a normal distribution. Visual inspection of the scatterplot indicated that the assumption of homoscedasticity was met because there was random spread of the residuals around the zero line.

There was not a problem with multicollinearity with the variables in the regressions because the tolerance values were greater than .20 and the VIF values were less than 10.00. Outliers on $y$ were not present because there were no standardized residuals greater or less than three standard deviations from the mean. There was no evidence for an outlier on $x$ because the maximum centered leverage value was less than
the calculated .338 threshold. Lastly, there was no evidence of influential data points in each regression because the highest value for Cook’s D was less than one.

Regression #1 Threat Appraisal

Table 8 displays the unstandardized regression coefficients (B), the standard errors of B (SE B), and the standardized regression coefficients (β) of the predictor variables for each of the four simultaneous regressions. In the first simultaneous regression threat appraisal was regressed on symptom distress, uncertainty, cancer stage, co-morbidities, age, sex, race/ethnicity (Caucasian, non-Caucasian), and education. Results indicated that these eight independent variables predicted 31.8% of the variability in threat appraisal score, \( R_{adj}^2 = .318, F(8, 71) = 5.61, p < .001 \). Of these, uncertainty and age were significant explanatory variables. The effect size for this result was large (\( f^2 = .47 \)).

Regression #2 Harm/Loss Appraisal

In the second simultaneous regression, harm/loss appraisal was regressed on the same independent variables of symptom distress, uncertainty, cancer stage, co-morbidities, age, sex, race/ethnicity, and education. The overall equation was statistically significant, \( R_{adj}^2 = .488, F(8, 71) = 10.41, p < .001 \). The eight independent variables explained 48.8% of the variance in harm/loss appraisal score. Uncertainty had the most influence on harm/loss appraisal and was statistically significant. In addition, age and cancer stage were significant explanatory variables. The effect size for this result was very large (\( f^2 = .95 \)).
Regression #3 Challenge Appraisal

The overall model including the same independent variables of symptom distress, uncertainty, cancer stage, co-morbidities, age, sex, race/ethnicity, and education, predicted 15.9% of the variance in challenge appraisal score, $R^2_{adj} = .159$, $F(8, 71) = 2.87$, $p < .01$. Of the independent variables, only uncertainty was a significant explanatory variable. A medium effect size for this model was found ($f^2 = .19$).

Regression #4 Benign/Irrelevant Appraisal

Benign/irrelevant appraisal was regressed on symptom distress, uncertainty, cancer stage, co-morbidities, age, sex, race/ethnicity, and education. The variables explained 34.4% of the variability in benign/irrelevant appraisal score, $R^2_{adj} = .344$, $F(8, 71) = 6.19$, $p < .001$. Of these variables, uncertainty and age were significant explanatory variables. The effect size for this result was large ($f^2 = .52$).

Summary

Of eight independent variables, only three were determined to be significant predictors of at least one type of appraisal. Uncertainty was a statistically significant predictor for all four types of appraisal, having a direct relationship with threat and harm/loss appraisals and an inverse relationship with challenge and benign/irrelevant appraisals. Also, uncertainty made the largest contribution as an explanatory variable in each of the four models. Age had a statistically significant inverse relationship with threat and harm/loss appraisals and a direct relationship with benign/irrelevant appraisal. Cancer stage had a statistically significant direct relationship with harm/loss appraisal.
Table 8.

Comparison of Predictors for Each Type of Appraisal (N = 80)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Threat</th>
<th>Harm/Loss</th>
<th>Challenge</th>
<th>Benign/Irrelevant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$B$</td>
<td>$SE_B$</td>
<td>$\beta$</td>
<td>$B$</td>
</tr>
<tr>
<td>Comorbidity</td>
<td>.447</td>
<td>.580</td>
<td>.081</td>
<td>1.672</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>.176</td>
<td>.034</td>
<td>.574*</td>
<td>.293</td>
</tr>
<tr>
<td>Symptom Distress</td>
<td>.428</td>
<td>.876</td>
<td>.054</td>
<td>2.035</td>
</tr>
<tr>
<td>Cancer Stage</td>
<td>.348</td>
<td>.456</td>
<td>.077</td>
<td>2.072</td>
</tr>
<tr>
<td>Age</td>
<td>-.070</td>
<td>.032</td>
<td>-.251***</td>
<td>-.164</td>
</tr>
<tr>
<td>Sex</td>
<td>-.666</td>
<td>.832</td>
<td>-.092</td>
<td>-.253</td>
</tr>
<tr>
<td>Race</td>
<td>.839</td>
<td>.764</td>
<td>.112</td>
<td>.635</td>
</tr>
<tr>
<td>Education</td>
<td>.127</td>
<td>.810</td>
<td>.018</td>
<td>.800</td>
</tr>
</tbody>
</table>

*p < .001. **p < .01. ***p < .05.
Research Question Three

What is the predictive relationship between cognitive appraisal of health at two weeks prior to ending radiation treatment and psychosocial adjustment during the post-radiation treatment transition?

This question was answered with one hierarchical multiple regression. Cancer stage, age, and scores for uncertainty and symptom distress were entered into the first step of the regression as control variables. These variables were selected as control variables based on (a) theory, (b) empirical reports in the literature, and (c) the results of bivariate correlations in this study that reported a relationship between the variable and psychosocial adjustment. Although comorbidity was significantly correlated with adjustment, it was not used as a control variable because the relationship was weak and the direction of the relationship was counterintuitive. The four types of cognitive appraisal (threat, challenge, harm/loss, and benign/irrelevant) were entered into the second step of the regression to determine if appraisal improved prediction of psychosocial adjustment.

Regression Diagnostics

Regression diagnostics were then conducted. First it was assumed that the independent variables were fixed. Second, although the theoretical assumption of measurement without error was violated, it did not influence the analysis. Third, the assumption of linear relationship was met because there was no curvilinear pattern on the residual plots of standardized residuals versus predicted values. Fourth, the assumption of zero mean was met because there was a constant in the equation and the mean of the standardized residuals was zero and the standard deviation was approximately one (.943).
Fifth, the assumption of independent residuals was met because the Durbin-Watson score was between 1.5 to 2.5 (1.84). Sixth, the assumption of residual normality was met because there were (a) no standardized residuals greater than three standard deviations from the mean, (b) the histogram of residuals approximated the normal curve, and (c) the normal P-P plot of regression standardized residuals fell very close to the normal line. Lastly, there was random and even spread of the residuals along the zero line on the scatterplot, indicating that the assumption of homoscedasticity was met.

Multicollinearity was not present because the tolerance statistics were greater than .20 and the VIF statistics were less than 10. There were no outliers on \( y \) because there were no standardized residuals greater or less than three standard deviations from the mean. The maximum center leverage value (.292) was less than the calculated threshold of .370, indicating that there were no outliers on \( x \). Influential data points were not present because the value for Cook’s D (.292) was less than one.

Results

The bivariate correlations are displayed in Table 9. Examination of the independent variables shows numerous statistically significant correlations between the variables. Harm/loss appraisal was significantly correlated with every variable. Subjects who had greater harm/loss appraisals, were likely younger with a higher stage cancer, and had greater uncertainty, symptom distress, threat appraisals, and poorer adjustment. The other types of appraisal were also found to be correlated with multiple other variables, as well as correlated with each type of appraisal. A statistically significant, strong positive correlation was found between threat appraisal and harm/loss appraisal. Conversely, a strong negative correlation existed between threat appraisal and benign/irrelevant
appraisal. A subject with a high amount of threat appraisal was also likely to have a high amount of harm/loss appraisal and lower amounts of benign/irrelevant appraisal.

Symptom distress was significantly correlated with all other variables except stage. A subject with high symptom distress was likely to be younger, have more uncertainty, have greater threat and harm/loss appraisals, and have poorer adjustment one month after radiation therapy.

Uncertainty was significantly correlated with six variables. There were statistically significant direct linear relationship between uncertainty symptom distress, threat appraisal, harm/loss appraisal, and psychosocial adjustment. Subjects with high uncertainty were likely to also have more symptom distress, have greater threat and harm/loss appraisals, and poorer adjustment after radiation therapy. In contrast, uncertainty was likely to be reduced if the subject viewed their health as a challenge or benign/irrelevant.

There were statistically significant inverse correlations between age and three variables. The younger the subject, the more likely that the subject had greater symptom distress and harm/loss appraisals, as well as poorer psychosocial adjustment.

The stage of cancer was significantly and positively correlated with two other variables. Subjects with a higher stage cancer were likely to be older and have greater harm/loss appraisal of their illness.

Table 10 summarizes the hierarchical regression model. After step one, with cancer stage, age, uncertainty, and symptom distress in the equation, $R^2_{adj} = .474$, $F(4, 68) = 17.21$,
In step two, the overall model remained significant with the addition of the four types of cognitive appraisal (threat, challenge, harm/loss, and benign/irrelevant), $R^2_{adj} = .521$, $F(8, 64) = 10.79, p < .001$. The types of appraisal were significant contributors to the model, explaining additional variance in psychosocial adjustment (Change in $R^2 = .071, p < .05$). Cancer stage, age, and scores for uncertainty and symptom distress and the four types of cognitive appraisal (threat, challenge, harm/loss, and benign/irrelevant) significantly predicted 52.1% of the variability in psychosocial adjustment.

The standardized regression weights indicate that of the eight predictor variables, symptom distress score made the largest unique contribution in explaining variability in psychosocial adjustment and this contribution was statistically significant. None of the other variables were significant explanatory variables. The unstandardized regression weight for symptom distress was 53.37. This suggests that if the other predictor variables are held constant, each additional point in symptom distress score results in an average increase of 53 points in psychosocial adjustment.

The effect size for this analysis was large, $f^2 = 1.09$, indicating that there was a strong predictive relationship among the independent variables (stage, age, uncertainty, symptom distress and the four types of cognitive appraisal) and psychosocial adjustment. The observed power of the test statistic was calculated to be greater than .99, given the sample size of 73, eight predictors, an effect size of 1.09, and an alpha set at .05 (Faul et al., 2007).

**Summary**

More than 52% of the variability in psychosocial adjustment was predicted by knowing an individual’s stage of cancer, age, and scores for uncertainty, symptom
distress, and the four types of cognitive appraisal. However, cognitive appraisal of health at two weeks prior to completing radiation therapy was not a significant explanatory variable for psychosocial adjustment one month post-radiation when controlling for uncertainty, cancer stage, age, and symptom distress.

Research Question Four

*Does social support moderate the relationship between cognitive appraisal of health and psychosocial adjustment during the post-radiation treatment transition?*

This question was explored with four hierarchical multiple regressions that assessed the moderating effects of social support on the relationship between appraisal and adjustment for each scale of the CAHS (threat, challenge, harm/loss, and benign irrelevant). Prior to conducting each regression, the centering procedure outlined by Aiken and West (1991) was followed to reduce the problem of multicollinearity. First, the independent variable (appraisal type) and moderating variable (social support) were converted to $z$-scores. Second, the $z$-score of the independent variable was multiplied by the $z$-score of the moderating variable. Third, the product of the second step was converted to a $z$-score to create an interaction term for the analysis.

In the first step of the regression, the appraisal type (independent variable) and the total score for social support (moderating variable) were entered into the equation to assess their contribution to explaining variance in the total score for psychosocial adjustment (dependent variable). In the second step, the interaction term was entered to determine if it effected the direction and/or strength of the relationship between cognitive appraisal and psychosocial adjustment. If the interaction term in the second step was statistically significant, a moderator effect was present (Baron & Kenny, 1986).
Table 9.

*Pearson Correlations Between Variables in Hierarchical Multiple Regression (N = 73)*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Adjustment</th>
<th>Uncertainty</th>
<th>Stage</th>
<th>Age</th>
<th>Symptom Distress</th>
<th>Threat</th>
<th>Challenge</th>
<th>Harm/Loss</th>
<th>Benign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uncertainty</td>
<td>.420*</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage</td>
<td>-.005</td>
<td>.105</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.281**</td>
<td>.034</td>
<td>.247***</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symp. Distress</td>
<td>.677*</td>
<td>.391*</td>
<td>-.067</td>
<td>-.291**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threat</td>
<td>.448*</td>
<td>.569*</td>
<td>.090</td>
<td>-.152</td>
<td>.315**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Challenge</td>
<td>-.373****</td>
<td>-.441*</td>
<td>.027</td>
<td>.061</td>
<td>-.218***</td>
<td>-.430*</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harm/Loss</td>
<td>.558*</td>
<td>.573*</td>
<td>.229***</td>
<td>-.295**</td>
<td>.463*</td>
<td>.671*</td>
<td>-.397*</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Benign</td>
<td>-.583*</td>
<td>-.392*</td>
<td>-.008</td>
<td>.432*</td>
<td>-.490*</td>
<td>-.696*</td>
<td>.402*</td>
<td>-.664*</td>
<td>1.000</td>
</tr>
</tbody>
</table>

*p < .001.  **p < .01.  ***p < .05.  ****p = .001.
Table 10.

Summary of Hierarchical Regression Analysis of Variables Predicting Psychosocial Adjustment (N = 73)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>p</th>
<th>$R^2_{adj}$</th>
<th>Δ $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uncertainty</td>
<td>.836</td>
<td>.397</td>
<td>.200</td>
<td>2.109</td>
<td>.039</td>
<td>.474</td>
<td>.503*</td>
</tr>
<tr>
<td>Cancer Stage</td>
<td>2.846</td>
<td>5.607</td>
<td>.045</td>
<td>.508</td>
<td>.397</td>
<td>.045</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.542</td>
<td>.372</td>
<td>-.135</td>
<td>-1.457</td>
<td>.150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symptom Distress</td>
<td>62.786</td>
<td>10.983</td>
<td>.563</td>
<td>5.717</td>
<td>.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Model 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.521</td>
<td>.071**</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>.080</td>
<td>.482</td>
<td>.019</td>
<td>.167</td>
<td>.868</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cancer Stage</td>
<td>-.345</td>
<td>5.785</td>
<td>-.005</td>
<td>-.060</td>
<td>.953</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.034</td>
<td>.407</td>
<td>-.008</td>
<td>-.082</td>
<td>.935</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symptom Distress</td>
<td>53.367</td>
<td>11.277</td>
<td>.479</td>
<td>4.732</td>
<td>.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threat Appraisal</td>
<td>.030</td>
<td>1.877</td>
<td>.002</td>
<td>.016</td>
<td>.987</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Challenge Appraisal</td>
<td>-1.669</td>
<td>1.295</td>
<td>-.124</td>
<td>-1.289</td>
<td>.202</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harm/Loss Appraisal</td>
<td>1.208</td>
<td>1.120</td>
<td>.148</td>
<td>1.078</td>
<td>.285</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benign Appraisal</td>
<td>-2.549</td>
<td>1.915</td>
<td>-.188</td>
<td>-1.331</td>
<td>.188</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .001. **p < .05.
Regression #1 Threat Appraisal

The results are displayed in Table 11. As shown in the second step of the hierarchical regression, the interaction term (the z-score of the product of z-score for threat appraisal and z-score for social support) is not statistically significant. Therefore, social support does not moderate the relationship between threat appraisal and psychosocial adjustment.

Table 11.

Summary of Hierarchical Regression Analysis of Moderating Effects of Social Support on the Relationship Between Threat Appraisal and Psychosocial Adjustment (N = 73)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z-score Threat Appraisal</td>
<td>20.219</td>
<td>5.085</td>
<td>.407</td>
<td>3.977</td>
<td>.000</td>
</tr>
<tr>
<td>z-score Social Support</td>
<td>-14.621</td>
<td>5.163</td>
<td>-.290</td>
<td>-2.832</td>
<td>.006</td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z-score Threat Appraisal</td>
<td>20.572</td>
<td>5.040</td>
<td>.414</td>
<td>4.082</td>
<td>.000</td>
</tr>
<tr>
<td>z-score Social Support</td>
<td>-15.113</td>
<td>5.123</td>
<td>-.299</td>
<td>-2.950</td>
<td>.004</td>
</tr>
<tr>
<td>z-score Interaction Term</td>
<td>-7.648</td>
<td>4.945</td>
<td>-.156</td>
<td>-1.547</td>
<td>.127</td>
</tr>
</tbody>
</table>

Regression #2 Harm/Loss Appraisal

The results are displayed in Table 12. As shown in the second step of the hierarchical regression, the interaction term (the z-score of the product of z-score for harm/loss appraisal and z-score for social support) is not statistically significant.
Therefore, social support does not moderate the relationship between harm/loss appraisal and psychosocial adjustment.

**Table 12.**

*Summary of Hierarchical Regression Analysis of Moderating Effects of Social Support on the Relationship Between Harm/Loss Appraisal and Psychosocial Adjustment (N = 73)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z-score Harm/Loss Appraisal</td>
<td>24.948</td>
<td>4.804</td>
<td>.506</td>
<td>5.193</td>
<td>.000</td>
</tr>
<tr>
<td>z-score Social Support</td>
<td>-12.053</td>
<td>4.923</td>
<td>-.239</td>
<td>-2.448</td>
<td>.017</td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z-score Harm/Loss Appraisal</td>
<td>24.239</td>
<td>4.789</td>
<td>.492</td>
<td>5.061</td>
<td>.000</td>
</tr>
<tr>
<td>z-score Social Support</td>
<td>-11.355</td>
<td>4.906</td>
<td>-.225</td>
<td>-2.315</td>
<td>.024</td>
</tr>
<tr>
<td>z-score Interaction Term</td>
<td>-6.904</td>
<td>4.698</td>
<td>-.140</td>
<td>-1.470</td>
<td>.146</td>
</tr>
</tbody>
</table>

*Regression #3 Challenge Appraisal*

Table 13 displays the results. As shown in the second step of the hierarchical regression, the interaction term (the $z$-score of the product of $z$-score challenge appraisal and $z$-score social support) is not statistically significant. Therefore, social support does not moderate the relationship between challenge appraisal and psychosocial adjustment.

*Regression #4 Benign/Irrelevant Appraisal*

The results are shown in Table 14. The interaction term (the $z$-score of the product $z$-score for benign/irrelevant appraisal and $z$-score for social support) is not
statistically significant. Therefore, social support does not moderate the relationship between benign/irrelevant appraisal and psychosocial adjustment.

Table 13.

Summary of Hierarchical Regression Analysis of Moderating Effects of Social Support on the Relationship Between Challenge Appraisal and Psychosocial Adjustment (N = 73)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z-score Challenge Appraisal</td>
<td>-15.540</td>
<td>5.270</td>
<td>-.318</td>
<td>-2.949</td>
<td>.004</td>
</tr>
<tr>
<td>z-score Social Support</td>
<td>-14.488</td>
<td>5.437</td>
<td>-.287</td>
<td>-2.665</td>
<td>.010</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z-score Challenge Appraisal</td>
<td>-14.839</td>
<td>5.275</td>
<td>-.303</td>
<td>-2.813</td>
<td>.006</td>
</tr>
<tr>
<td>z-score Social Support</td>
<td>-14.405</td>
<td>5.414</td>
<td>-.285</td>
<td>-2.661</td>
<td>.010</td>
</tr>
<tr>
<td>z-score Interaction Term</td>
<td>6.546</td>
<td>5.138</td>
<td>.135</td>
<td>1.274</td>
<td>.207</td>
</tr>
</tbody>
</table>

Summary

Hierarchical multiple regression was used to test the hypothesis that social support moderated the relationship between types of cognitive appraisal and psychosocial adjustment. This hypothesis was not supported. Social support did not affect the direction or strength of the relationship between any type of cognitive appraisal and psychosocial adjustment.
Table 14.

Summary of Hierarchical Regression Analysis of Moderating Effects of Social Support on Relationship Between Benign/Irrelevant Appraisal and Psychosocial Adjustment ($N = 73$)

<table>
<thead>
<tr>
<th>Variable</th>
<th>$B$</th>
<th>SE $B$</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z-score Benign Appraisal</td>
<td>-26.983</td>
<td>4.633</td>
<td>-.542</td>
<td>-5.825</td>
<td>.000</td>
</tr>
<tr>
<td>z-score Social Support</td>
<td>-13.298</td>
<td>4.701</td>
<td>-.263</td>
<td>-2.829</td>
<td>.006</td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z-score Benign Appraisal</td>
<td>-26.931</td>
<td>4.656</td>
<td>-.541</td>
<td>-5.784</td>
<td>.000</td>
</tr>
<tr>
<td>z-score Social Support</td>
<td>-12.951</td>
<td>4.764</td>
<td>-.257</td>
<td>-2.718</td>
<td>.008</td>
</tr>
<tr>
<td>z-score Interaction Term</td>
<td>2.594</td>
<td>4.632</td>
<td>.052</td>
<td>.560</td>
<td>.577</td>
</tr>
</tbody>
</table>

Research Question Five

Does self-efficacy for coping moderate the relationship between cognitive appraisal of health and psychosocial adjustment during the post-radiation treatment transition?

This question was addressed in a similar fashion as the previous research question. Four hierarchical multiple regressions were conducted to test the moderating effect of self-efficacy for coping on the relationship between each type of appraisal and psychosocial adjustment.
Table 15.

Summary of Hierarchical Regression Analysis of Moderating Effects of Self-Efficacy for Coping on Relationship Between Threat Appraisal and Psychosocial Adjustment (N = 73)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z-score Threat Appraisal</td>
<td>10.689</td>
<td>5.302</td>
<td>.215</td>
<td>2.016</td>
<td>.048</td>
</tr>
<tr>
<td>z-score Self-Efficacy</td>
<td>-24.517</td>
<td>5.347</td>
<td>-.489</td>
<td>-4.585</td>
<td>.000</td>
</tr>
<tr>
<td><strong>Model 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z-score Threat Appraisal</td>
<td>9.230</td>
<td>5.382</td>
<td>.186</td>
<td>1.715</td>
<td>.091</td>
</tr>
<tr>
<td>z-score Self-Efficacy</td>
<td>-26.879</td>
<td>5.600</td>
<td>-.536</td>
<td>-4.800</td>
<td>.000</td>
</tr>
<tr>
<td>z-score Interaction Term</td>
<td>6.557</td>
<td>4.882</td>
<td>.132</td>
<td>1.343</td>
<td>.184</td>
</tr>
</tbody>
</table>

**Regression #1 Threat Appraisal**

The results are displayed in Table 15. As shown in the second step of the hierarchical regression, the interaction term (the z-score of the product of z-score for threat appraisal and z-score for self-efficacy for coping) is not statistically significant. Therefore, self-efficacy for coping does not moderate the relationship between threat appraisal and psychosocial adjustment.

**Regression #2 Harm/Loss Appraisal**

Table 16 displays the results. The interaction term (the z-score of the product of the z-score for harm/loss appraisal and the z-score for self-efficacy for coping) is not statistically significant, indicating that self-efficacy for coping does not moderate the
relationship between harm/loss appraisal and psychosocial adjustment. However, a trend toward moderation is noted ($p = .07$).

Table 16.  

**Summary of Hierarchical Regression Analysis of Moderating Effects of Self-Efficacy for Coping on the Relationship Between Harm/Loss Appraisal and Psychosocial Adjustment**  
($N = 73$)

<table>
<thead>
<tr>
<th>Variable</th>
<th>$B$</th>
<th>SE $B$</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z-score Harm/Loss Appraisal</td>
<td>16.001</td>
<td>5.490</td>
<td>.325</td>
<td>2.915</td>
<td>.005</td>
</tr>
<tr>
<td>z-score Self-Efficacy</td>
<td>-20.267</td>
<td>5.588</td>
<td>-.404</td>
<td>-3.627</td>
<td>.001</td>
</tr>
<tr>
<td><strong>Model 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z-score Harm/Loss Appraisal</td>
<td>16.800</td>
<td>5.419</td>
<td>.341</td>
<td>3.100</td>
<td>.003</td>
</tr>
<tr>
<td>z-score Self-Efficacy</td>
<td>-24.058</td>
<td>5.879</td>
<td>-.480</td>
<td>-4.092</td>
<td>.000</td>
</tr>
<tr>
<td>z-zcore Interaction Term</td>
<td>9.032</td>
<td>4.963</td>
<td>.184</td>
<td>1.820</td>
<td>.073</td>
</tr>
</tbody>
</table>

**Regression #3 Challenge Appraisal**

The results are shown in Table 17. As shown in the second step of the model, the interaction term (the $z$-score of the product of the $z$-score for challenge appraisal and the $z$-score for self-efficacy for coping) is not statistically significant. Therefore, self-efficacy for coping does not moderate the relationship between challenge appraisal and psychosocial adjustment.
Table 17.

Summary of Hierarchical Regression Analysis of Moderating Effects of Self-Efficacy for Coping on the Relationship Between Challenge Appraisal and Psychosocial Adjustment (N = 73)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z-score Challenge Appraisal</td>
<td>-9.091</td>
<td>4.928</td>
<td>-.186</td>
<td>-1.845</td>
<td>.069</td>
</tr>
<tr>
<td>z-score Self-Efficacy</td>
<td>-26.346</td>
<td>5.051</td>
<td>-.525</td>
<td>-5.216</td>
<td>.000</td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z-score Challenge Appraisal</td>
<td>-8.966</td>
<td>4.975</td>
<td>-.183</td>
<td>-1.802</td>
<td>.076</td>
</tr>
<tr>
<td>z-score Self-Efficacy</td>
<td>-26.006</td>
<td>5.189</td>
<td>-.519</td>
<td>-5.012</td>
<td>.000</td>
</tr>
<tr>
<td>z-score Interaction Term</td>
<td>1.559</td>
<td>4.770</td>
<td>.032</td>
<td>.327</td>
<td>.745</td>
</tr>
</tbody>
</table>

Regression #4 Benign/Irrelevant Appraisal

Table 18 displays the results. The interaction term (the z-score of the product of the z-score for benign/irrelevant appraisal and the z-score for self-efficacy for coping) is not statistically significant. Thus, self-efficacy for coping does not moderate the relationship between challenge appraisal and psychosocial adjustment.

Summary

The hypothesis that self-efficacy for coping moderated the relationship between cognitive appraisal and psychosocial adjustment was not supported. Self-efficacy for coping did not affect the direction or strength of the relationship between any type of cognitive appraisal and psychosocial adjustment.
### Table 18.

*Summary of Hierarchical Regression Analysis of Moderating Effects of Self-Efficacy for Coping on the Relationship Between Benign/Irrelevant Appraisal and Psychosocial Adjustment (N = 73)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z-score Benign Appraisal</td>
<td>-19.216</td>
<td>5.001</td>
<td>-.386</td>
<td>-3.842</td>
<td>.000</td>
</tr>
<tr>
<td>z-score Self-Efficacy</td>
<td>-20.160</td>
<td>5.041</td>
<td>-.402</td>
<td>-3.999</td>
<td>.000</td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z-score Benign Appraisal</td>
<td>-19.362</td>
<td>5.118</td>
<td>-.389</td>
<td>-3.783</td>
<td>.000</td>
</tr>
<tr>
<td>z-score Self-Efficacy</td>
<td>-19.837</td>
<td>5.458</td>
<td>-.396</td>
<td>-3.635</td>
<td>.001</td>
</tr>
<tr>
<td>z-score Interaction Term</td>
<td>.758</td>
<td>4.708</td>
<td>.015</td>
<td>.161</td>
<td>.873</td>
</tr>
</tbody>
</table>

**Additional Analyses**

Several additional analyses were undertaken to further explore the relationships between the independent variables and the dependent variable (psychosocial adjustment). First, because the proposed model was not supported in this study, a backward statistical regression was conducted to build a model by identifying a concise group of predictors of psychosocial adjustment. In this method, all independent variables were entered in the beginning of the analysis and non-significant contributors to the regression were deleted at each step of the analysis by the computer (Tabachnick & Fidell, 2007). Age, cancer stage, and scores for comorbidity, uncertainty, social support, self-efficacy for coping, symptom distress, and the four types of appraisal were entered simultaneously in the
model. After nine re-estimates of the model by the computer, the final model identified three significant explanatory variables of psychosocial adjustment: self-efficacy for coping, symptom distress and benign/irrelevant appraisal. This relationship was statistically significant, \( F(3, 69) = 33.73, p < .001 \). Self-efficacy, symptom distress and benign/irrelevant appraisal predicted 57.7% of the variability in psychosocial adjustment. The standardized regression weights indicate that symptom distress made the largest unique contribution to psychosocial adjustment (\( \beta = .435, p < .001 \)), followed by self-efficacy (\( \beta = -.275, p < .01 \)), and benign/irrelevant appraisal (\( \beta = -.235, p < .05 \)).

The second additional analysis that was conducted was a simultaneous regression to explore the unique contributions of the two subscales of the MSAS in predicting psychosocial adjustment. The total score for psychosocial adjustment was regressed on the physical symptom subscale and the psychological symptom subscale of the MSAS. Regression diagnostics indicated that the assumptions of multiple regression were met. Results indicated that the overall model significantly predicted psychosocial adjustment, \( R^2_{adj} = .382, F(2, 70) = 23.28, p < .001 \). The null hypothesis of no predictive relationship was rejected and the effect size for this result was large (\( f^2 = .62 \)). Of these variables, the psychological symptom subscale made the largest contribution to the model (\( \beta = .511 \)) and this contribution was statistically significant (\( t = 4.33, p < .001 \)). The physical symptom subscale was not a significant explanatory variable (\( \beta = .172, t = 1.46, p > .05 \)). The observed power of the test statistic was calculated to be greater than .99, given the sample size of 73, two predictors, an effect size of .62, and an alpha set at .05 (Faul et al, 2007).
The third additional analysis, a Pearson product moment correlation, was undertaken to explore the relationship between the psychological symptom subscale of the MSAS and the psychological distress subscale of the PAIS-SR. The assumptions of the Pearson product moment correlation were met. There was a statistically significant, direct linear relationship between the psychological symptom subscale of the MSAS and the $t$-score for psychological distress, $r(71) = .66, p < .001$. High scores for psychological symptom distress two weeks prior to ending radiation therapy were correlated with high psychological distress, as measured by the PAIS-SR, one month after radiation therapy. The confidence interval around $r$ (.501 to .770) indicates a strong relationship between these variables. A large effect size for this relationship was found; 43.16% of the variance in psychological distress one month after treatment can be explained by knowing the individual’s psychological symptom distress score on the MSAS. With a two-tailed test and a level of significance of .05, the observed power for the test statistic was greater than .97.

Conclusions

The 80 subjects with breast, prostate, and lung cancer who participated in this study were typically Caucasian, married, not working and had a mean age of 62 years. At two weeks prior to completion of radiation therapy, the subjects on average had high scores for challenge appraisal, social support, and self-efficacy for coping. They did not exhibit high uncertainty, or symptom distress. One month after radiation therapy, the mean total score for psychosocial adjustment for this sample was in the 50th centile of the normative cancer population. Better psychosocial adjustment was significantly
associated with older age and higher scores for challenge appraisal, benign/irrelevant appraisal, social support, and self-efficacy for coping.

Uncertainty, cancer stage, and age were significant predictors of cognitive appraisal and were used, along with symptom distress score, as control variables in a hierarchical multiple regression analysis exploring predictors of psychosocial adjustment. More than 52% of the variability in psychosocial adjustment was predicted by knowing an individual’s stage of cancer, age, and scores for uncertainty, symptom distress, and the four types of cognitive appraisal. However, cognitive appraisal of health at two weeks prior to completing radiation therapy was not a significant explanatory variable for psychosocial adjustment one month post-radiation when controlling for uncertainty, cancer stage, age, and symptom distress. In addition, there were no moderating effects of social support or self-efficacy for coping found on the relationship between cognitive appraisal and psychosocial adjustment.

Additional analyses confirmed the findings of symptom distress as a significant predictor of psychosocial adjustment during the post-radiation treatment transition. Furthermore, the psychological symptom distress score on the MSAS was a significant explanatory variable for adjustment and was strongly correlated with the psychological distress, as measured by the PAIS-SR, one month after radiation therapy. In the next chapter, these findings will be further discussed in relationship to other empirical studies and conceptual frameworks.
Chapter V

Discussion

The purpose of this chapter is to discuss the major findings of this study in relation to the conceptual framework and scientific literature. First, each of the major concepts explored in this study will be discussed with the aim of describing the post-radiation treatment transition. Then, predictors of cognitive appraisal and psychosocial adjustment will be discussed with the intent to discern characteristics of vulnerable individuals. Implications for clinical practice and future research will be discussed. Lastly, limitations of the study will be considered.

Characteristics of the Post-Radiation Treatment Transition

The post-radiation transition was conceptualized in this study as a critical point along the cancer continuum, during which time the patient is potentially vulnerable as he or she is confronted with numerous physical and psychosocial tasks. A rather surprising finding in this study was how well the subjects were doing overall, disputing the notion that the post-radiation treatment transition is a vulnerable period for all patients. In this section a snapshot of how this sample was adjusting one month after radiation therapy is provided.

Cognitive Appraisal

At two weeks prior to ending radiation therapy, subjects did not exhibit high levels of threat appraisal, harm appraisal, or benign/irrelevant appraisal. More often, subjects appraised their health as a challenge or an opportunity for growth and mastery. Although there were no studies that described appraisal during the post-radiation treatment transition, this result is consistent with the literature. Mid-range stress
appraisal scores rather than extreme values were noted in patients receiving initial
treatment with chemotherapy (Munkres et al., 1992) and in patients undergoing radiation
therapy (Oberst, et al., 1991). Ahmad and colleagues (2005), who explored cognitive
appraisal with an earlier version of the CAHS, found that men with prostate cancer were
more likely to identify harm/loss or challenge appraisals than threat appraisal.

One explanation for the result found in the current study, is that the median time
since diagnosis was 207 days, 85% of the patients had received prior treatment, and most
had completed the bulk of their radiation treatments. These were “seasoned” cancer
patients who had likely encountered the numerous stressors associated with the
diagnostic and early treatment phases and had reframed any threat and harm appraisals
earlier in their cancer experience. Also, by the end of radiation treatment, most patients
have become accustomed to treatment side effects and their patterns, and are likely
feeling more in control of their health and less frightened. Another factor that might
explain the low levels of threat and harm/loss appraisals is the plan for post-radiation
hormonal treatment in approximately 50% of the sample. Subjects with ongoing
treatment, in the form of a daily pill or periodic injection, may find reassurance and
comfort in that something is actively being done to treat their cancer, resulting in less
stress appraisal.

Lastly, although cognitive appraisal was not measured longitudinally in this study,
perhaps the data reflect a response shift in appraisal at the end of the treatment course.
Response shift is “the change in meaning of one’s self-evaluation” of a concept due to a
change in the individual’s standard for measuring the concept, values related to the
concept, or conceptualization of the concept (Sprangers & Schwartz, 1999, p. 1508). For
example, in this study, initial threat or harm/loss appraisals may have lessened and
challenge appraisals may have increased as the patient reflected on personal growth or
opportunities as a result of a life-threatening illness. This type of shift may be referred to
as an outcome indicator of the transition, meaning that a healthy transition has occurred
or is underway (Meleis et al., 2000).

*Uncertainty*

Subjects did not have high levels of uncertainty about their illness two weeks
prior to completion of treatment. The low to moderate mean score found in this study is
consistent with the literature. Christman (1990) reported stable and relatively low scores
for uncertainty, as measured by a different version of the MUIS, throughout the course of
radiation therapy for a sample of patients with mixed diagnoses. Low levels of
uncertainty, as measured by the MUIS-C, were also reported in breast cancer survivors
who were 1 to 15 years post-diagnosis (Sammarco, 2001; Wonghongkul et al., 2000;
Wonghongkul et al., 2006). Although uncertainty may be reduced at the end of
treatment, qualitative studies have shown that it does persist to some degree in the year
following treatment (Lethborg et al., 2000; Allen, Savadati, & Levy, 2009).

According to Mishel’s theory of uncertainty in illness (1988), the low scores in
this study indicated that the patients were able to form cognitive schemas to help them
interpret their illness experiences and reduce any ambiguity about health, complexity
regarding the treatment protocol, lack of information about cancer and its treatment, and
unpredictability about the course of their illness. They also likely had adequate “structure
providers” which helped to reduce any uncertainty (Mishel, 1988). Because the patients
in this study were well into their treatment course, they had had opportunity to access
“structure providers” such as the health care team, social support, and educational opportunities, thereby reducing their uncertainty.

Symptom Distress

The total symptom distress score, as well as the scores for the global distress index, psychological symptom subscale, and the physical symptom subscale were not high in this sample. This indicates that the patients on average did not experience extreme symptom distress two weeks prior to ending radiation treatment. This finding is somewhat surprising considering that side effects during radiation treatment tend to intensify as the patient progresses during treatment. Yet, symptom intensity is not necessarily correlated with symptom distress and a patient may have distress even with symptoms that are not identified as severe and conversely, one may have low symptom distress with a severe symptom (Tishelman et al., 2005; Cheng et al., 2005).

There are several possible explanations for the low symptom distress scores found in this study. First, technical advances in the planning and delivery of radiation therapy has led to the application of highly tailored treatment fields that lessen the radiation exposure of healthy tissues near the tumor and ultimately lessen the severity of acute side effects. Although the severity of symptoms was not measured in this study, patients may have reported less symptom distress because the side effects were not severe. A second explanation is that, independent of the severity of the treatment side effects, the patients were beyond the midpoint of their treatment and were therefore more accustomed to and less bothered by side effects. Another possibility is that subjects who had received prior treatment and had experienced rigorous side effects due to chemotherapy or surgery may
have redefined their notion of symptom distress, essentially downgrading their distress level during radiation therapy.

The high prevalence of self-reported symptoms was notable in this study and is consistent with Cheng and colleagues (2005), who also used the MSAS, and reported a high prevalence of physical and psychological symptoms in cancer patients within the first twelve months of completing treatment. Because the MSAS focuses on all current symptoms, the scope of symptoms reported by subjects in this study was beyond the expected side effects associated with the radiation treatment field.

Lack of energy was both the most prevalent and most distressing symptom reported. This finding is consistent with the literature that cites fatigue as one of the most frequent and distressing side effects during radiation therapy (Mock et al., 1997; Magnan & Mood, 2003; Knobf & Sun, 2005). Skin alteration, as the second most common symptom, was an expected finding as it was related to the treatment. Pain, the third most prevalent side effect, was reported by more than 52.5% of the sample and ranked as the second most distressing side effect. The subjects in this sample did not have metastatic cancer and it is unlikely that the pain was due to the cancer or treatment. This illustrates that patients undergoing cancer treatment experience significant symptom distress related to other chronic conditions and thus require a broad symptom assessment by the health care team.

The prevalence of psychological symptoms and the associated distress supports the concept that the end of treatment is an emotionally vulnerable time for some patients. Worry was reported by more than half of the subjects and was ranked with pain as the second most distressing side effect. Feeling sad was reported by approximately half of
the sample. Difficulty sleeping, which may due to psychological distress, was another prevalent symptom, reported by 42.5% of the sample. These results are somewhat consistent with the literature. Moderate amounts of worry about cancer recurrence were found in women with breast cancer both during cancer treatment as well as three weeks and three months post-treatment (Costanzo et al., 2007). However, in another study, worry about the future decreased during radiation therapy in a sample of young women with breast cancer, and did not increase until six months post-treatment (Dow & Lafferty, 2000). Sleep alterations were found in 39% to 64% of the women with breast cancer undergoing radiotherapy (Knobf & Sun 2005). Heightened depression scores at the end of radiation therapy was noted in a sample of patients with breast cancer (Deshields et al., 2005). The feeling of being on an “emotional rollercoaster” at the end of cancer treatment has been described in a qualitative study of women with breast cancer (Allen et al., 2009) as well as expressed anecdotally in the current study. One subject commented to the investigator during the interview two weeks prior to completing radiation therapy: “It’s a rollercoaster – all year. Now the doors will be flung open and out I go! The emotions that I had earlier in the year are now back.” Another subject had similar sentiments: “The emotional feelings surfaced about two weeks ago. Now I am on an emotional rollercoaster. I haven’t taken time to express my feelings.”

Although the etiology of psychological distress was not explored in this study, qualitative studies and anecdotal observations suggest that many factors cause distress at the end of cancer treatment. These include loss of the safety net of daily treatment, fear of recurrence, reduced social support, persistent physical side effects, and difficulty resuming “normal” roles and activities (Lethborg, et al., 2000; Allen, et al., 2009).
However, in a quantitative study, physical side effects and fears of recurrence were the primary sources of psychological distress in women with breast cancer three months following cancer treatment (Costanzo et al., 2007). Lack of contact with health care providers and reduced social support were not rated highly as sources of distress.

_Self-Efficacy for Coping_

Subjects in this sample were very confident in their ability to cope with their illness. This is not a surprising result given that the CBI assesses an individual’s self-efficacy for coping with tasks associated with cancer treatment. The subjects in this study had completed most of their planned course of treatment and had likely increased their self-efficacy through one of several sources of self-efficacy. Performance accomplishment, such as successful management of stress during medical appointments or coping with treatment side effects, may have bolstered their self-efficacy. Health care professionals may have provided verbal persuasion to enhance self-efficacy through suggestions, advice, and instructions on how to cope with common treatment situations. Observation of other patients during the weeks of radiation therapy and any prior treatments may have, through vicarious experiences, been a source of self-efficacy for coping. High self-efficacy for coping is a process indicator for the post-radiation treatment transition. Evidence of process indicators suggests that the individual is progressing toward a state of health (Meleis et al., 2000). However, self-efficacy for coping is susceptible to change in new situations, and had the CBI focused on future post-treatment physical, emotional, and social tasks, the mean self-efficacy score may have been lower in this sample.
Social Support

The subjects in this study, as in others, reported high amounts of perceived social support, including emotional/informational support, tangible support, positive social support, and affectionate support. High levels of perceived social support have been reported in patients with prostate cancer undergoing radiation therapy (Roberts et al., 2006), in unmarried women undergoing breast cancer treatment (Budin, 1998), in newly diagnosed lung cancer patients (Klemm, 1994), and in breast cancer survivors (Lewis et al., 2001). The fact that 64% of the subjects in the current study were married may account for the high levels of social support. Another possible reason for this finding is that the subjects may have had large social networks, which have been found to provide increased access to a variety of support (Lugton, 1997). Future studies should consider examination of social networks, in addition to perceived social support, to achieve a more holistic perspective on what Thoits (1982) labels as the individual’s “social support system.”

Psychosocial Adjustment

The mean total score for psychosocial adjustment placed the subjects in this study in the 50th centile of the normative cancer population, meaning that the group did not exhibit extremely poor adjustment one month after completing radiation therapy. The total PAIS-SR mean score of 349.58 was very similar to the mean scores, reported by Dow and Lafferty (2000), of young women with breast cancer at the end of radiation therapy (357.06) and six months post-radiation therapy (346.44).

The domains of extended family relationships and sexual relationships showed the poorest adjustment. Disruption with extended family relationships is evaluated on the
PAIS-SR though items related to communication, interest, dependency on the family, and quality of the relationship. The finding that subjects in this study had more problems with family relationships than with other areas assessed by the PAIS-SR highlights the adjustment of the family during the period of “re-entry” after cancer treatment as a potential area of concern for health care professionals. Survivorship research has focused primarily on the spouse or partner relationship with the patient, and not the extended family (Kornblith, 1998). Family relationships and functioning may have changed during the course of treatment, impacting communication. Discrepancy in expectations for recovery between the patient and family may also be a source of conflict.

The quality of interpersonal sexual relationships and sexual functioning (interest, frequency, satisfaction, dysfunction, and interpersonal conflict due to dysfunction) are assessed within the sexual relationship domain of the PAIS-SR. The mean score of 54.07 was again very close to the mean score reported by Dow & Lafferty (2000) in their study of women with breast cancer (51.44). The difficulties with sexual relationships reported in this study are consistent with research studies detailing the negative impact of cancer treatment on sexual functioning and relationships in women with breast cancer (Ganz et al., 2004; Barni & Mondin, 1997) and in men with prostate cancer (Sanda et al., 2008; van der Wielen, van Putten, & Incrocci, 2007). Other factors have also been associated with poorer sexual functioning in breast cancer survivors including older age, depression, and relationship concerns (Speer et al., 2005).

The domain score for psychological distress was in the 48th centile for the normative cancer population. The finding that psychological distress was not extreme one month after radiation therapy suggests that the subjects were adjusting well
psychologically. Reports in the literature of low depression scores or distress scores in patients with breast cancer who were 2 to 7 weeks post-radiation therapy support this finding (Graydon, 1994; Deshields et al., 2005; Costanzo et al., 2007). However, researchers also contend that there is a subgroup of post-treatment cancer survivors who will experience significant psychological sequelae that will interfere with psychosocial functioning (Kornblith, 1998; Holland & Reznik, 2005; Costanzo et al., 2007).

In this study, psychosocial adjustment did not differ based on sex, marital status, education level, diagnosis, or stage. This result is partially supported by the findings of Peleg-Oren, Sherer, and Soskolne (2003), who found no gender differences on subscales of the PAIS-SR in 49 patients with mixed cancer types when stratified by type of treatment (chemotherapy versus radiation therapy). However, an interaction effect between stage of cancer and gender were found for the domain exploring sexual relationships. This study illustrates that the complex, multidimensional and dynamic nature of psychosocial adjustment is difficult to differentiate based on one demographic characteristic alone, as multiple interactions are likely that influence differences among individuals.

**Predictors of Cognitive Appraisal**

Uncertainty, age, and cancer stage were found to be significant predictors of appraisal, with uncertainty accounting for the most variance in all types of appraisal. This result is consistent with the conceptual view of uncertainty as an antecedent to appraisal (Mishel, 1988; Lazarus & Folkman, 1984) and is supported by the literature. Age and uncertainty have been shown to significantly explain the variability in stress appraisals in cancer survivors (Wonghongkul et al., 2000; Bowman et al., 2002).
Although symptom distress was significantly correlated with all four appraisal types, it did not predict any type of appraisal. This finding was surprising and contrary to findings from other studies. Symptom distress was found to predict appraisal in patients undergoing radiation therapy (Oberst et al., 1991) and in patients undergoing chemotherapy (Munkres et al., 1992).

There are two possible theoretical explanations for this observation, both of which lead to revisions in the current study model that positions symptom distress as preceding cognitive appraisal. First, based on the early work of Lazarus and Folkman (1984), symptom distress may be construed as an immediate effect of the primary, secondary, and coping processes, rather than a causal antecedent of appraisal. Positive and negative feelings, as well as physiologic changes, were described as immediate effects in the Lazarus and Folkman (1984) model of stress, coping and adaptation. The negative feelings associated with symptom distress may be an immediate result of the appraisal of other aspects of the symptom experience (duration, intensity, and quality of the symptom).

Lazarus’s revised model (1999), which expanded on the dynamic and recursive relationship between stress, appraisal, emotion, and coping, provides further insight into the results found in this study. In that model, cognitive appraisal is described as an evaluative process that leads the individual to form a relational meaning of a situation. Relational meaning, which is the individual’s connotation of a transaction with the environment related to his or her well-being, evokes an emotional response (Lazarus, 1999). Symptom distress may be thought of as a relational meaning in that a patient
subjectively attributes meaning to his or her appraisal of the symptom experience, resulting in a negative affective response.

Predictors of Psychosocial Adjustment

The hypothesis that cognitive appraisal of health would predict adjustment was not supported in this study. None of the four types of appraisal was a significant explanatory variable for psychosocial adjustment after controlling for uncertainty, cancer stage, age, and symptom distress. In addition, uncertainty, which was a significant predictor of adjustment in step one of the hierarchical regression, dropped out of the regression in the second step. Although cognitive appraisal and uncertainty do not play significant explanatory roles in this model, we know that a relationship does exist between these independent variables and adjustment because the correlations were strong. It is likely that if the model were reconfigured the variables might play a more substantial role in predicting psychosocial adjustment.

The finding that cognitive appraisal did not predict adjustment was unexpected given prior evidence that threat appraisal predicted psychological functioning in women with breast cancer (Gallagher et al., 2002) and harm/loss appraisal predicted mental health functioning in men with prostate cancer (Ahmad et al., 2005). The discrepancy in results may be due to the current study’s broad focus on psychosocial adjustment rather than psychological functioning. In addition, the present study controlled for variables that have been shown to significantly influence adjustment: uncertainty, age, cancer stage, and symptom distress, whereas the other studies did not control for these variables.

The most striking finding in this study was that symptom distress made a large unique contribution to explaining variability in psychosocial adjustment and was the only
significant explanatory variable. Furthermore, the additional analysis highlighted psychological symptoms and not physical symptoms as most influential. This result was unexpected given the evidence in the literature that threat appraisal was predictive of poor psychological functioning and accounted for more variance than symptom distress (Oberst et al., 1991; Munkres et al., 1992). However, the result is consistent with Budin (1998), who reported that symptom distress, alone, accounted for 56.9% of the variance in psychosocial adjustment (measured by the PAIS), in women with breast cancer, some of whom were receiving radiation therapy. The large magnitude of the influence of symptom distress on quality of life has also been noted (Northouse et al., 1999). However, in another study that focused on symptom severity, rather than symptom distress, psychosocial adjustment at the end of radiation therapy was predicted by uncertainty and hope, and to a much less extent symptom severity (Christman, 1990).

The middle-range theory of unpleasant symptoms (Lenz et al., 1997) provides a framework for understanding the powerful relationship between symptom distress and psychosocial adjustment that was observed in this study. According to this model, symptom distress, along with the other dimensions of the symptom experience (duration, intensity, and quality), impact both functional and cognitive performance. Psychosocial adjustment reflects an individual’s performance with roles within seven domains: vocational, domestic, social, leisure, family relationships, healthcare, and psychological distress (Derogatis, 1986). Thus, symptom distress potentially has a broad reach into each of these domains because it impacts one’s ability to function.

Lastly, characteristics of individuals, who are vulnerable for poor adjustment during the post-radiation treatment transition, can be gleaned from the bivariate analyses.
Poorer adjustment was correlated with greater threat appraisal, greater harm/loss appraisal, greater uncertainty, and higher symptom distress. Better psychosocial adjustment was associated with greater challenge appraisal, greater benign/irrelevant appraisal, greater social support, and greater self-efficacy for coping. Older age was associated with better psychosocial adjustment, although the statistical association was weak. This finding was consistent with the literature. Young age predicted greater psychological distress in breast cancer survivors during cancer treatment and three weeks and three months later (Costanzo et al., 2007). This may be due to the multiple psychosocial demands that are not related to cancer or cancer treatment that younger individuals may be juggling. These may include work-related responsibilities, child and/or elder care responsibilities, financial concerns, and social activities.

Role of Social Support and Self Efficacy for Coping

Surprisingly, neither social support nor self-efficacy for coping moderated the relationship between cognitive appraisal of health and psychosocial adjustment. The trend toward moderation by self-efficacy for coping on the relationship between harm/loss appraisal and psychosocial adjustment should be reevaluated in future studies. Although there is evidence in the literature for a moderating role of social support (Lewis et al., 2001) and self-efficacy (Carlosson et al., 2004), the result in the current study suggests that these variables may influence psychosocial adjustment along other pathways. It is likely that self-efficacy for coping exerts a direct effect on psychosocial adjustment as research studies have shown that self-efficacy for self-care influences and predicts health-related quality of life in patients with cancer (Eton, Lepore, & Helgeson, 2001; Lev, Paul, & Owen, 1999). In this study, self-efficacy for coping did emerge in the
backward statistical regression as a significant predictor of psychosocial adjustment, along with symptom distress and benign/irrelevant appraisal. Social support has also been shown to have a direct effect on psychosocial adjustment (Northouse, 1988); however, the backward statistical regression did not identify it as a significant predictor in this study.

Summary

The findings indicate that most patients in this study were doing fairly well during the post-radiation treatment transition when compared to other cancer patients. However, it is important to recognize that not all patients were adjusting well and that potential vulnerability for poor adjustment was associated with young age and high amounts of threat appraisal, harm/loss appraisal, uncertainty, and symptom distress. Furthermore, it is possible that the adjustment scores for this sample may be much worse than those found in a sample with less threatening diseases, such as diabetes or heart disease.

The hypothesized relationship between cognitive appraisal and adjustment was not confirmed, as symptom distress was identified as the only significant explanatory variable. Further analyses identified both psychological symptom distress and self-efficacy for coping as predictors of adjustment during the post-radiation treatment transition. Lastly, the moderating roles of social support and self-efficacy for coping on the relationship between cognitive appraisal and psychosocial adjustment were also not verified, suggesting that these variables influence adjustment along other pathways.

Implications for Nursing Practice

Oncology nurses, with their expertise in patient education, symptom management, and supportive counseling, play a key role in preparing patients for and guiding them
through the post-radiation treatment transition. This study has several implications for nursing practice particularly related to the screening, assessment, and education of patients during the transition.

Although many of the patients in this study were adjusting well during the post-radiation treatment transition when compared to other patients with cancer, it is important for nurses to recognize that certain patients may be more vulnerable during this time. Individuals at risk for poor adjustment include those who are younger; have high levels of uncertainty, symptom distress, threat appraisal, and harm/loss appraisal; and low levels of social support and self-efficacy for coping. Consequently, there is a need to screen patients by exploring their feelings, concerns and views related to their illness and completion of treatment. An open-ended question, such as “How do you think you are doing now that your treatment is ending?” may provide clues to the individual’s appraisal of the illness and level of uncertainty. Listening to a patient’s concerns and fears and providing appropriate education and support may help the patient to diminish uncertainty and reframe his or her appraisal.

Of critical importance is the need for a comprehensive assessment throughout treatment of the patient’s symptom distress, broadening the assessment beyond the expected radiation-induced side effects. Recognition that patients have significant symptom distress related to other conditions than cancer and active management of the problem to reduce the distress are essential to promoting psychosocial adjustment after radiation therapy. The MSAS is a simple tool that can be used to assess symptom distress at the beginning of radiation therapy, mid-treatment, and during the follow-up phase.
The finding in this study that psychological symptom distress during radiation therapy predicts psychological adjustment one month post-treatment, suggests that screening of all patients for psychological symptom distress is essential. Screening for psychological symptom distress should occur at the initial consultation and at mid-treatment, so that supportive counseling can be offered and referrals to mental health professionals can occur prior to the end of radiation therapy. Several options can be used to systematically screen patients for psychological distress. First, the psychological subscale of the MSAS can be used to identify patients. Second, a simple screening tool, such as the Distress Thermometer, may be a feasible method for identifying patients needing help during treatment and the early-post-treatment survivorship phase (Holland & Reznik, 2005). A third approach is to use a more in-depth assessment tool such as the Profile of Mood States (McNair, Lorr, & Droppleman, 1971).

The findings in this study also support the assessment of psychosocial adjustment during the post-radiation period. Of the 18 subjects in the top quartile of adjustment scores, 10 had total scores greater than 400 placing them in the 85th percentile when compared to the normative group. These subjects were not adjusting well after treatment and would likely benefit from psychosocial interventions. Use of a screening tool, such as the PAIS-SR, would provide comprehensive information of the seven domains of psychosocial adjustment and allow for comparison of the individual to a normative group. A more focused assessment of extended family relationships and sexual relationships using more in-depth tools is recommended based on the results of this study.

Education of the patient who is undergoing radiation therapy should be broadened to include preparation of the patient and family for the physical, social, and
emotional tasks of the transition and should be integrated into the patient’s weekly visit with the healthcare team. Education to dispel common myths of the end-of-treatment transition, as described by Stanton and colleagues (2005), should acknowledge that it is a time of mixed emotions, that recovery is not instantaneous, that patients often feel a new sense of normalcy in their lives, and that it is not unusual to need support after treatment. Given the prevalence of worry as a distressing symptom in 50 percent of this sample, nurses should discuss concerns with patients and instruct patients in relaxation techniques or stress management if appropriate. Coaching the patient through the transition can increase self-efficacy for coping and lower symptom distress, resulting in better psychosocial adjustment. Nurse coaching activities include techniques such as providing information, collaborative symptom management, modeling of effective communication behaviors, goal-setting, supportive counseling, verbal persuasion to self-manage treatment side effects, and positive reinforcement.

Recommendations for Future Studies

To better describe the dynamic nature of psychosocial adjustment, future studies should use a methodology and analysis that is based in complexity theory, exploring the individual’s response from multiple perspectives. This approach would acknowledge three essential features of complexity theory: (a) self-organization or pattern within the complex adaptive system, (b) co-evolution or dynamic linear and non-linear relationships that improve adaptation of the system, and (c) emergence or the evolution of an outcome or pattern (Gaddis, 2002; Burton, 2002). A mixed method design would analyze from two diverse perspectives the multi-level and multi-directional relationships among cognitive appraisal, uncertainty, symptom distress, social support, self-efficacy and psychosocial
adjustment. Unique patterns in psychosocial adjustment would be better assessed with a longitudinal approach encompassing the early phase of treatment, through the transition and into the year following treatment. The multiple relationships among the variables should be identified using path analysis, followed by creation of a causal model and testing using structural equation modeling. More advanced statistical methods should be used to evaluate feedback loops within the model.

Descriptive studies are needed to examine the post-radiation treatment transition in populations other than patients with breast cancer or prostate cancer. The concept of transition should be expanded to include the post-chemotherapy period. The family’s experience of the post-cancer treatment transition should also be explored to identify needs, concerns, and misconceptions.

In this study, symptom distress played a major role in predicting psychosocial adjustment, despite little variability in distress scores due to the homogeneous sample. It is possible that the true nature of this relationship was underestimated and that an even stronger relationship between symptom distress and adjustment may be found in a more diverse sample. Future studies might further confirm this relationship between symptom distress and psychosocial adjustment by using a more heterogeneous sample in terms of diagnoses, cancer stage, and treatments. Consideration should also be given to use of another symptom distress tool to verify this relationship.

Interventional studies should be targeted towards reducing psychological distress and enhancing self-efficacy for coping prior to the post-radiation treatment transition. Testing the feasibility of integrating a screening tool for symptom distress into clinical
practice is an essential step in identifying vulnerable patients for interventions designed
to match the intensity of the patient’s distress.

Lastly, the characteristics of dropouts in this study were a proxy for low
socioeconomic status and represent a vulnerable population, whose problems are
compounded within the context of illness. It is likely that this group may have had the
most difficulty with psychosocial adjustment during the post-radiation treatment
transition as lower socioeconomic status has been associated with poorer quality of life in
long-term survivors (Ferrell, Dow, Leigh, Ly, & Gulasekaram, 1995) and more
specifically in breast cancer survivors (Ashing-Giwa, Ganz, & Peterson1999) and
prostate cancer survivors (Penedo, Dahn, Shen, Schneiderman, & Antoni, 2006). Future
studies might explore participation of patients with low socioeconomic status in
psychosocial research studies, with attention to perceptions of research, barriers to
participation, and communication patterns within the research clinical encounter.

Limitations

The use of a convenience sample was a threat to external validity and limits
generalizability of results to the subjects in this sample. Also, the limited number of
subjects with lung cancer makes it difficult to draw conclusions about psychosocial
adjustment for that particular group. The differential loss of subjects and significant
differences noted between the dropouts and those subjects who remained in the study is a
threat to internal validity.

Several limitations of this study are related to the instruments. First, although the
PAIS-SR offered a comprehensive assessment of psychosocial adjustment, 42% of the
subjects had missing data and subjects with missing data on the PAIS-SR had
significantly less symptom distress than those who did not have missing data. This pattern impacts internal validity of the study. Another issue with the PAIS-SR was the limited information about the referent group, making it difficult to assess its relevance to the sample in this study. The referent group consisted of 114 patients with mixed cancer diagnoses (excluded prostate cancer) and was characterized as being mostly female and almost entirely Caucasian, with 50-60% of the subjects having metastasis (Derogatis & Derogatis, 1990). It is unknown if the subjects were undergoing treatment at the time when the PAIS was administered. This mismatch between the referent group and the sample in this study limits the accuracy of the area $t$-scores for the PAIS-SR subscales.

Second, items on the CAHS were too abstract for patients with low health literacy and challenging for most subjects as the first tool administered. Future studies might explore randomization of the order in which the tools are administered.

Third, the CCI was not sensitive to the less severe comorbid conditions in this sample, resulting in a low mean score, little variability, a skewed distribution, and a correlation with adjustment that was not intuitive. The observed power for the correlation was low, resulting in a 45% chance of a Type II error. A larger sample size is needed to confirm the relationship between adjustment and comorbidity.

Lastly, the threat of history reduced internal validity in two ways. First, data collection occurred during a sharp economic decline in the country that impacted the financial markets. Several male subjects commented that their distress was related more to their financial and business issues rather than their health issues. Second, treatments at the community radiation facility were suspended for several months for replacement of the treatment machine. This required several subjects to transfer their treatments to the
medical center facility and was a potential source of added stress as they encountered a new environment and routine. The measurement of psychological distress may have been confounded by the patients’ experiences in both of these situations.

Conclusion

This study contributes to the description of patients’ experiences after radiation therapy and our understanding of the role of cognitive appraisal in psychosocial adjustment. Results from this study also provide insight into predictors of psychosocial adjustment during the post-radiation treatment transition, which will aid the development of assessment and intervention tools. Strengths of this study include the use of comprehensive, psychometrically-sound instruments to measure complex phenomena and a correlational design with a longitudinal, rather than cross sectional, approach to determine a predictive relationship between the independent and dependent variables.

The study was based on an established theoretical framework, Lazarus and Folkman’s theory of stress, appraisal and coping. The low refusal rate for participation in the study, adequate power, and the diverse sample are additional strengths.

Although the results of this study indicate that the post-radiation treatment transition is not a vulnerable period for most patients, there is a subgroup of patients that may be at high risk for a difficult transition. Young age and high amounts of threat appraisal, harm/loss appraisal, uncertainty, and symptom distress are characteristics associated with poor psychosocial adjustment during the immediate post-radiation therapy period. Furthermore, symptom distress, rather than cognitive appraisal of health, holds a pivotal role in predicting psychosocial adjustment. The radiation oncology nurse
may facilitate adjustment during the transition by routine comprehensive assessment of symptom distress and early intervention to reduce physical and psychological symptoms.
Bibliography


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*Psychosomatic Medicine, 55*, 234-247.


